UNITED STATES BUREAU OF EDUCATION
BULLETIN, 1914, NO. 12 - - - - - - - WHOLE NUMBER 585

RURAL SCHOOLHOUSES AND GROUNDS

By FLETCHER B. DRESSLAR
PEABODY COLLEGE FOR TEACHERS
NASHVILLE, TENN.

WASHINGTON
GOVERNMENT PRINTING OFFICE
1914

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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, June 20, 1914.

SIR: Among the greatest needs of the rural schools of the United States is that of better houses. Most of the older houses are cheap, ugly, uncomfortable, insanitary, badly ventilated, poorly heated and lighted, with no conveniences for school work, and with inadequate and filthy toilets and privies, or with none. In many places abandoned churches and cabins no longer fit for use as homes are given over to the schools, somewhat as outgrown, outworn, and cast-off clothing is given to paupers.

Since the beginning of the recent revival of interest in rural schools millions of dollars have been expended annually for country schoolhouses, and expenditures for this purpose have grown larger from year to year. Some of the newer buildings are large and relatively costly, but many, probably most, of them are built with little or no reference to architectural appearance, to the local needs, or to the principles of sanitation and the health requirements of growing children.

Schoolhouses are not only the temples which we erect to the god of childhood; they are also the homes of our children for a large part of the day through the most plastic years of their lives, the years in which they are most responsive to impressions of beauty or of ugliness, and when their environment is, therefore, most important. These houses should, therefore, be planned and built not only with the feeling of reverence with which all temples and other sacred buildings are erected, but also with that care for health, comfort, and convenience which we exercise in the building of our homes. It is economic waste of the worst type to spend annually hundreds of millions of dollars in money for schools and hundreds of millions more in the time of children and then fail of the best results because of bad construction and poor equipment of schoohouses. It is worse than economic waste to destroy the health and lives of children through failure to observe simple and well-known sanitary laws. The places to which children come to gain preparation and strength for life and its duties should not prove to be hotbeds for the seeds of disease and death. The school improvement leagues of the Southern

States have taken for their motto—"For our schools: Health, Comfort, and Beauty." This might well become the motto for all who have to do with the planning and building of schoolhouses.

Within the last twenty-five years there has been a remarkable improvement in the school buildings of cities and large towns and in the buildings for county and township high schools. Many of these now approach the ideal. A bulletin of this bureau, *American Schoolhouses*, issued in 1910, has had a wide circulation and has proved very helpful to school boards and architects. The eagerness with which it was received, and the continued requests which come to this office for it, indicate both the need and demand for it. There has been an even greater need for similar help for school officials and others responsible for the building of schoolhouses of one, two, three, or four rooms in rural communities. To give this help the manuscript transmitted herewith has been prepared by Dr. Fletcher B. Dresslar, special agent of the Bureau of Education and professor in the George Peabody College for Teachers, Nashville, Tenn., with the cooperation of the joint committee of the National Council of Education and the American Medical Association on health problems in education, which committee accepted the material of this manuscript and submitted it as its report to the National Education Association at its meeting in Salt Lake City on July 7, 1913. The manuscript is the result of careful and prolonged study of rural school architecture with constant reference to economy and the highest degree of utility. I recommend that it be published as a bulletin of the Bureau of Education.

Respectfully submitted.

P. P. CLAXTON,
Commissioner.

The SECRETARY OF THE INTERIOR.

INTRODUCTION.

[Report on Health Problems by a Joint Committee of the National Council of Education and the American Medical Association.]

In 1911 the National Council of Education appointed a committee on health problems in education. From the time of its appointment this committee has worked in cooperation with a special committee of the American Medical Association, and the fund available for the work of these health committees has consisted of small appropriations from the National Education Association and an equal amount appropriated each year by the American Medical Association.

At the meeting of the department of superintendence of the National Education Association, held in St. Louis in February, 1912, a general report on health problems in the schools of the United States was presented and discussed.

At the meeting of the National Education Association in Chicago, July, 1912, the topic "Sanitation of Rural Schools" was selected for the two committees mentioned for their special study.

During the spring of 1913 a field secretary, employed by the two committees acting as a joint committee, made a careful statistical and photographic survey of about 100 rural schools in four Eastern States. This information has been placed at the disposal of Dr. F. B. Dresslar, to be used, in addition to the extensive body of material which he has gathered, in the preparation of a special bulletin on country schoolhouses.

The following general propositions have been approved by the joint committee of the National Council of Education and of the American Medical Association:

It is the conviction of the joint committee that there is no more important health problem in education than that which relates to the sanitation of the rural schools.

The one-room country school is the oldest and most primitive type of school in this country.

More than half the school children of the United States are educated in rural schools.

The country-school child needs a healthful environment quite as much as the city child.

In general, good architecture and good sanitation have been much more carefully studied and much more frequently secured in the school of the city than in the school of the country, but the sanitation of the rural school is in every respect as important as the sanitation of the city school.

The problems are at bottom identical. Both the city child and the country child need fresh air and good light and clean, wholesome, and attractive surroundings; but the methods of securing these educational essentials are somewhat different in city and country.

A schoolhouse without an adequate playground is an educational deformity and a gross injustice to childhood.

Neglect of anything essential for health in construction, materials, arrangement, and equipment of the country-school building is an educational sin of omission, if not a social and civic crime.

The expense of the things which really affect the health of the pupil in school should be estimated in terms of child life, child health, and human efficiency, and only for convenience be reduced to dollars and cents.

The following features are considered most important for satisfactory sanitation of the rural school:

I. Good air.

(*a*) Supplied abundantly from outdoors in all weather.

(*b*) Not warmer than 68° F. in cold weather.

(*c*) Heated (but not overheated) and kept in moderate motion by the operation of a jacketed stove or a properly arranged furnace heater.

Outdoor air is the most valuable tonic known to man, and acts constantly not only through the lungs, but as a continuous air bath affecting the entire surface of the body. Ventilation is therefore the most important feature in the sanitation of the school. A vitiated atmosphere lowers the vitality, increases the susceptibility to and the severity of disease, and decreases the physical working power of the individual. Although it does not produce sudden death, it inevitably shortens life.

II. Cleanliness.—Cleanliness not only exerts a powerful influence upon physical health, but also produces important effects almost directly upon minds and morals.

III. Water, pure and abundant.

(*a*) Water should be as free, as health-giving, and as available as the air.

(*b*) A sanitary drinking fountain should be furnished in every rural school.

IV. Disposal of sewage.—Provisions for toilet accommodations and sewage disposal in every rural school should satisfy all essential sanitary requirements.

V. Lighting.

(*a*) Light should be abundant and effectively controlled.

(*b*) Windows should be located at left or at left and rear of the schoolroom; they should extend to the ceiling and provide a lighting area equal to one-fifth to one-fourth of the floor area.

(*c*) Light should be controlled by double shades.

(*d*) Direct sunlight should have access, if possible, to every schoolroom some time during the day.

VI. Hygienic furniture, books, and materials.

(*a*) Desks and seats, whether fixed or movable, should be individual, separate, adjustable, clean.

(*b*) Books and other materials should not only be sanitary, but should be attractive enough to stimulate a wholesome response from the pupils.

VII. Screening against insects.—Mosquitoes may convey germs of malaria and yellow fever. Flies may convey germs of typhoid, tuberculosis, infantile paralysis, and perhaps other diseases. Fleas may convey bubonic plague. Ticks may convey Rocky Mountain fever. Every schoolhouse and privy should be effectively screened against mosquitoes and flies.

VIII. Location, site, surroundings, and grounds.

(*a*) With reasonable regard for the geographic center of the community, the rural school should be located on a site that is (1) well drained and away from stagnant water; (2) free from troublesome noise, unpleasant outlooks, or air contamination; (3) protected, so far as possible, from unfavorable weather conditions.

(*b*) School grounds should provide sufficient space for play and games.

IX. Cooperative work.—Sanitation of the rural school requires not only a healthful building and well-kept grounds, but intelligent and conscientious cooperation on the part of teacher and pupils for the preservation and improvement, where possible, of all the health values in the school and the school surroundings.

X. Social and moral welfare.—The arrangements and equipment of the rural school should not only conserve in every vital way physical health, but should also favor in all fundamental particulars the social and moral welfare of all the pupils. The rural school is the most effective agency for influencing all standards of country life.

The following are some of the reasons for the present deplorable conditions in rural schoolhouses:

(*a*) Low architectural and sanitary standards in rural regions generally throughout the country.

(*b*) Ignorance regarding the physical and moral effects of unattractive and insanitary school buildings upon the children and upon the community as a whole.

(*c*) False economy expressed by local school boards in failure to vote enough money to build and maintain suitable school plants.

(*d*) Lack of State supervision or assistance, which is usually necessary to maintain desirable standards.

Some important influences that are effective for obtaining and preserving the sanitary and other valuable features of rural schools are suggested:

(*a*) Assistance of the United States Bureau of Education and of the State departments of education in furnishing plans and instructions for construction and equipment of rural school buildings. The Bureau of Education in Washington is already supplying on request help of this kind, and a few State departments are demonstrating what may be done by supervision and support which aids without restricting.

(*b*) Supervision of rural schools by State departments of education with power (1) to condemn insanitary and wholly unsuitable buildings; (2) to give State aid to rural schools when the local authorities fulfill certain desirable and reasonable conditions.

(*c*) Inculcation of high standards of school sanitation in the minds of both local school patrons and of school authorities who control school funds and who administer the affairs of the schools. Public lectures in the schoolhouses on health topics.

(*d*) Introduction of effective school health courses in normal schools and teachers' institutes. Better education of rural school teachers, county superintendents, and rural school supervisors in the principles and practice of school hygiene and sanitation.

(*e*) Arousing the enthusiasm of rural school pupils for the improvement and care of everything in the school and its surroundings that affects health and happiness. Development among pupils of organizations such as "Pupils' boards of health," "Civic leagues," and "Health militias," for actual constructive effort.

(*f*) Cooperation with the rural school of organizations like the granges, women's clubs, county medical societies, and other groups so situated that they may further the cause of health and efficiency in the school.

(*g*) Popular education by attractive and reliable health information in the public press.

(*h*) Introduction of social demonstration of sanitary school standards and improvements by voluntary or paid demonstrators.

The two health committees acting as a joint committee express their appreciation of the valued counsel and cooperation of the United States Bureau of Education.

This bulletin has been approved and adopted by the joint committee as its general report on "The Sanitation of Rural Schools."

Committee on Health Problems in Education of the National Council of Education.

THOMAS D. WOOD, *Chairman,*
Columbia University, New York.

WILLIAM H. BURNHAM,
Clark University, Worcester, Mass.

P. P. CLAXTON,
U. S. Commissioner of Education, Washington, D. C.

F. B. DRESSLAR,
Peabody College, Nashville, Tenn.

CLARK W. HETHERINGTON,
1115 East 54th Place, Chicago, Ill.

DAVID STARR JORDAN,
Leland Stanford, jr., University, Palo Alto, Cal.

JOHN F. KEATING,
Supt. Public Schools, Pueblo, Colo.

CHARLES H. KEYES,
Skidmore School of Arts, Saratoga Springs, N. Y.

JACOB SHAWAN,
Superintendent of Schools, Columbus, Ohio.

ALBERT E. WINSHIP,
New England Journal of Education, Boston, Mass.

Committee on Health Problems of the American Medical Association.

Council on Health and Public Instruction.

H. B. FAVILL, *Chairman,*
Chicago, Ill.

FREDERICK R. GREEN, *Secretary,*
Chicago, Ill.

Special Committee on Health Problems.

R. W. CORWIN, *Chairman,*
Minnequa Hospital, Pueblo, Colo.

JOHN M. DODSON,
Rush Medical College, Chicago, Ill.

M. J. ROSENAU,
Harvard University, Cambridge, Mass.

RURAL SCHOOLHOUSES AND GROUNDS.

By FLETCHER B. DRESSLAR.

Chapter I.

SOME CONDITIONS AND OPPORTUNITIES IN RURAL LIFE.

The main purpose of this bulletin is to offer suggestions with reference to the construction of rural school buildings, especially from the sanitary and educational point of view. Before discussing the main topic, however, it is desirable to consider briefly the rural school as it should relate itself to the community, for the nature of this relation will have definite bearings on the size of the grounds, the construction of buildings, and their general utility.

Rural life in the United States is in many respects different from that of any other country and especially that of continental Europe. There is probably more isolation in farm life in this country than in any other progressive country of the world, unless it be in parts of the Canadian northwest. The European farmer lives, as a rule, in a village and goes to and from his farm daily. The village church, the public garden, and the public halls give him opportunities for society and fellowship during his leisure hours. Cooperation, companionship, and social solidarity bring satisfaction and contentment. Such opportunities are not to be had in many of our rural communities at any cost.

The houses of most American farmers have not resulted from careful planning, either with reference to beauty or convenience, and least of all with due regard to the joys of life. They were built to meet temporary needs. Habit has fastened upon our rural communities such types as were thus developed, and these types persist long after the financial ability to build better and more beautiful homes has been acquired. It is not more expensive houses that are needed, but more intelligently planned homes, those which will contribute greater joy, comfort, and healthfulness to the family. Many farmers have made the blunder of building expensive houses with little thought and less planning for the essentials of beauty, comfort, convenience,

and pleasure. One farmer of this type, after saving and adding to his original farm until he owned 800 acres of very valuable land, recently built a big house. The house has no bath rooms, no central heating plant, no labor-saving methods of lighting, no water supply, no kitchen conveniences, no sleeping porches, no sanitary toilets, no laundry. Is it any wonder that his sons have gone to town to work in a shop or that his only daughter has preferred the life of a stenographer? A library was not thought of; opportunities for games and recreation never entered into consideration; and yet the amount of money expended in the construction of this house would have purchased these things and a more beautiful and usable house as well.

Many country people have failed to grow away from unhygienic practices about the home simply because there were no near neighbors to object to unwholesome conditions. Conditions wholly permissible, and even good, in a sparse settlement may become highly undesirable with the presence of greater numbers. The fact that there are few neighbors to view his back yard has kept many a farmer oblivious to the educational and moral significance of cleanly surroundings.

Here is a whole series of problems to which the country schools should address themselves. It will be a better sort of education for the children to use part of their time in considering how the farm home may be made more attractive, satisfying, and sanitary, than to use all their time on subjects which touch their life only incidentally.

On the other hand, farm life in our country has many elements of strength in it, and upon these elements we must build. In general it is a healthful life. Fresh air, hard work, with rest days scattered all through the year, plenty of food, and direct contact with nature have produced strong bodies possessing great resistance. The evil habits of dissipation have not fastened themselves upon country people as a class; and, despite many insanitary conditions, the death rate in the country districts is probably lower for all contagious diseases save four (typhoid fever, hookworm disease, influenza, and whooping cough) than in the cities. Vigorous health is the most effective weapon with which to fight against disease.

The claim has been made that the highest type of character can not develop in the country; that the stress and strain of city life are needed to purify, refine, and spiritualize. Be this as it may, it is certainly true that the foundation upon which the highest types of human character can be developed requires the training and development incident to life in the country. No foundation for learning and character is safely builded if it does not include in its elements that first-hand knowledge of nature and things, that many-sided training in practical affairs, and that all-round physical development which

country life emphasizes in such a positive and natural way. Most of the men and women who have enriched our national life and whose memories we revere have had just such early training and development as our country life afforded. On this basis of insight and initiative they were able to enter into the life of a city and utilize its special opportunities, and yet abstain from its degrading influences.

It would be false, however, to attempt to picture country life as free from all difficulties and discomforts, or to imagine that the only thing necessary to get the most out of life is to go to farming. The best of all things have never been brought together at any one spot nor included in any one calling. Many things which the city has are vastly superior to anything of like kind in the country; but it is just this need for bettering conditions that should stir all who are really seeking to reveal to our rural communities the possibilities of country life. Country life must be made more enticing, more beautiful, and more joyous.

The field of service of the country school must include the general needs and longings of country people. The rural schools must set themselves to the task of creating a more satisfying educational fellowship in country communities. They must bring people together for the sake of comradeship and for the sake of community interests. They must teach the economic, social, hygienic, and religious importance of civic unity and civic righteousness. They must make it plain to all the people that this is an age of cooperation and that we can not live unto ourselves without limiting our own happiness and endangering the success of others.

The public school is the only institution in which all are interested and through which all may cooperate. The schoolhouse door must swing open freely for all who would work for the public good, and the schoolhouse must be so constructed as to invite to its shelter all who seek for a larger vision in anything and everything that may contribute to the community welfare. Above the door of every rural schoolhouse in this land some such legend as the following should be inscribed and through the work of patrons and teacher its sentiment be woven into the fiber of the people: *This building is dedicated to the service of this community and to the common cause of a better life for all.*

Chapter II.

RELATION OF THE COUNTRY-SCHOOL PROGRAM TO THE COUNTRY-SCHOOL EQUIPMENT.

It is clear from even the brief analysis of country conditions in the preceding chapter that the rural school has before it a larger and more purposeful program than it is now undertaking. There are opportunities for a new and difficult service, and these must be seized and utilized effectively if the country school is to measure up to the needs and demands of a prosperous and satisfying country life. What, then, are the requisites for the realization of this preparation for worthy service?

THE TEACHER.

1. Teachers for rural schools should be better and more specifically prepared for their work. A sad mistake is made both by the State and the community when the intellectual and moral guidance of the children is intrusted to those who themselves have gone little further along the paths of learning than the more advanced pupils whom they are called to instruct. A teacher whose knowledge of the facts and processes of learning is meager and sterile can not bring to any community, especially to a rural community, that lively interest and enthusiasm which will thoroughly commend her work. Before the rural school can reach its highest usefulness the standard of scholarship demanded by the State for teachers of such schools must be raised so that they will have at least a wider and more critical knowledge of the common branches of learning. But there are other important considerations in the preparation of a rural-school teacher. He or she must know more about country life and country work. A girl brought up in a city, educated in a city, and adjusted to city life, has no real understanding of the problems of a country school. The general custom of making rural schools in effect training schools for those who aspire to teaching as a profession is most unfortunate. The normal schools of the country are partly to blame for this condition. Very few of them attempt to address themselves to the specific task of thoroughly preparing teachers to meet in a large way the responsibilities of the work of teaching in a rural school. Of late many normal schools, instead of wisely deciding to limit their endeavors to the preparation of elementary teachers, are dividing

their energies, mixing up their curricula, and spreading their work over such varied fields that nothing intensive and specifically vital is done. In general, normal schools should not undertake to train teachers for both secondary and elementary schools. They should devote their time either to high-school work or to elementary-school work, exclusively. Some normal schools in every State ought to give their time and efforts strictly to the training of rural-school teachers, and their whole curriculum should be centered about the needs and opportunities in rural schools; others should devote their time to the training of teachers for city schools; and still others, if there exists no better agency for this purpose, should dedicate their energies to the work of training teachers for secondary schools.

It has been said that one brought up in a city and thoroughly adjusted to city life has no real understanding of the problems of a country school. On the other hand, when such persons have specific training for country-school work and are possessed of ability to make the most of their environments, they are often more efficient than those born and reared in the country. The latter are habituated to the routine of country life, and they are often thereby prevented from seeing things from a different point of view. City experience and the educational and social refinements generally associated with it will be of very great service if, in addition, life in the country is thoroughly understood and its spirit appreciated.

The purpose here, however, is not to outline in detail all that a country-school teacher should know about country life, but merely to call attention to those phases of her preparation that have a bearing on the sort of schoolhouse and grounds that must be furnished for her.

The rural school teacher should have a liberal knowledge of the science and art of agriculture, for this is the paramount economic interest in the country. A thorough and practical knowledge of agriculture will help a teacher who has any power of imagination to see things not as they are, but as they should be. Whenever a country-school teacher says, "This community is so backward and so set in its ways that I can do nothing" she shows that she is not liberally educated in the best sense of the term. The chief trouble with the teaching of agriculture in our country schools is that the teachers know next to nothing about the real thing. They may have a smattering of book knowledge, but if they have no power to apply it to the conditions in their community their knowledge will count for naught. There are teachers who can talk volubly of the growing of corn, but who would be unable to select the best ear from a bushel, or to test, in any conclusive way, its germinating power. There are teachers who can expatiate on the value of leguminous plants but who could not, in the open, distinguish alfalfa from ragweed.

On the assumption that it is possible to get teachers who do know, how can they successfully teach agriculture in a country school with no ground to prepare or to cultivate? The average country-school lot is not one-tenth large enough, and even school lots that are large enough are generally ill-adapted to agriculture. A few teachers have had sufficient imagination and initiative to rent or borrow a plat of land adjoining the schoolhouse and to do some real farming and teaching thereon.

Three acres of arable land connected with a rural school could be made to pay a good profit, not only as a laboratory for teaching purposes but in actual money returns. The reader is possibly saying to himself: "This is all theory, for crops must be made during vacation, and then the teacher is gone and there is no one to look after them." But suppose the teacher has impressed the people with the fact that she knows, and is there for a real purpose besides drawing her salary? She will then spend part of the winter months determining what is best to do with that plat of ground; what will give the best educational and financial returns to the community; what preparation the soil will need; and what seeds are to be selected and tested. Suppose she thus plans during the winter the work and cultivation to be carried on during the vacation, makes out a definite program, and then appeals to the larger boys and girls and also to the men and women of her community to volunteer to carry out the work as directed? Here is a chance for a new kind of "Corn club;" a chance to work for the common good and not simply for one's self; both kinds of club are needed. Here is a chance also for a community "Tomato club" to be undertaken for the benefit of the school and with resultant benefit to the individual. Each of these cooperative efforts could and would bring social contacts and social pleasures of the kind the country needs.

There is a rural school "farm" in North Carolina where a plan very similar to the one here suggested has been of such influence on the neighborhood that young women who had never before thought of working in the field entered into this sort of community labor with great zest and with a sense of new-found joy.

"What will you do with the money from school crops?" Devote it to the interest of the school. Buy baseballs, tennis rackets, and tennis balls; paint the schoolhouse; build sanitary toilets; build a neighborhood clubhouse; buy a piano or an organ for the school; buy books for the whole community to use; equip manual-training and domestic-science rooms; lengthen the school term; increase the teacher's salary.

All this has been said mainly for the purpose of reenforcing the appeal for larger and better grounds for rural schools from the point of view of social service and of the actual needs of community teach-

ing. There are other reasons why school grounds should be larger; these will appear in the chapter on the location of country schoolhouses. It is enough to indicate here that even if we had teachers specifically prepared to do what the country schools need, neither the grounds nor the buildings are adequate. A new and broader purpose for country schools demands a new sort of equipment in grounds and buildings, and it is hoped that this bulletin may suggest at least some of the necessary changes.

THE CURRICULUM.

2. The fundamental tools or implements of education are comprised in a knowledge of reading, writing, and mathematics, and a good control of the mother tongue. All the rest may be acquired by use of these and by orderly observation. One who can not count and calculate with precision is unable to deal effectively with the results of his observation. One who can not read, write, and spell is debarred from entering into the heritage of his own literature—moral, scientific, religious, æsthetic, or philosophic.

Despite all the attacks on the country-school curriculum, the essential tools for educational progress are generally comprised in it. Note that these fundamentals are called tools. A tool always implies material upon which it may be used. A knife would be meaningless if there were nothing to cut. Arithmetic would be equally useless if there were nothing to count and no numerical relations to calculate. It would be a poor policy for a joiner to instruct his apprentice simply in the manipulation of saw, chisel, or square rather than to teach him the use of these tools through the cutting, shaping, and fitting of timbers designed to serve a real purpose in life. Every country schoolhouse should have a workshop where boys and girls can put to test their arithmetic and reading and drawing and all the other educational tools which they are supposed to learn to use.

Here is a problem that will teach more real arithmetic, or at least make this subject more actual and interesting, than all the puzzles found in the regulation textbooks: "What will it cost to build in this community the sort of a barn needed on a good farm of 100 acres, with 75 acres under cultivation?"

This is a practical problem for a country boy. Before answering it he will first have to make drawings and plans for the barn. These drawings and plans will represent, if he goes at the problem intelligently, all his knowledge and ideals of that part of farm life which must center in or about a barn. He will have to determine how many horses it would be best to keep, and how they should be housed. He will need to consider the number of cattle such a farm will need, and how best to care for them. Problems will arise in con-

nection with the amount of storage space needed for hay and grain and with the proper location of rooms. He will need to figure on shed room for wagons, and farm tools of all sorts, and to consider how these can be cared for with the least trouble and the greatest economy. He will be forced to give thought to the building location, to the water supply, to the care of the compost, and to all the included hygienic relations of the home. All this will require calculation of the most painstaking sort. But he has not yet begun to build. When his plans are matured he will need to figure out the amount of material needed and the cost in the local markets of this material. Here questions of local economics will come into prominence. The price of labor, skilled and unskilled, the expense of hauling—all of these will enter into the calculation. He will find before he has finished that he has in these and in a score of other ways been brought face to face with the whole problem of the farm and home life that centers about the barn.

A teacher who sets such a problem should know many things of practical importance to farm life not learned in the schoolbooks. She will be greatly aided in making such work interesting and helpful if she has gathered many suggestive plans and descriptions of farm barns and of the common conveniences which ordinary ingenuity may suggest and construct.

The arithmetic and other subjects involved in the solution of this problem might be extended to the planning and construction of a house. Here the girls will be more interested. The planning of a convenient, beautiful, and sanitary home is about the last thing thought of in our rural-school curriculum. But the farmhouse is one of the most important factors in country life. Here is the center of family life, for good or evil. Here conveniences, sanitation, and comfort pay the highest dividends. The farmhouse need not be large and expensive. It may be beautiful, sanitary, and convenient, oftentimes at less cost than otherwise. A log house can be made beautiful, sanitary, and convenient if those who plan know that beauty and health are fundamental, and that it is not necessarily expensive to meet these demands.

There should be a collection of suggestive plans for all grades of country houses in the libraries of country schools. These can be gathered from magazines, post cards, photographs, and drawings made directly from successful houses. They can be made intensely interesting to the larger boys and girls, and through them much of the theoretical work of the curriculum can find application.

All this suggests certain needs in school buildings. If there are no good places for drawing, for making plans, or for working up such plans into models, it is almost impossible for the teacher to follow the line of work suggested above. Therefore, when the appeal is made

for workrooms and libraries in this bulletin, the reader will understand that this is done in order to hasten the time when this larger program for country schools can be successfully undertaken. With a building planned to meet these suggestions, many other adjustments helpful to both teachers and children will be easily made.

THE TEACHER'S HOME AND FARM.

3. The time is coming when the people will learn that it pays to hire competent men as teachers of country schools and to furnish them homes on the school grounds. Then a real experimental school farm will be easily managed and all the needs of the community can be centered in a school curriculum. It would be easier to arrange for consecutive and constructive work when conditions are such that a country teacher can see the possibilities of a useful and prosperous life ahead. To allow the schoolhouse and school grounds to lie idle all summer and to depend on young and inexperienced teachers for the educational leadership of the community is poor economy. The one paramount need in most rural schools is a teacher with ideals and with the desire to focus the attention and interest of every man, woman, and child in the district on the work done in and about the schoolhouse.

Suppose there is a small school farm, a home for the teacher, and a building arranged to accommodate the intellectual and social needs of the community, what could a virile man in charge, employed for the year instead of for a few months, do under such conditions? He could make the farm pay half of his salary and at the same time make it the most effective teaching agency connected with the school. He could develop a community interest and pride in the school now sadly lacking in most country districts. He could be the social guide for all the young people, those out of school as well as those in school. If he were musical, and most certainly he ought to be, he could develop some sort of a neighborhood orchestra and chorus which would furnish an incentive and a means of entertainment for all religious and social gatherings.

The village schoolmaster of Germany has a house and garden on the school grounds. He settles there for a life's work and is, next to the priest or pastor, the most influential and useful man in the village. But he must have had a thorough training in all the things that will make for joy and happiness in that community. First, he must be a good musician. He must be able to play the violin and the pipe organ, and in addition he must be able to sing and conduct an orchestra and a chorus. This does not mean that he must be able to do these things in a mere passable fashion; he must be a skilled musician. During the many years of his special train-

ing as a teacher his musical studies are carried on in a most exacting way, and if he fails to develop good ability he will not receive an appointment as a village schoolmaster, even if all other requirements are met. What is the result? He has an orchestra made up of old and young people in school and out of it. He is the leader of the church choir and of congregational singing. His help is demanded wherever music is desired. It would be almost impossible to overestimate the influence his musical ability gives him with his people.

In the United States we can not move our isolated farmhouses into villages, and it is doubtful if the work of our country schools can be made as effective in this way as that of the village schools of Germany. But as long as we neglect to give the country people the uplifting and harmonizing influence of music, so long will it be more difficult to unite a community into a social and civic body. Music is preeminently a social art, and is most satisfying when enjoyed in common.

If we could have larger school grounds, a school farm, a home for the teacher, and an all-year-round social and educational center in the community, there would be fewer desertions from farm to city.

Chapter III.

HYGIENIC CONDITION OF TYPICAL RURAL SCHOOL-HOUSES AND GROUNDS.

In investigating the hygienic conditions of typical country schoolhouses in 18 States, the following method was used: With the cooperation of the State superintendents, two typical progressive counties in each State were selected. To the teachers of the rural schools in these counties the following personally addressed letter and list of questions were sent:

[LETTER TO RURAL SCHOOL TEACHERS.]

The United States Bureau of Education is very desirous of getting reliable information concerning the hygienic condition of typical country schools and asks your cooperation in the work. Two counties in your State have been designated by your State superintendent from which this material is to be gathered.

Please fill the inclosed question form as carefully as you can and return it in the envelope inclosed, which requires no postage. Get one or two of your larger boys or girls to help you to do the measuring and calculation required. They will enjoy it, and it will do them more good than an ordinary lesson in arithmetic. Make your answers as clear as you can, yet short. If you have a photograph of your building, or can get one, it would help us very much if you would send us a copy. The bureau is planning to publish a bulletin on country schoolhouses and is hunting for all the good features available. If you desire it, a copy of the bulletin will be sent to you when ready.

Please answer the questions fully, whether your conditions are good or bad. No individual answers will be published, and neither praise nor blame will appear charged to any persons or locality. We simply want the facts as they are, and we trust that you will help us immediately.

SURVEY OF THE HYGIENIC CONDITION OF RURAL SCHOOL, DISTRICT NO. ...., COUNTY OF ....., STATE .....

SURVEY MADE BY ....., *Teacher.*

School grounds: Length, ... feet; width, ... feet.
Size of playground, ... square feet; space for garden or agricultural work, ... square feet.
Ground: Level? .....; rough or hilly? .....; well drained? .....; trees? .....
Building: Wood? .....; brick? .....; cement? .....; stone? .....; new? .....; old? .....
Size of schoolroom: Length, ... feet; width, ... feet.
Light from one side? .....; two sides? .....; three sides? .....; four sides? .....
Toward what direction do the windows face? East? .....; west? .....; north? .....; south? .....
From what sides do your pupils get light? Left? .....; right? .....; rear? .....; front? .....
What is the total area of all the windows? ..... square feet.
Floors: Single thickness? .....; double? .....

Blackboard: Area, ... square feet; where placed? .....; height from floor? .... feet; of what material? .....
Are the desks single? .....; double? .....; adjustable? .....; sufficient in number?.....
Have you window shades? .....; what color? .....; do they run up from the bottom or down from the top? .....
What is the color of the schoolroom walls? .....
Have you cloakrooms? One? .....; two? .....; none? .....
Briefly describe any special means you employ to secure ventilation.....
Have you tested the eyesight of your pupils? .....; if so, by what method?.....
Have you tested their hearing? .....; if so, by what method? .....
What is your water supply? From well on school ground? .....; from spring? .....; how far distant? .....
Do you consider your water pure? .....; are you furnished drinking fountain? .....; individual cups? .....; or two cups for all? .....
How do you heat your schoolroom? Common stove? .....; jacketed stove? .....; where located? .....; do you burn wood or coal? .....
Do you have special janitor service? .....
Do you use dry sweeping? .....; sprinkle floor with water? .....; scatter damp sawdust on floor before sweeping? .....; use any prepared dust-gathering material? .....; are your floors oiled? .....; do you use a feather duster, or dust cloth, to keep the furniture clean? .....
Do you have a thermometer? .....; what temperature do you strive to maintain in your schoolroom? .....
At what hour do you begin school in the morning? .....; at what time do you dismiss for the day? .....; how much time do you give for recess in the morning? ..... in the afternoon? .....
Toilets: One? .....; two? .....; none? .....; are they protected against flies? .....; are they made with deep excavations? .....; no excavations? .....; septic tank disposal? .....; washout system? .....; how far are they from the well, if you have one? .....
Do you do any of your regular school work out of doors during pleasant weather? ....
Do you have medical inspection of your school children? ..... If so, how is it managed? .....
Has any provision been made in your county or township for the care of the teeth of school children? ..... If so, describe it. .....
Do you wish a copy of the bulletin on country schoolhouses when completed? .....

These questions were sent to the teachers, instead of to the county superintendents, for two reasons: First, the questions required more specific and definite facts than a county superintendent could ordinarily command; second, it was hoped that through these questions many suggestions would be lodged in the minds of the teachers and that thereby some good might be accomplished in addition to getting the facts.

In all, 3,300 letters and lists were sent out, and about 50 per cent of all these were filled out and returned. The results here presented were tabulated from 1,296 returns, typically representative of the 18 States. Naturally, some who replied did not answer all the questions; hence, the figures for the different topics vary slightly.

GROUNDS.

Out of 1,245 returns giving figures regarding the area of school grounds, 727, or more than 58 per cent, reported less than 1 acre, and nearly half of this number, or 321, had only ½ acre or less. Only 124 of all these schools were furnished with grounds equal to 2 acres or more. Clearly the movement to adapt rural schools to rural life will

amount to very little unless our rural schools are furnished more ground for their needs. It seems foolish to expect any sort of worthy teaching of agriculture to emerge from our district schools under the conditions shown.

With regard to the character of the ground as represented by the returns, it seems that of 1,283 rural schools of this group, 1,030 have comparatively level land, and that 253 are situated on hilly, rough land. About the same proportion of school grounds, or 1,014, are reported as well drained, and 234 are wet and undrained. There are one or more trees on the lots of 930 schools, while 3[illegible] schools report no trees at all. The returns do not show whether the trees reported are mainly natural forest trees or whether they have been planted—probably the former.

Measurements of the school grounds were taken in feet and have been reduced to acres in making the tabulation. The reason for asking for returns in feet was to forestall guessing as to the size of the school lots. It should be remembered also that the dimensions given include the ground upon which the building is situated, as well as that about the building.

THE BUILDINGS.

In order to get some composite notion of what a rural schoolhouse is at this date, the request called for returns on the material of which the buildings are made. Wooden buildings number 1,134, or 91 per cent; 110, or less than 9 per cent, are of brick; 37 are built of stone, and 7 of cement. Of the total number, 464 are listed as new buildings, and 805 are tabulated as old. More than 63 per cent of the buildings included in this survey are old, and a little less than 37 per cent are new. But the term "new building" does not in any sense of the word mean buildings constructed according to modern demands of school hygiene. The hatchet-and-saw carpenter of the country is generally unable to read architects' drawings or to follow specifications. Rural schoolhouses are, for the most part, attempts to copy some existing school in the township or county. Therefore, "new buildings" are generally very little better adapted to their purpose from many points of view than old ones. Especially is this true in the older sections of the country.

LIGHTING.

When we attempt to look on the inside of rural school buildings, the following significant facts come to light: Only 25 classrooms out of 1,244 received light from but one side; 880 from two sides, 346 from three sides, and 35 from four sides. In other words, about 2 per cent of the buildings under consideration received the light from

one side. The prevailing custom, representing over 70 per cent, is to have light from two sides. But this tells less than half the story of the lighting of the school rooms. Fourteen per cent have less than one-tenth as much glass area in the windows as floor surface within the room. A little over 46 per cent have an area of glass surface between one-sixth and one-tenth as great as the floor surface. Combining these, we are able to see that more than 60 per cent of all the rural schools included in this survey have an insufficient amount of glass surface to furnish proper lighting, even if the windows were properly placed in all particulars.

Under a separate heading, facts were gathered relative to the proper use of window shades, and, although the returns are not sufficient to justify a final decision, it is plain that in the great majority of schools the shades are badly placed and can not be easily adjusted to suit conditions. To sum up then, investigation of the lighting problem shows that windows are often wrongly placed; that insufficient glass surface is furnished; and that the best arrangement of window shades is not often found. It is probably not far from the truth to say that classrooms in rural schools receive only about one-half the light they should, and that even this light is improperly distributed.

FLOORS.

With reference to the floors of school buildings, the returns show that a little less than one-half (611) have single floors, and that the rest have some form of double floors. The importance of double floors for school buildings in any part of our country needs to be emphasized. Naturally, in cold climates double floors are more necessary; yet even in the South, during periods of sharp weather, children are likely to suffer from cold. It is almost impossible to equalize the heat in schoolrooms during cold weather if the floors are not practically air-tight. A warm room acts as a sort of exhaust to gather drafts of outside air from all directions, especially up through the floor, and therefore the temperature at the floor line, unless the floors are double and properly deadened, will almost invariably be several degrees lower than at the breathing line. This is one of the reasons why children and teachers complain when the thermometer goes as low as 65° at the breathing line. If the floors are properly protected and the heat of the building is properly distributed, it would be comparatively easy to reduce the temperature in most of the schoolrooms without objection, and to gain thereby from the point of health. Many of the rural schools reporting single floors are not only uncomfortable, but dangerous in cold weather, because of the drafts and the dust brought up in this way.

JANITOR SERVICE.

As to the methods of caring for the schoolhouse, especially the floor, out of 1,262 replies, only 213 teachers stated that there was any janitor service furnished. In other words, 1,049 teachers out of 1,262 are required not only to teach school in such houses, but also to keep their school buildings clean. As a result, the following methods of cleansing are used: 548 sprinkle the schoolroom floor with water before sweeping, 417 use dry sweeping, 227 use damp sawdust or other dust-absorbing materials, and only 199 have oiled floors. It seems unnecessary to discuss these facts at any length, but it appears that 965 schools, out of 1,391 that answered this question, must have dirty, dusty floors for a large part of the year, not to mention the dust on benches, desks, window sills, and all possible ledges throughout the room. It does seem almost inexcusable that a teacher should not at least be furnished sawdust by the use of which she may be able more easily to cleanse the floors and prevent the great clouds of dust that must necessarily arise from the sort of sweeping here indicated.

WATER SUPPLY.

The water supply for country schools is far from satisfactory. Of 1,258 schools reporting under this general heading, only 567 are supplied with a well or with running water on the school ground; 691 schools, or nearly two-thirds of all reporting, have to depend on springs and wells outside of school grounds; and 266 schools depend on carrying water from wells or springs located more than one-quarter mile from the schoolhouse. Obviously, under such conditions as these, the children are deprived not only of fresh water, but also of clean water. Where no janitor is furnished, the children or the teacher have to carry the water. It would be much more sanitary and acceptable for each child so handicapped to bring a bottle of water from his home for his own needs, and in a few places it has been necessary to resort to this method.

The receptacle for the water in the schoolroom is generally an open bucket, and approximately half of those reporting use a common drinking cup or dipper. Recently there has been a rapid growth in the use of individual drinking cups. This is due chiefly to the laws in many States making it mandatory to avoid common drinking vessels. In this connection, it needs to be said that individual drinking cups in rural schools are altogether inadvisable. They can not be kept in a sanitary condition, and despite all a teacher can do, they will be indiscriminately used. The only safe method is the bubbling fountain connected with a covered water can or jar, or, better still, with a pressure tank supply. These are found in only 5 of the schools reporting.

TOILET FACILITIES.

The toilet facilities of the rural schools are, generally speaking, not only a disgrace but a menace to public health and decent morals. Not over 1 per cent of rural schools are furnished with completely sanitary toilets. This is a liberal estimate. From the descriptions given in the returns, it has been comparatively easy to decide between those which are passably sanitary and those insanitary. The figures are these: Out of 1,276 replies examined, 50 schools have no toilets at all; 52 have only one; and the rest, or 1,174, have two. Nearly half (601) have no pit at all for the refuse, and 631 have an open pit. Not 20 in the whole number are protected against flies or can be cleaned with any sort of success. The Rockefeller Sanitary Commission for the Eradication of Hookworm Disease has recently concluded that it will inevitably fail in eradicating this devitalizing disease unless rural communities institute some form of septic toilets, both for residences and for schools. Likewise, there is little hope of keeping down typhoid epidemics when toilets are insanitary or wholly lacking. The biggest rural problem is that of domestic and personal hygiene. The rural school ought to lead in the health movement; but the facts set forth help us to realize how far we are from what ought to be. Every State and county board of health having to do with rural or village conditions should institute a persistent campaign for better hygienic toilets. Models should be available for every community. Boards of health are already rendering a great service in this direction. They are doing much to interest and instruct in matters of health, but they can not reach all the people, and teachers and county superintendents should feel it their special duty to carry this gospel everywhere.

OTHER ITEMS.

A little over half the schools in the county have some form of slate blackboards, and the rest have painted wood, painted canvas, painted plaster, or some one of the various preparations of paper or pulp. Nearly one-third have their blackboards set 3 feet or more above the floor, too high for the primary classes to use properly. School work begins at 8 o'clock in 74 schools, at 7.30 in 117, and at 9 o'clock in 1,102; only 167 dismiss before 4 o'clock. The report shows no cloakrooms of any sort in 537 schools; 418 have one cloakroom, and 308 two. Where no cloakroom is available, clothing is hung inside the classroom, or piled up on benches in the corners.

No thermometers are found in nearly two-thirds of the buildings reported, and even where they are supplied it is manifestly clear that many teachers either know next to nothing about keeping a schoolroom at the proper temperature, or else that the conditions of the

buildings are such that the rooms can not be kept at even temperature. For example, many a teacher reports: "I am supplied with a thermometer and I strive to keep the temperature at 75° to 90° in winter." This may not be so bad as it seems. If the thermometer registers 80° a little above the breathing line, the temperature 1 foot above the floor may be as low as 65°. Until the buildings are more carefully constructed, the matter of heating rural schools will necessarily be unsatisfactory. Of 1,268 reports on method of heating, 764 schools use the common stove and 604 locate it in the middle of the room.

There are practically no workrooms in the schools reporting; not one-fourth of the desks are adjustable; and few of the buildings are properly decorated.

In concluding the discussion of this brief survey into typical rural schools, it should be said that it is very important at this time for the various States to render helpful service to their rural-school officers, who are eager for better things; they need specific help. Much of the back-to-the-farm movement will be disappointing, unless the rural schools are remodeled and revivified.

The reader who will take time to study carefully the summarized results presented in the accompanying table will be able to get a more complete idea of actual conditions than he can get from the condensed account given above. The names of the States from which these returns were gathered are here given in order to show that the figures represent as nearly as practicable typical conditions the country over. A study of the detailed reports brings out the fact that there is less difference between rural schoolhouses in the States mentioned than might be anticipated.

Returns were studied from 2 counties in each of the following 18 States:

Alabama.	Missouri.	Pennsylvania.
Arkansas.	Montana.	South Dakota.
Colorado.	Nebraska.	Tennessee.
Indiana.	North Carolina.	Texas.
Maryland.	North Dakota.	West Virginia.
Minnesota.	Oklahoma.	Wisconsin.

Size of school grounds:	
Less than one-half acre	321
One-half acre to 1 acre	406
One acre to 2 acres	394
Two acres to 3 acres	74
Three acres or more	50
Area available for gardening:	
Less than one-tenth acre	156
More than one-tenth acre	34
No ground available for gardening or agriculture	1,108

Character of ground:	
Level	1,030
Rough or hilly	253
Drained	1,014
Not well drained	234
Trees	930
No trees	340
Material construction and age of the buildings:	
Wood	1,134
Brick	110
Stone	37
Cement	7
New	464
Old	805
Number of classrooms:	
One	1,162
Two	60
More than two	33
Method of lighting:	
From one side	25
From two sides	880
From three sides	346
From four sides	35
Amount of glass surface in classrooms:	
Less than one-tenth floor area	171
Less than one-sixth to one-tenth floor area	559
One-sixth floor area or more	482
Window shades and methods of using them:	
Having window shades	1,145
No shades	144
Shades fastened at the bottom of windows	234
Shades fastened at the top of window	897
Character of floors of the classrooms:	
Single thickness	611
Double thickness	644
Kind of blackboards used and height set above floor:	
Painted lumber	177
Some form of liquid slate	668
Painted canvas	98
Other improved material	188
Less than 3 feet above the floor	692
Character and number of desks used:	
Single	514
Double	774
Nonadjustable	848
Adjustable	281
Sufficient in number	1,127
Insufficient in number	143
Color of classroom walls:	
Unpainted lumber	122
Passable color	691
Unsuitable color	457

Number of cloakrooms:	
None	537
One	418
Two or more	308
Ventilation of the classrooms:	
Windows	405
Some help from jacketed stove	336
Other devices	133
Testing the vision of the children:	
Tested	294
Not tested	968
Testing the hearing of the children:	
Tested	238
Not tested	1,002
Source of water supply:	
Well on school grounds	567
Spring in the neighborhood	134
Neighbor's well	557
Less than one-fourth mile from building	727
One-fourth mile or more from building	226
Pure (teacher's judgment)	1,032
Not pure (teacher's judgment)	182
Methods of serving water to the children:	
Bubbling fountain	5
Individual cups	673
Common drinking cups	580
Methods of heating the classrooms:	
Common stove	764
Jacketed stove	503
Fireplace	1
Stove placed in middle of room	604
Stove not placed in middle of room	559
Janitor furnished:	
Yes	213
No	1,049
Methods of sweeping:	
Dry	417
Sprinkled floors	548
Damp sawdust or other dust-gathering material	227
Floor oiled	199
Method of dusting:	
With feather duster	145
Cloth (dusting evidently poorly done)	1,080
Regulation of temperature:	
Well regulated (teacher's judgment)	814
No thermometer	755
Time of day for opening school:	
8 o'clock	74
8.30 o'clock	117
9 o'clock	1,102
Time of day for closing school:	
4 o'clock	1,121
Earlier	167

Number and condition of toilets:	
None	50
One	52
Two	1,174
Passably sanitary	601
Insanitary	631
Open-air studying:	
Yes	406
No	845
Medical inspection:	
Yes	61
No	1,196
Care of the teeth of the children:	
Yes	68
No	1,148

The following report of the results of the sanitary inspection of 3,572 fourth-class district schools, made in 1911 and 1912 by the Pennsylvania State Department of Education, shows that the condition of rural schools in that State is about on a par with that brought out through similar investigations in other States.

The tabulated statement giving the summaries of the investigation is here reproduced:

Summary of sanitary inspection of 3,572 district schools in Pennsylvania in 1911 and 1912.

Number of schools inspected	3,572
Number of schools insanitary	3,036
Number of schools sanitary	536
School building:	
Rooms and halls unclean	229
Sawdust and antiseptics not used	2,662
Dry dusting	2,934
Light surface not 20 per cent of floor space	1,083
Light admitted in front of pupils	622
Ventilation insufficient	1,647
Stove in room	2,793
Stove not jacketed	1,029
Steam or hot water	210
Furnace in cellar	602
Room not warm	223
Floors not warm	279
Hot air	2
Water supply:	
No water supply	1
Fountain	15
Hydrant or spigot in room	188
Spigot in building or on ground	246
Drilled well	794
Dug well	1,021
Spring	1,095
Surface drainage not excluded	437
Nuisance within 100 feet	384

Water supply—Continued.	
Menace on higher level	287
Cooler with spigot	688
Bucket not covered	1,233
Not scalded daily	1,500
Fresh supply not secured each session	251
Individual cups not used	2,337
Cups dipped in bucket	1,781
Creek water	1
Cistern	24
Ground pollution	148
Privies:	
One single	169
Approaches not screened	1,748
Dividing fences not tight	1,138
Bad repair	397
Not clean	1,190
Objectionable odor	1,320
No vault	839
Vault not water-tight	785
Vault full	500
Vault overflowing	208
Lime or ashes not used	1,066
Surface drainage not excluded	962
Urinals and flush closets:	
Not properly vented	21
Not clean	13
Objectionable odor	17
Not sufficiently ventilated	17

The accompanying tabular statement of the general hygienic condition of 109 rural schools was compiled from the details of a survey made under the direction of the joint committee of the American Medical Association and the National Council of Education. This committee sent a specially trained field agent with a camera into certain counties of the States of Connecticut, Vermont, New York, New Jersey, and Maryland to make a personal investigation of the conditions of the schools. The summary of facts given below was derived from a compilation of the returns. Many other facts were gathered, but it has not been thought necessary to present them in this connection.

It should be said that the States selected and the counties chosen within each State were singled out, not from previous knowledge of conditions, but more or less fortuitously. The committee does not claim that they are typical counties and typical schools, but it believes that they are approximately so. The fact that they are typical could be substantiated only after a similar investigation had been made in practically all of the counties of each of the States named. However, indirect evidence through the results obtained by the investigations previously referred to bears out the supposition that they approximate typical conditions the country over.

Summary of results of the survey of 109 one-teacher rural schools in the States of New York, New Jersey, Connecticut, Vermont, and Maryland. Investigation made in 1915 by direction of the joint committee of the American Medical Association and the National Council of Education.

GROUNDS.

	Schools.
Size of grounds:	
Less than one-half acre	74
One-half acre to 1 acre	25
One acre to 2 acres	10
Location of buildings:	
On side of hill	32
On level ground	43
High ground	28
Low ground	6
Character of soil:	
Loam	31
Gravel	10
Sand	52
Hardpan	4
Clay	12
Trees on grounds:	
Schools having trees	86
Schools without trees	23
Character of fence:	
Wire	26
Board	17
Stone wall	9
Picket	3
Rail and wire	5
Rail	3

WATER SUPPLY.

Source of water supply:	
Open springs	15
Piped from open spring	7
Dug wells	68
Driven wells	10
Walled reservoirs	4
Field stream	2
No water supply	3
Sources of defilement:	
Too near privies	7
Too near farm buildings	22
In open cow pasture	4
Sources that are exposed to other kinds of defilement	36
Receptacles for holding drinking water:	
Common open pail	53
Covered tanks with faucet	40
Covered tanks with bubbling cups	1
No receptacle provided	15
How often receptacles are cleaned:	
Four times a month	37
Daily	10
When teacher thinks necessary	8

	Schools.
Lavatory facilities:	
Washbasins	91
No washbasins	18
Provided with soap	61
Not provided with soap	48
Provided with towels	56
Not provided with towels	53
Towels washed twice a week	3
Towels washed once a week	31
Towels washed at infrequent intervals	13
Methods of serving water:	
Schools using paper cups	5
Schools with only one cup	20
Schools with one cup per child	51
Schools with more than one cup, but fewer cups than children	29
Schools without cups	4

PRIVIES.

Both boys and girls use same	50
Partitioned	45
Separate buildings provided for sexes	59
Screened	51
Distance from school building:	
Less than 10 feet	25
Between 10 and 25 feet	32
Between 25 and 50 feet	36
Over 50 feet	16
Provided with locks	14
Obscene drawings	50
Kinds of toilets and their condition:	
Provided with removable receptacle	9
Cesspool protected from flies	8
Cesspool unprotected from flies	101
Neither receptacle nor excavation	92
How often refuse removed:	
Once a year	101
Less frequently	8
Ventilated:	
No provision made	75
Some provision made	34
Odor offensive	106
Not offensive	3
Seats clean	60
Not clean	49
Disinfected	1
Not disinfected	108
Number of roofs that leak	22

WALLS AND CEILINGS.

Material of walls:	
Matching	53
Plastered and papered	14
Plastered	40
Wood	

	Schools.
Color of walls:	
Wood	23
Gray	30
Green	10
Tan	8
White	25
Terra cotta	2
Yellow	5
Brown	6
Color of wainscoting:	
Gray	37
Green	6
Wood	8
Brown	14
White	10
Material of ceiling:	
Matching	65
Plastered and papered	7
Plastered	33
Metal	4
Color of ceiling:	
White	36
Gray	24
Green	5
Tan	4
Terra cotta	3
Brown	3
Yellow	5
Wood	29

BLACKBOARDS.

Material of blackboards:	
Wood	49
Slate	42
Composition	4
Cement	6
Plaster	8
Location of blackboards:	
Front only	42
Front and rear	9
Front and one side	13
Front and two sides	15
Front, rear, and one side	2
Front, rear, and two sides	12
One side only	1
Two sides	7
Rear	2
Rear and two sides	3
Between windows	57
Height of blackboards set above floor:	
4 feet	1
3½ feet	2
3 feet	61
Less than 3 feet	22

	Schools.
Width of blackboards:	
5 feet	5
4 feet	11
3½ feet	3
3 feet	70
2 feet	9
Schools not given	11
Square feet of blackboards:	
30 square feet or less	23
30 to 50	26
50 to 100	40
100 to 150	18
Over 150	2

SCHOOL BUILDINGS.

Character of building:	
Wood	100
Stone	4
Brick	5
Old	103
New	6
Good condition	80
Needing repairs	29
Basements:	
School buildings with basements	11
Sanitary basements	7
Insanitary basements	4
Floors:	
Single floors	39
Double floors	70
Deadened	1
Good condition	63
Bad condition	46
Oiled	38
Roof:	
Leaks about belfry	7
Leaks elsewhere	22
Schoolrooms:	
Length—	
20 feet or less	4
20 to 22 feet	20
22 to 24 feet	6
24 to 26 feet	13
26 to 28 feet	10
28 to 30 feet	7
30 to 32 feet	11
32 to 34 feet	14
34 to 36 feet	8
36 to 38 feet	11
38 to 40 feet	4
Width—	
12 to 16 feet	6
16 to 18 feet	6
18 to 20 feet	28

	Schools.
Schoolrooms—Continued.	
Width—Continued.	
20 to 22 feet	31
22 to 24 feet	11
24 to 26 feet	12
26 to 28 feet	8
28 to 30 feet	2
30 to 32 feet	5
Height of ceiling above floor—	
7 to 8 feet	28
8 to 9 feet	39
9 to 10 feet	17
10 to 11 feet	14
11 to 12 feet	2
12 to 13 feet	4
15 to 16 feet	2
16 to 17 feet	3
Windows:	
Schools with—	
3 windows	1
4 windows	6
5 windows	9
6 windows	58
7 windows	9
8 windows	14
9 windows	8
10 windows	3
12 windows	1
Windows in classroom face—	
North and south	15
North, south, and east	9
North, south, east, and west	11
North, east, and west	17
North, south, and west	13
North and east	1
North and west	2
East and west	1
East and south	1
South and west	1
South, east, and west	22
Total area of glass surface in windows compared to floor surface—	
Glass surface equal to—	
Less than one-tenth floor surface	10
More than one-tenth but less than one-eighth	27
More than one-eighth but less than one-sixth	20
More than one-sixth but less than one-fourth	36
One-fourth or more	13
Not given	3
Double sash on weights	38
Can be opened for ventilation—	
Upper and lower sash	52
Lower sash	105
Can not be opened	2

	Schools.
Windows—Continued.	
When cleaned—	
Once a year	98
Oftener	6
Never cleaned	5
Windows with shades	100
Windows without shades	9
Shades in good condition	63
Shades in bad condition	37
Cloakrooms:	
Schools having one cloakroom	64
Schools having two cloakrooms	25
Schools having no cloakrooms	20
Janitor service:	
Special janitor service	38
Teacher serves as janitor	71
Desks:	
Double desks	73
Single desks	36
Sufficient in number	105
Nonadjustable	109
In good condition	94
In bad condition	15
Desks face windows	16
Heating:	
Jacketed stove	15
Unjacketed stove	88
Furnace	6
Stove in middle of room	72
Stove in corner of room	18
Sufficient heat in cold weather	94
Insufficient heat	9
Stove troublesome	26
Ventilation:	
At recess only	62
Oftener	41
By the use of windows	48
By the use of doors	5
Both doors and windows	56
Upper sash of windows	14
Lower sash of windows	34
Both lower and upper sash	50
Sweeping and dusting:	
Once a week or less	20
Once a week and oftener	39
Daily	50
Dry sweeping	70
Sprinkle or use compound	39
Use feather duster	13
Use dust cloth	86
Use brushbroom	3
Medical inspection:	
Vision and hearing tested by teacher	62
By regular medical inspector	38

Chapter IV.

THE LOCATION OF COUNTRY SCHOOLHOUSES.

More friction has arisen between county superintendents and school patrons and among the patrons themselves with regard to the location of rural school buildings than over any other question directly or indirectly having to do with country schools. When school district boundary lines have been established, the people naturally conclude that the building should be located in the exact center of the district, or as near the center as roads will permit. Rarely has the thought of the location from the needs of health, playgrounds, or a school farm been the chief consideration.

There is reasonableness in the demand for a central location, but only when more important demands are not in conflict with it. It is far more important, for example, to have well-drained school grounds, where the opportunity for securing a sanitary water supply and toilet system is good, than it is to give the preference to a location nearer the center of a district where these sanitary necessaries are not readily supplied. The slight inconvenience to a few children resulting from locating the building to one or the other side of the geographical center should not be considered seriously when the more important considerations of health, sanitation, playgrounds, and the larger community interests are at stake. Of course, in very cold climates children will have to be protected in bad weather, but parents are generally ready and willing to do this of their own accord. In good weather a walk to school of a mile and a half furnishes excellent exercise, teaches the children to be self-helpful and courageous, gives them strength to resist the effects of ordinary exposure to wind and rain, and is usually of greater value in general physical training than all the unnatural calisthenic exercises the teacher can devise.

In selecting a site for a rural schoolhouse, the following factors should be considered:

1. No site should be selected that will not offer a good outlet for tile drains set well below the walls of the building to keep the basement and garden in good condition. A wet, swampy piece of land is not only a muddy, dirty place, but it introduces dangers from ground air and moisture that will always prove troublesome and unwholesome. The air, on account of its great weight, presses into the ground to a much greater depth than is ordinarily supposed. When

the air above the ground becomes colder than that in the ground, and this is true at night during warm weather and even during the day in cold weather, the heavy air above the ground will displace that in the ground, and will drive it out at the point of least resistance. Since the ground underneath and about a schoolhouse is drier than that not covered, the ground air is driven from all directions toward the schoolhouse, and by reason of the fact that the heat escaping from the building will cause an upward draft, this ground air is easily drawn into the rooms. Ground air contains a far greater percentage of carbon dioxide and other noxious gases than is ordinarily found in air above the ground. These gases are produced through the agency of the bacteria acting upon decaying animal and vegetable matter in the soil. Moreover, ground air is generally saturated with moisture, and as it rises in the schoolroom, especially at night when the building is cold, this moisture will be deposited on the walls, blackboards, and floors, so that all wooden parts of the building are rendered liable to decay and the air in the building will be stuffy and cellarlike. Unless school buildings are so built as to prevent the entrance of this ground air and the moisture brought up with it, no amount of effort on the part of the teacher will be able to keep the air always wholesome and hygienic. It is of great importance, therefore, to prevent these difficulties by selecting a site which can be kept wholesome by proper drainage.

To go to the other extreme and select a high hill or a wind-swept place for the location of the school building is also an error. What is needed is a location comparatively level, but so situated that it can be easily kept dry.

2. Other things equal, it is generally better to select a site with a frontage to the north or the south, so that the building may be planned with the short side facing toward the roadway and the long sides toward the east and the west. Such a site makes it easier on the whole to plan the building with reference to its general appearance and also with reference to its cost. In order to make this point clearer, let the reader undertake to draw a floor plan for a lot with an approach to the building from the east or the west. Either he will have to depend for his classroom on north or south light, which is to be avoided, or to face the building with the long side toward the roadway. This will introduce some architectural difficulties, for it is often much easier to get a satisfying elevation for a one-room school building with the entrance in the end rather than in the side of the building; and it is also more economical of space. Many school buildings have been doomed to bad illumination from the fact that builders have followed the custom of facing the end of the building toward the roadway, regardless of the direction from which the classroom must get its light.

However, it is not impossible to adjust a satisfactory building to a lot facing a roadway on the east or west. Several of the plans presented in this bulletin have been drawn to meet just this situation, for sometimes school authorities are limited to the selection of a site east or west of a roadway. But where there is a choice and all other considerations are even, it is better to utilize a lot with a frontage on the north or the south.

3. Another set of conditions must be taken into account, and these have to do indirectly with the lighting. Suppose a lot is selected with a north or a south frontage, and that to the east or the west of it there are high hills or mountains sufficiently near to raise the horizon line appreciably. Such a location would at once handicap the building by making it next to impossible to secure the proper amount of light from one side or the other. If high forests or mountains are near on the east, then the west light should be preferred for the class room. If this hindrance to light is on the west of the lot selected, then the east exposure would be the only one to use. Many rural school buildings located in valleys are much more seriously handicapped from the point of view of illumination than the average schoolman is conscious of.

4. Elsewhere emphasis has been laid on the fact that our school grounds are not large enough, especially from the point of view of agricultural work. The country schools will never be able to do their work properly unless the amount of ground assigned to them is increased. Playgrounds, agricultural work, fruit growing, and forestry—all legitimate demands upon the rural school—require more land than is usually given to rural schools. But it would be possible to select a plat of ground sufficiently large and yet ill-adapted for playgrounds or for agricultural work. Hence the site selected should be on good soil, adapted for the cultivation of any or all kinds of plants or grain ordinarily grown in the neighborhood. To select a poor, sterile, rocky soil, though well situated with reference to other requirements, would be a mistake, for no teacher could, on such ground, make such a showing in agricultural experiments as would attract the favorable attention of the farmers in the community. Hilly, rough, or rocky land is not satisfactory either for playgrounds or for any other purpose to which the country school plat should be devoted.

In one case in New York State observed by the field agent of the joint committee in the summer of 1913 the schoolhouse was on a hillside and the accumulated wash down the hill had risen above the foundation to such an extent that the drainage actually "seeped through to the floor."

5. An abundant and sanitary water supply is a matter for thoughtful consideration in the selection of the site for a rural schoolhouse.

A country school building is frequently located because of the proximity of a spring or a neighbor's well. The average spring in the country has proved to be a greater menace to health than people have ever dreamed of, because with increasing population and deforestation there is more opportunity both for contamination of springs and greater irregularity of water supply than was formerly the case. Spring water may appear very clear and yet be unwholesome to drink, and it is therefore risky to depend on springs for drinking water. If a site is selected with the idea of depending on a well for drinking water, it is important to take note of any possible chances for seepage into the well. If a high, rocky place is selected, it would be very difficult and expensive to sink a well to such a depth as to insure a sufficient amount of pure water. Generally speaking, a gravelly or sandy loam into which a well can be driven to a sufficient depth to prevent any surface contamination is preferable.

6. Finally, no site should be selected for a school building too close to electric lines and steam railways. Such a location offers opportunity for the introduction of a great deal of smoke and dust into the schoolroom. Further, there is always some danger due to fires or electricity when a building is situated near such lines. There is also great temptation for children to walk or play on car lines, and this naturally introduces useless danger. The chief difficulty, however, is the noise. Some States have laws forbidding the erection of school buildings within 500 feet of railway lines, and this sort of legislation is bound to increase.

Chapter V.

ORIENTATION OF THE BUILDING.

No school building can be well lighted if it is not first properly placed with reference to the cardinal points of the compass. If a building is so placed on a lot as to make it necessary to locate the windows in the classrooms to face toward the north or the south, neither the required amount of glass surface nor the correct setting of the windows will overcome the difficulties thus introduced. In order to make this last statement clear and significant, these difficulties must be stated and explained.

The fundamental demands of health require the purification of a classroom by direct sunlight; but it is also necessary to introduce this all-important purifying agent in such a manner as to prevent as far as possible the direct rays of the sun from falling on the desks and books of the pupils while they are engaged in study. If the windows of a classroom are placed on the north side of a building located in any section of our country, very little direct sunshine will ever enter, and during the school season practically none, for the sun's path is then too far to the south. It may be possible in the southern and southwestern sections to get sufficient well-dispersed light in a classroom with windows facing toward the north, but the light thus entering has lost its power as a germicidal agency. Direct sunlight is the most powerful and reliable disinfectant known, and it is running contrary to one of the best-established principles of hygiene to construct either a school building or a dwelling house in such a manner as to fail to get this value of direct sunlight.

True, in large buildings devoted to high-school or technical education some special rooms are needed for art work, and for these the north light has an advantage because of its quality. North light is soft and produces more artistic shadow effects than light from any other direction. But these rooms are not as wholesome as those receiving direct sunlight, and are allowable only for short periods during the day. For ordinary classrooms, where children remain at work during the whole day, dependence on north light is a serious error.

Elsewhere detailed reasons are given why classrooms should receive light from but one side; it is sufficient here to state the fact that unilateral lighting is universally recommended in all locations

where light is not impeded by tall buildings, a dirty, smoky atmosphere, or any other serious hindrances. In cold climates it is not best to depend on windows facing toward the north, because it is more difficult, and consequently more expensive, to heat these rooms. They are not only exposed to the direct winds from the north, but they fail to get whatever available heat the direct rays of the sun carry. By reason of these two handicaps a schoolroom so situated may require in cold weather 10 to 20 per cent more fuel than one getting east or west light. Of course the effect of the wind will depend to a great extent on the construction and location of the building. A building with walls made of porous brick or wood will show greater leakage than one whose walls are of cement or of hard brick. But while these difficulties suggest greater expense, they are not of so much importance from the health point of view as the dangers due to lack of sunshine. For the sake of health every schoolroom—and, for that matter, every living room—should receive a "sun bath" every day the sun shines.

Doubtless some who realize the great hygienic importance of sunlight have concluded that classrooms facing toward the south are the most acceptable. This conclusion would be warranted were it not for the fact already mentioned. With direct sunlight streaming into a schoolroom during the entire school day, it is well nigh impossible to furnish proper light to all the pupils in the room. This difficulty is not serious in a dwelling, where chairs are not fastened to the floor and where people can adjust themselves so as to get proper light either for reading or for work, but in a schoolroom, where from 25 to 45 children must spend a good part of each day, it is impossible, whether the desks are fastened to the floor or not, for all of the children to adjust themselves to avoid the shifting rays of direct sunlight entering the room. If, as is usually the case and probably will be for a considerable time to come, the desks are fastened to the floor, the pupils can do little to adjust their positions so as to avoid the painful and harmful effect of direct sunlight on desk or book.

If shades are used, they will inevitably reduce the light in parts of the room below the normal demand, and hence some of the children will suffer for lack of light. Many kinds and qualities of window shades have been devised to meet these conditions, but none of them has fully overcome the difficulty suggested. Space is lacking to discuss window shades at length. Suffice it to say here no shade has been developed that will properly condition the direct rays of the sun to a schoolroom so as to guard the children from eyestrain due to reflection of direct sunlight and at the same time permit the passage of sufficient light to give satisfactory illumination for all parts of the room.

The conclusion, therefore, is this: Be sure that no lot for a building is selected which will require such an orientation of the building that it will be necessary to depend on south light for the classrooms; buildings for school purposes, especially for elementary classes, should be so planned and so located on a school lot that the classrooms may receive either east or west light.

In the construction of a small building there are some advantages of the east light over the west. First, an eastern exposure will permit the morning sun to take the chill out of the room before school begins. Second, it is probably true that there are in most parts of the country fewer cloudy mornings than afternoons, and hence those rooms having windows toward the east will get a better sunning than those with windows toward the west. In those sections where foggy mornings are prevalent, the opposite would be true. In buildings with east exposure the troublesome direct rays of the sun will have nearly disappeared by 10 o'clock in the morning. The shades can then be rolled up for the rest of the day. In the third place, the prevailing cold winds in the winter are more from the west and northwest than from the east, except along the eastern coast.

However, the correct choice between east and west windows will depend to a large degree on the surroundings. For example, if a school building must be placed near hills, mountains, or tall forest trees, it would be better to choose the west side for the windows, if the horizon line is high toward the east. If the opposite be true, the east side is preferable. A range of high hills or mountains often raises the horizon line so high that the sun may not appear above it until quite late in the day. Besides, even after the sun has reached the zenith, a mountain's side will not reflect back enough light to insure good illumination. A wide expanse of sky is necessary. It will be important then to study the surroundings, to note the possible hindrances and the general outlook in order to decide wisely whether the building should be placed to introduce east light or west light into the classrooms.

Plate 17 represents a schoolhouse in the mountains of Colorado. The location of this building makes it very essential that the light entering the classroom should come from the side opposite the mountain near which the school is built.

Even when the difficulties with reference to lighting are for all practical purposes equal, other considerations may affect a decision. An attractive outlook from a classroom is better than an ugly one, and it sometimes happens that this consideration decides the orientation when other things are equal. For example, if a lot must be selected near a busy, dusty roadway, much relief from the dust, noise, and disturbance may be secured by facing the windows in the opposite direction. On the other hand, the appearance of a building may

demand the placing of the windows on the side from which the approach is made. All matters of this sort must be determined by local conditions. But it will always remain true that in the latitude of this country it is better and safer to depend on east or west light for schoolrooms than on north or south light.

There is still another point worth mentioning and this favors west windows. Children seated in rooms lighted from the west will naturally face north, and are then in a position to read their maps without confusion. The cardinal points on the map will then agree with the realities about them. The top of the map will be toward the real north, the left side will correspond with the real west, and altogether the representation and the reality will be more easily connected.

Thus far this discussion relative to orientation has been concerned with the proper lighting and sanitation of the classroom. The question of lighting workrooms, libraries, cloakrooms, and toilets, demands separate treatment, for in these rooms direct sunlight is not a disturbing element, and in the main the purifying influence of sunlight is more important. Unilateral lighting is not an essential condition in these rooms.

Workrooms in general are decidedly better for receiving abundant sunshine, for here benches and tables should be arranged to suit the convenience of the students, and more individual liberty is necessary. The same is true of library rooms. Toilets and cloakrooms require direct sunshine and abundance of light in order to keep them sanitary and wholesome. Proper orientation when applied to these rooms means provision for abundant light and as much direct sunshine as good sanitation demands.

Chapter VI.

THE COUNTRY SCHOOLHOUSE.

GENERAL CONSIDERATIONS.

The country schoolhouse should be beautiful. This does not mean that it needs to be expensive. Frequently those who have much money to spend on a school building do it so thoughtlessly as to destroy all possibility of beauty. Towers and turrets have no place on a country schoolhouse. A log schoolhouse can be made beautiful. There is power in beauty closely allied to righteousness. The dissatisfaction with country life which has caused so many young people to go to the cities is partly due to the bleakness and ugliness of the farm home, the farm barn, the rural schools, and churches. If a beautiful rural schoolhouse could be constructed in every neighborhood, it would not be long before the people would see and feel its power.

How shall we get beautiful schoolhouses? There is only one way. Those who have developed that sense of fitness which we call appreciation of beauty must have power and means furnished them to create it in our public buildings. Cities where a few artist-architects are at work can do much, for they can afford to hire such architects to plan their buildings and to supervise their construction. In the country where a meager allowance is made for the construction of a schoolhouse, those in authority do not feel justified in hiring a worthy architect to make their plans. Even if they did, it is not likely that they would get the building the artist had planned; for the ordinary carpenter who builds most of our rural schoolhouses is not able to read drawings and to follow exactly the specifications the architect would draw up. Practically all of the rural schoolhouses constructed in the last quarter of a century have been copied after others in adjoining neighborhoods, and hence little progress has been made. Year after year new houses have been built perpetuating the evils of unhygienic construction and the horrors of architectural ugliness in almost every detail. By the use of the plans detailed and illustrated in another chapter, it is hoped that a little may be done to further the construction of more beautiful rural schoolhouses, and at the same time to save money and get more satisfactory buildings. (See chap. 7.)

This emphasis on the beauty of school architecture is not for the purpose of declaring it to be the prime essential. Yet none of us should forget that beauty is in its own nature useful. Unfortunately those who have built our country schoolhouses have for the most part given little or no thought to real beauty. Some have attempted to adorn, but these adornments frequently only accentuate the lack of unity and harmony. Hundreds of rural school buildings show that if the roof and the sides, the height and the width, had been befittingly proportioned the one to the other, much money would have been saved, and far more beautiful buildings would have been obtained. Ugliness in rural school buildings has, therefore, not only cost money, but has corrupted the youth by rudely staring them in the face daily. Simple beauty is not expensive; it is by its very nature economical of material. Look at the illustration of the little log schoolhouse (plate 18A) located in a far Western State. Cover up the monstrous lean-to, and you will see how beautiful a simple building can be. Contrast this little, inexpensive building with the new and elaborate building shown in plate 18B. See how many things have been stuck together in the latter, and how much might have been saved if some one in authority had seen the real through the ideal.

Beauty is more than economical; it is educational in the highest sense. Beauty is not for the rich; neither is it for the poor. It is for all. A beautiful country school building, appropriately located, will exert a quiet but persistent educational influence on all who are associated with it, in school or out. Its unconscious reflex influence will enter into the life of the neighborhood and of necessity express itself in many ways. All who see a beautiful and appropriate school building are inclined to be more loyal to the cause it represents and less satisfied with ugliness anywhere. The district schoolhouse is the only building in the community that belongs to all, and in a definite way it reflects the civic standards of all. It is, therefore, important to express through it the highest attainable ideals of beauty and fitness, so that it may serve all acceptably.

WORKROOMS NEEDED.

The rural schoolhouse should be designed to accommodate and encourage many legitimate phases of school work now generally neglected in the country. All district schoolhouses, those for one-teacher schools as well as those of the consolidated type, should have, at least, one workroom—two would be better—where manual training, domestic science, and related subjects could be taught according to laboratory methods. In a district where the number of school children does not exceed 30, one good-sized, well-lighted workroom

can be made to accommodate both boys and girls by alternating their work. Here the boys can be taught to make useful articles of furniture for their homes or for the school, and to apply their arithmetic and drawing to real problems. Such work can not be done in the regular classroom. When a separate room is provided, much of the manual work can be done while the teacher is hearing other classes recite. The separate workroom will furnish an excellent opportunity to place a definite responsibility on pupils who work for a part of their time out of sight of the teacher, but near enough to call for direction whenever it is needed. Manual and domestic work is individual work and each pupil can be held to strict account for the faithful use of his or her time.

An attempt to do manual training in a one-room rural school is shown in plate 2A, but certainly this is an unsatisfactory makeshift for a workroom. Under the conditions here shown the boys would either have to work out of school hours or else the rest of the school would have to take a vacation while they hammer and saw. Much cardboard work could be done without serious distraction; but very few vigorous boys take as kindly to cardboard carpentering as to making some real thing of wood. This interesting picture serves to emphasize in a more vigorous way than one could in words the need of a workroom for boys in a rural school.

The boys can use the workroom as an agricultural laboratory as well as for shop work. The preparation of boxes for testing the germinating power of seeds, the study of soils and fertilizers, experiments on the growth of plants, and a large number of similar experiments call for a special room. This room could be used by the older boys two afternoons or two stated periods a week, by the older girls for a similar time, and possibly by boys and girls together for one period when things of common interest, like domestic hygiene and sanitation, house planning, studies in food values, drawing, could be worked out to the advantage of all the older pupils. The workroom is needed by the girls for cutting, sewing, cooking, canning, and millinery, for laundry work, and for all other subjects directly connected with women's work in the home. A well-prepared teacher can make the workroom of a district school a very significant connecting link between the school life and the home.

The ordinary district schoolhouse consists in general of a classroom only, and there will be a good deal of prejudice to overcome by those who would introduce workrooms. The hoary and customary objection—"The schoolhouse I used as a boy had no workroom. I got along all right, and my children are no better than I"—will have to be met. This objection can be answered in some such fashion as this:

Yes, you have done well; but why do you not use the same sort of a plow your father used? You find it to your advantage to use many kinds of tools he did not have. Would you be willing to deny yourself and your neighbors a modern harvester because your father used a scythe and cradle? Would you be willing for your wife to do her cooking in an old-fashioned fireplace instead of on a modern stove? Would you have her do all your sewing by hand, as her mother did? Yes; they were as good as you and your wife; but conditions have changed, and you would not be as good as they if you did not take advantage of labor-saving devices, just as they did. They did the best they could, and would be ashamed of you, were they alive, if you did not do the same thing.

Such argument may not convince all, for prejudice is not always amenable to reason. But it will rationalize the demands for workrooms and will in the end serve a purpose.

This demand will find more favor, however, if such objectors can be shown that it will often cost very little more to introduce workrooms than to do as we have been doing; that is, building schoolhouses with classrooms larger than needed. There are not so many children in many of the districts as there were 15 or 20 years ago. It is an unusual one-teacher country school that has an average daily attendance of 35 children. But suppose it does cost a little more to provide workrooms, that is no excuse for not doing it. A reaper costs more than a scythe and cradle, but it is worth more.

No apology will be offered for introducing workrooms into most of the plans which follow later in this bulletin. They are needed, and the children and the community should have them. They should be fitted with tables, cases, drawers, and benches, where tools and work could be kept safely during the progress of the work and when school is not in session. If possible, a small cooking stove should be installed and utilized for cooking an occasional warm luncheon for the children as a part of the work in domestic science, and on which, during social affairs at the schoolhouse, a pot of warm chocolate or a cup of tea could be prepared. This stove will not rust out during the summer, provided the schoolhouse is used as it should be, and as it will be if a proper incentive is furnished. With proper care, and that should be a part of the teaching, it would not rust through a summer even if not used at all. Special training in the care of tools would teach boys to take better care of tools and implements at home, as well as of public property, and this training is sorely needed by the average farmer.

It is not proposed to keep children after school hours to do manual labor of any kind; the training should be a legitimate part of the daily program. Objection to such work will, of course, be urged by some teachers and patrons on the ground that the program is already overcrowded, and that if time for manual work is taken the course of study as outlined can not be completed and the examinations passed for promotion. Such objections have weight, and

some country teachers are so hedged about with rules, regulations, and rigid programs that they could at first do little along the lines of industrial work. It is difficult to cover all the work ordinarily mapped out, and demands for more time are constant from every one who is exploiting some specialty for the supposed betterment of the school. Each devotee to mathematics, nature study, geography, classic myths, English composition, grammar, local history, spelling, or what not is pleading, and sometimes scolding, for the greater recognition of her specialty, and by reason of this persuasion the curriculum is overcrowded, and too much fact-instruction is demanded.

No specialty is exploited when it is urged that every girl in a district school should learn something about home-making and home life in general. Girls will have to learn it some day, whether they learn it in school or not; in fact, most of it can not be learned in school, but only through actual experience; yet it is possible to interest deeply all girls, and boys, too, for that matter, in home sanitation, house planning, care of children, food values, sewing, cooking, and other things of fundamental importance to the home. These are not specialties; they are the common demands of life; and even if a girl is so fortunate as to be able to keep servants, she must know how to do such things in order to direct servants properly and economically. The demand for workrooms in the district schools in which boys and girls can be taught some of the things of practical life is part of the current demand for a more rational education for the children. By no means should the ordinary school work be neglected; but it ought to be shorn of its useless features and adapted to meet actual needs.

CLASSROOMS.

The size of the classroom in a district school should vary to suit the number of pupils of school age in the district, and more especially the probable number attending school. A room 30 feet long and 21 feet wide will accommodate 35 pupils, will allow for 5 rows of desks—7 desks in each row—and will give ample aisles between the seats and about them. A room 32 feet long and 24 feet wide will accommodate 40 to 45 pupils by placing 5 rows of desks and 8 to 9 desks in each row. In a room 30 feet long and 21 feet wide, such as shown in figure 16, 35 desks could be placed. The width of the aisle next the windows would be approximately 2 feet; the aisles between the rows of desks 18 inches wide; the space behind the last desk in each row 3 feet; and the space between the inner wall and the first row of desks approximately 3 feet. The space between the first seat in each row and the front end of the room would be about 8 feet. This location

of the desks insures good lighting and will give sufficient space about and between the desks to manage the classes without confusion. If we could enlarge this room 1 foot in width, retaining the same number of desks, the advantage would be considerable; for then instead of 3 feet between the inner wall and the first row of desks there would be 4 feet. This suggestion is made to emphasize the need of plenty of space next the blackboard most used by the children. The size of this room should be considered in relation to the fact that it will not be cumbered by bookcases or supplies of any sort; for it has been planned for a building which is to include workroom, library, and cloakrooms.

By reference to statistics concerning the number of children attending the average district school it will be seen that such a classroom would be amply large for the great majority of one-teacher rural schools. If, however, the indications in any district are that provision should be made for 40 to 45 desks, the other dimension of 32 by 24 feet should be used.

Country schools are in session usually during the winter season, and therefore are not as likely to be troubled by the presence of flies, mosquitoes, and similar pests as they would be if in session in summer; nevertheless in many parts of the country during the fall months flies are particularly plentiful and dangerous. Whenever trouble from these plagues is liable to occur, wire screens should be provided for doors and windows, and every effort be made to prevent their presence in the schoolroom. This precaution will not only protect the children while in the schoolroom, but will impress upon them the great importance for such provision at their homes.

The height of a classroom of this size need not exceed 12 or 12½ feet from finished floor to finished ceiling. If the building is located on a lot which will permit the lighting of the classroom from either east or west and there are no obstructions from tall buildings, high hills, or forest trees, 12 feet will be sufficient. This height will save a good deal of expense in the construction and maintenance of the building as compared with a building a foot higher. The placing of the windows will be considered carefully in another section.

In planning this classroom and the other rooms in connection with it, the use of the basement as a furnace and fuel room should be borne in mind. If a classroom of this size must also accommodate a stove, it would be necessary to reduce the number of desks somewhat in order to give the proper space for the jacketed stove in the corner next the fuel room.

Some objection may be raised to the size of this room because it is smaller than many one-teacher rural classrooms, but its freedom from any incumbrances whatever answers these objections.

FLOORS OF SCHOOL BUILDINGS.

No more serious mistake can be made in the construction of a rural school building, unless it be in a failure to provide plenty of light, than in bad construction of floors. The floors of every country school should be made double, with some deadening material between them. This is necessary primarily to prevent the floors from being cold and to exclude the possibility of the entrance of ground air. The under or rough floor may be made of any well-seasoned, rough lumber, and should be laid diagonally across the floor joists and joined together carefully. When this floor is finished, it should be covered with some form of asbestos quilt, deadening felt, or, if expense must be reduced to its minimum, good quality of building paper. Upon this, at right angles with the joists, should be laid the boards of the main floor.

Floor material of good quality is becoming more and more expensive, and as a result dealers are economizing by using lumber unfit for schoolroom floors. The best material to use is a good quality of white oak, well seasoned, in boards not more than 3 or 3½ inches wide, tongued and grooved, and blind nailed or screwed. Nailing is much less expensive, and, if properly done, answers just as well. Floors, however, are often damaged by careless workmen in their efforts to draw the boards closely together; instead of using a nail set or carefully fitting the boards so that they will join together easily, they drive the nails in with a hatchet or hammer and frequently batter the edge of the board so that when the floor is completed it will show these marks and leave openings for the entrance of dirt. Those who have under their charge the construction of schoolhouses will save a great deal of future difficulty if they will hire someone to oversee the work of laying the floors. Such an overseer could select the boards, see that they were properly prepared, and prevent them from being marred in the nailing.

If it is impossible, on account of expense, to use oak, a good quality of hard pine, with boards not more than 3 inches wide, properly tongued and grooved and set carefully, will make an excellent floor. Here again the supervisor should be on guard to prevent the use of any boards with pitch gashes or knots; otherwise the probability is that such boards will be used, and they will always make the room appear untidy and gather much dirt and dust.

Maple flooring may be used, and, if properly laid and carefully kept, will prove satisfactory; but maple boards are soft, stain easily, show the dents of nails in shoes, and in general are more easily marred than either hard pine or oak. Maple, however, does not splinter so easily as pine and will generally wear longer.

After the floor has been laid it should be planed or sandpapered to an even surface. Before it is used it should be treated with hot linseed oil, and then, after it is thoroughly dried, it should be waxed. The oil will fill the pores of the flooring and prevent it from shrinking, and the wax will give it a finish so that it will not mar easily nor hold the dust.

This is a more careful preparation of the floor than is usually made in constructing a district schoolhouse. The main things, however, to be insisted on are double floors, a good quality of material for the upper floor, and careful laying. The care of the floors will be discussed in another section dealing with the general hygiene of the schoolroom.

WALLS OF THE CLASSROOM.

As lumber has rapidly increased in cost during the last few years, and as the use of plastering made of cement or pulp has become much more common, comparatively few country schoolhouses are now built which have an all-wooden finish on the inside. In certain sections of the South, where lumber is less expensive, and in parts of the Far West, where buildings are remote from railways, classrooms are still ceiled entirely with wooden boards; but throughout the country as a whole most rural school buildings use some form of plastering for the walls. When it seems necessary, on account of convenience or expense, to use lumber, the boards should be well seasoned, not more than 3 or 4 inches in width, carefully tongued and grooved, and joined evenly. The chief difficulty in the use of lumber for the ceiling is that it is often left unpainted, absorbs much light, and makes the schoolroom too dark. Those walls on which no blackboards are placed should be painted above the 4-foot line a very light buff or grayish color, so that there will be no glare and yet the absorption of much light will be prevented. A clear white is objectionable, because it is liable to reflect high lights and to overstimulate the eyes of the children. The red end of the spectrum should never be used, because those colors absorb too much light, are objectionable in appearance, and produce disagreeable mental effects. Naturally, the walls above the blackboard should be painted the same color as the other walls. All walls carrying no blackboard should be stained or painted below the 4-foot line a neutral light brown or a dark gray. The walls below the blackboard should be treated in the same way. The ceiling overhead should be painted a light gray.

When plastering is used the surface should be made firm and hard, so that an occasional cleaning with a damp cloth will not harm it. Clear white plastered walls should be tinted a light, grayish

buff or, when light is plentiful, a slight greenish tint may be substituted. Green, however, is a rather risky color to use because of the danger of introducing too much of it. The use of a light, grayish buff is in general to be recommended.

If wainscoting is used below the windows and the blackboards, the boards composing it should be stained a light brown or a medium gray. This will prevent any strong and useless reflection into the eyes of the children when at work at their desks.

The ceiling should be tinted a lighter color than the walls in order to prevent too much absorption of the light.

BLACKBOARDS FOR CLASSROOMS.

Ordinarily, the best blackboard material that can be used for rural schools without a good deal of expense is a prepared slate cement, which can be mixed and spread on as ordinary plaster. This costs more than the various forms of veneer or the preparations of pulp or cardboard now on the market, but if it is put on in the proper way it is much more permanent and will not buckle or draw away from the wall as the other material mentioned is inclined to do. If it is possible to use slate for the blackboards, it should be used by all means, for, when carefully set, it will prove more satisfactory than any sort of manufactured blackboards. Glass blackboards are still better, but they are so expensive that it is not likely that they will be used for the ordinary district school. Glass blackboards are prepared as follows: A plate of heavy glass is ground on one side lightly, but thoroughly and evenly, and is slightly roughened on the other side; then this roughened side is painted the exact color that the board is to have. By setting this painted side against the wall the color is reflected through the glass to the other side and seems to be an integral part of the structure of the glass. The ground side is the side upon which the writing will be done. The grinding roughens the glass, which causes the chalk to leave a clear, distinct mark on it.

Many experiments have been made in order to determine the proper color of the blackboard. In general the most satisfactory color is a dull black. A very slight tint of green renders the blackboard a little more satisfactory and a little less conspicuous, but it is so easy to use too much green that one hesitates to recommend it. A decidedly green blackboard is very trying on the eyes and disturbing to the sensibilities. Many people suffer when in the presence of much greenish color, and for this reason it is generally safer, unless the work can be intrusted to some one who appreciates all these difficulties, to use a dull, dead black. The liquid slating, so called, often put directly upon the plastered walls, may prove fairly satis-

factory for a time, but the plastering will soon begin to chip and discolor, and after some usage the board will look spotty and the crayon marks will not give a clear, distinct impression. Money can be saved, therefore, by the use of a specially prepared cement blackboard or of some good quality of the other preparations now on the market.

HEIGHT OF BLACKBOARDS.

A district school must accommodate the children of all of the elementary grades, and hence the blackboards must be placed within the reach of all the children. The mistake of placing blackboards so high that the little folk can not use them is a very common error, which those who are constructing a rural school should seek to avoid. If the blackboard on the wall opposite the windows is set 28 inches above the floor, the little folk will be able to use the lower part of this board to advantage. If the board is 3½ feet wide the larger pupils will have no difficulty in finding space at the proper height for their work. One can not do good work on a blackboard in a stooping posture, and the work can not be seen so readily if it is too high. The blackboard on the end wall near the teacher's desk will prove more satisfactory if set 3 feet above the floor and made 4 feet wide, for this space will be utilized largely by the teacher for illustrative work and for such assignments as she may wish to indicate on the board. The rear end of the room may also be utilized for blackboards when the "breeze windows" are set as indicated in the floor plans suggested. The placing of this board may correspond with that at the other end of the room—that is, it should be set 3 feet above the floor and should be about 4 feet wide. The irregular line of the blackboards about the room will not be disagreeable, despite the opinion of some architects.

No blackboards should be placed on the window side of the room. There should be no wall space of any conesquence left on the window side on which blackboards could be placed; there will be no space between the windows and only a short space in front of the windows, and this space ought not to be used for blackboards. It will not receive sufficient light, and it will be so badly placed with reference to the children seated at their desks that they will not be able to read easily anything written on it. The two ends of the room and the side opposite the windows will give space enough for blackboards.

The chalk troughs underneath the blackboard should be wide enough to hold the erasers as well as the chalk, and should be deep enough to catch and hold the chalk dust dropping from the brush and the board surface. If a narrow strip of ¼-inch wire mesh is laid in this trough and is hinged so that it may be lifted when the trough is to be cleaned, it will keep the erasers from dipping into the chalk dust

and carrying it to the hands and to the board, and thence scattering it over the room. This device will cost very little and will prove very helpful and acceptable.

DOORS OF SCHOOLROOMS.

Comparatively little may be said concerning the doors of schoolrooms, for those generally used are of the stock pattern, and no others are ordinarily available. It is to be hoped that we shall get away from the ordinary panel doors in time, especially for school buildings, and come to use the plain door without panels. These are now manufactured in a few places and have proved acceptable. No panels mean no ledges to gather dust and dirt; and plain doors are easily kept clean.

The outer door of the schoolhouse should swing outward, both as a protection against danger from fire and against the driving rains. The positions of the doors of the schoolrooms, workrooms, and libraries shown in the various floor plans are worth the attention of those who are planning school buildings.

TRANSOMS.

Transoms in schoolrooms, and for that matter in dwelling rooms, are largely a delusion and a snare. They are usually the dirtiest places in the room, are rarely used, and have been continued from time immemorial out of mere habit. Generally they are so far out of reach and so hard to open that they can not be used. As a result they merely add to the expense of building, gather dust, and render the room untidy. It costs a great deal more to set transoms properly than one would imagine. The "breeze windows" and the doors and windows in the adjoining rooms may be utilized for breezes in hot weather much more safely and easily than transoms. Those who are planning rural schoolhouses would do well to abandon transoms.

PICTURE MOLDINGS IN SCHOOLROOMS.

One is loath to advise the leaving out of picture moldings in schoolrooms and dwelling houses; they are very convenient and useful; and without them walls are usually marred and rendered unsightly by the use of nails and other fastenings for hanging pictures; but these moldings gather so much dust and dirt that a schoolroom on the whole is better off without them. Some inconspicuous nails or screw hooks may be fastened to the woodwork of the walls without marring them and without catching the dust. Incidentally it should be noted that it is not infrequent to find too many pictures in schoolrooms. Few things are more tiresome than a wall loaded down with a hodgepodge of various kinds of pictures.

CLOAKROOMS.

Every country school should have a special room where children can hang up their wraps and place their lunch baskets in safety and out of the dust and bad atmosphere of the schoolroom. Two cloakrooms, one for the boys and one for the girls, would be better than a single cloakroom for both boys and girls; but, if a single room is properly placed, lighted, ventilated, and heated, it will serve the purpose. In the chapter on the hygienic condition of rural schools it was shown that a comparatively small percentage of rural schools are furnished with cloakrooms and that in the main the children have to hang their wraps in the classroom or stack them up in piles on unused benches. No argument seems necessary to prove that such care of children's wraps is not only untidy, but dangerous because of infectious diseases. If hooks for wraps are placed on the schoolroom walls, they will prevent the use of these walls for blackboards, render the room unsightly, contaminate the air with odors from damp or soiled garments, and absorb some of the light. Furthermore, wraps so placed will be knocked down as the children pass about in the schoolroom. Merely from the point of view of economy, it will require almost as much space to make room for hooks and passageways about the wraps within the classroom as it would to partition off a part of the building specifically for this purpose. No teacher can make a room appear attractive and well cared for when all kinds of wraps are hung upon the walls, and it is one business of the school to teach children the proprieties of life. When cloakrooms are properly located, they can be carefully supervised by the teacher, and this will lessen the probability of pilfering. The loss of umbrellas, overshoes, and other similar articles is frequently very troublesome to the teacher, as well as to the pupils. Cloakrooms are necessary, and every plan set forth in this bulletin calls for them.

LIBRARY AND TEACHER'S ROOM.

It may be repeated that the school building belongs to the whole community and not simply to the children who are attending school and the teacher who is employed. It is generally the only community property within the district, and, hence, everybody has a right to use it, under proper restrictions, and to make it the general civic center of the community. Practically all district schools throughout the country have or should have some general reference books, and they need decent places to keep these books where they can be consulted readily, easily, and without disturbance. It is not necessary in a small district school to have a large room for the library, but the library room should be made the most beautiful and interesting

one in the building. Here little touches of decoration and comfort may appear and an atmosphere of quiet study be suggested.

Many of the books found in school libraries can be used to advantage in interesting the patrons in the community in what the school is attempting to do and is doing, and a special effort should be made to collect such books as the people need. One of the general reasons why country people do not read more good books, and why they read newspapers instead, is that the newspapers are brought to them and that books, even if found in the school library, are kept there and are not readily accessible.

Many States have provided by legal enactment for the establishment and maintenance of libraries in country schools. Lists have been made out by committees and officers to guide in the selection of books. But for the most part these books must be kept on shelves or in bookcases within the classrooms and be used by the pupils at their desks while classes are being conducted. As a result the school library is not used effectively by the pupils unless the teacher has special aptitude for interesting them in the books at hand. Adults have difficulty in giving undivided attention to their reading when they are surrounded by much noise and confusion. School children have still less power to focus and hold their attention. Moreover, the ordinary classroom with its necessary discipline does not furnish the incentive nor the atmosphere of a reading room. A library room can be made attractive at little expense. It can be kept neat and tidy, and will exert a tranquilizing effect on the children who are accorded the privilege of using it. The mere experience of being in a room devoted to books and reading will create a new sort of sentiment for books and develop a love and respect for them.

A district-school library should not be restricted to the use of the pupils in attendance. The books belong to the community, and all who can make worthy use of them should have access to them. Therefore, with a special library room available, children who have left school and all adults in the district should be invited to come at any time during school hours to read and to borrow books for home reading. This use of the books would be impossible if they were kept in the classroom, for the work of the regular recitations must go on and the teacher's time be left undisturbed. In brief, the country-school library should be the public library for that community, and the school building should be designed with this in mind.

The question of the size of this room would naturally arise here. How much space can be spared, or rather, how much can be provided for a library room? There will not be a large collection of books in most of the rural schools for a long time to come, and, hence, from the point of view of providing room for books, only a small space will be needed. Shelves can be built in the walls at little expense and

without encroaching much on the space available, but a room large enough to provide for a reading table and a few chairs will be necessary. Furthermore, the library room should in many buildings, and perhaps in most one-teacher buildings, be used also as a teacher's room. For her accommodation a small wardrobe, a washstand, and a mirror would suffice. The school supplies also can be kept in this room.

The library room will afford the teacher opportunity to confer privately with patrons and school officers. Teachers will soon learn that when parents call to present a grievance it will appreciably lessen any possible friction to send them to this room where an atmosphere of quiet and dignity prevails and to allow a few minutes to elapse before conferring with them. The more beautiful and tasteful this room can be made, the easier it will be to come to an amicable agreement. For these various reasons, in many of the floor plans presented for one-teacher buildings one room is planned to serve as a library and a teacher's room.

A room 10 feet long and 8 feet wide will generally be large enough for both purposes, especially if the windows are correctly set and the shelves and wardrobe are built into the wall.

This room should open only into the classroom, so as to give the teacher entire control of it and to make it possible to keep it warm from the classroom stove. If its location should afford an opportunity to build a small fireplace in it in connection with the chimney for the classroom stove, its usefulness and cheerfulness would be appreciably increased. The floor should be stained and waxed, and some tasteful, inexpensive rugs be supplied.

If this library room can be made a sort of spiritual and intellectual sanctuary for the community, its reflex influences will be seen and felt in many unexpected ways. A tasteful, cozy, and inviting library room in some of our district schools would help mightily to develop a dissatisfaction with rusty stoves, broken window panes, dirty floors, a hodgepodge of chromos on the walls, ill-kept school grounds, and that general air of neglect so commonly seen about country schoolhouses. This reflex influence might reach beyond the school grounds.

The possible use of the library room in connection with social activities in the community needs only to be mentioned. The room would be too small, of course, to attempt to entertain in it alone, but in connection with the workrooms and the classroom, it would prove a place for some social features that would aid in making the community life more enjoyable.

If some such plans for a library room could be wrought out, and the books be selected and used with reference to the special needs of the

community, the people would soon be willing to increase the expenditure for books and would develop a commendable pride in their public-school library.

BASEMENTS.

Until recent years very few rural schoolhouses have been constructed with basement rooms, and these have been in the colder climates of the north, but with the use of basement rooms there has been a growing recognition of their value in rural schools. In the first place, a good basement furnishes the best location for a furnace for heating the building. The word "furnace" is used here instead of "jacketed stove;" the only difference between a jacketed stove and a furnace is that the jacket surrounding the furnace is open at the top only through ducts or pipes, which are devised to conduct the warm air to different parts of the building. In all essentials, a hot-air furnace is merely a modified jacketed stove. When a furnace is used in a basement, it will be possible to heat directly, not only the classroom, but the workrooms, library, and cloakrooms. This will give a much more satisfactory and even heat to the various rooms than if dependence were placed upon a jacketed stove within the classroom itself. Furthermore, it will give an opportunity to ventilate all the rooms to good advantage. By placing the heating device in the basement, space will be saved in the classroom and a greater amount of space for fuel can be economically provided than would be easily possible on the first floor.

In the second place it would obviate much dirt, dust, and confusion in the classroom. In spite of all one can do, even with the use of wood, a stove in the classroom is a source of a good deal of litter in one form or another, and it always makes the room appear untidy and ill kept. Moreover, a building is less endangered by fire when a furnace is properly placed in the basement than it is with a stove located within the classroom. There is always some danger of fire dropping on the floor, or of doors coming open out of school hours and thus endangering the building. A good basement with a cement floor and carefully protected joists above to prevent overheating from the furnace reduces the possibility of danger from fire to a minimum. A furnace also generally has a better draft than a jacketed stove set in the room above because of the greater distance between the intake of the smoke flue and the exit at the top of the chimney. The fresh-air duct can be easily arranged from the outside through the basement to the furnace without in the least disturbing the general appearance or structure of the building. In another place more extended discussion will be made of the heating of schoolrooms.

Basements are always advantageous for the location of toilets and baths. This matter will be taken up in another chapter; it

is sufficient here simply to state the fact in order to make clearer the value of basements under rural schoolhouses.

It has been said above that a basement offers opportunity for a larger fuel room than can be accommodated on the main floor. This is a very important matter. In cold climates it is absolutely necessary to have some convenient and ample space for the storage of fuel for the winter, else the teacher or the pupils will be exposed to the weather in bringing in fuel and cleaning the stove of ashes. With a basement under a rural schoolhouse, ample room can be secured for the storage of sufficient fuel to last through the winter. This can be put in before the beginning of school and will be safe from rain and snow and will be in far better condition than if it were in some detached outbuilding. It is impracticable to attempt to build a fuel room sufficiently large on the main floor to accommodate a year's supply of fuel.

Doubtless the main objections which will be raised against the construction of basements under rural schoolhouses are the expense of construction and the difficulty of keeping them in a sanitary condition. A basement should not be constructed in a school building located on flat, wet land, unless there are abundant opportunities for properly underdraining it, or, rather, surrounding it with drains so that it will not become damp or allow water to seep in during a rainy season.

The best method of keeping basements dry is to surround them with tile drains, set at least a foot below the level of the basement floor. To surround the building with tiles is better than to attempt to run a drain beneath the floor. The tiles must be large enough to carry away all of the water flowing toward the basement, and the ditch must be so constructed that there will be ample flow into it from all directions. Comparatively little local surface water sinks into the drain; the water comes up from below into the drain and is thus carried away, frequently after having traveled a long distance underground. This principle is not generally understood by those who have not had large experience with the use of drain tiles. The pressure of the water increases with the depth and naturally that lower down would be the first to escape, just as in artesian wells. If, therefore, a drain is placed all about a school building and below the level of the basement floor, there is no probability that any flow of underground water will reach the school building, for it will be carried off through the tiles thus placed.

When a rural-school building is located on high, gravelly soil, with no drainage toward it from any direction, it will not be necessary to surround the building with a drain, for a good, strong cement floor and cement walls will prevent the entrance of any moisture

that might otherwise come in. However, it is generally safer and frequently not expensive to surround the building with a drain as indicated, and this makes assurance doubly sure.

Under ordinary conditions eaves troughs and leaders should be provided to carry away the water from the roof of the building. If there are no eaves troughs, the water will fall down all about the building and saturate the ground, making it difficult to keep the basement walls dry. The water from the roof should be carried away a sufficient distance to prevent any of it from finding its way back to the basement. When a drain is placed well below the level of the basement floor, the roof water can be carried down through the leaders and through cemented sewer tiles into the drain. Care must be taken, however, to prevent the débris which gathers on the roof and in the gutters from clogging the leaders or the drain below. Generally, there should be some form of trap between the sewer tile and the end of the leaders to catch the coarser materials and thus prevent clogging.

Eaves troughs, however, have their disadvantages, especially in cold climates. Frequently, when the roof is covered with snow and the atmosphere is below the freezing point at the eaves, the heat escaping from the school room will cause the underside of the snow to melt. A part of this water will freeze in the troughs and leaders and in time they will be clogged with ice and rendered worse than useless. Some builders in the north have given up the eaves troughs and depend on a drain directly below the eaves to catch and carry away the water falling from the roof. They lay the drain a safe distance below the level of the walls, give it a good gradient, fill the space above it to within a few inches of the surface with coarse broken stone or boulders, put a thin coat of soil and sod over the broken stone, and thus let the water sink quickly to the tiles. When stone is near at hand, this method of drainage will cost less than the use of leaders and eaves troughs and has proved acceptable in many places.

Besides the difficulty experienced with ice, eaves troughs are easily clogged with leaves and are frequently broken. Constant care should be exercised to keep them in proper condition.

The space to be excavated for a basement will not necessarily be of the same size as the school building. If it seems necessary to economize, only such excavation need be made as will give sufficient space for the use of the basement as indicated.

The height of the basement is a matter that can not be definitely settled once for all; each location will offer different conditions of drainage and surrounding topography. At some places it will be possible to excavate to a greater depth with safety than at others. Besides, the size and shape of the building will have a good deal to

do with the amount of basement walls showing above the ground. Ordinarily the distance between the finished floor of the basement and the joists of the floor above is about 8 feet. If the depth of the finished floor is 4 feet lower than the surface of the ground around the building, it would be necessary to raise the foundation wall 4 feet above the surface of the ground, and unless the building is rather low and wide this would leave the foundation wall too high and make it difficult for the exterior to maintain proper proportions. If the excavation is 5 feet below the surface of the ground, precaution will be necessary to prevent the entrance of ground water and to keep the basement from becoming damp and unhealthful.

The contour of the ground and the nature of the soil, as well as opportunities for carrying water away from the building will have much to do with the depth of the basement. It is possible to make a basement, where work rooms are not to be installed, usable and sanitary when the height between the cement floor and the bottom of the joists supporting the floor above is only 7 feet. In this case it will generally be necessary, however, to set the furnace in a water-tight cemented pit a foot deeper than the level of the basement floor, so as to keep the top of it at a safe distance from the floor joists above.

UNILATERAL LIGHTING.

If the great majority of children were not right-handed, it would be unreasonable to demand that the windows be so placed in school-rooms as to admit the light from the left side of the pupils when seated at their desks. But, since we are a right-handed race, with brains organized accordingly, the great majority of children are rid of troublesome shadows in writing only when light is admitted from the left side, thus carrying the shadows away from the written work and relieving the vision from the disturbances which would otherwise come. If the reader will take a seat in a closed room near a window and attempt to write with the hand which is next the window, he will realize more fully than words can tell how the shadows of his hand and pen will trouble him. Children suffer more from such disturbances than older people, because their eyes tire more quickly and their attention is more easily distracted. Hence it is a matter of importance to the health and comfort of all right-handed children to be so placed in the school room that light should come from the left rather than from the right.

All left-handed children should be taught from the first to write with their right hands. Contrary to the general belief, this is not a serious undertaking if it is made when the child is just learning to write. If, however, a child has not been early taught to use his right hand and has reached the upper grades with an established

habit of using his left hand for writing, it is often better to let him continue rather than to insist on a late change. In all cases, however, it is only fair to the left-handed writers to seat them, if possible, so that the light may come from their right, so as to throw the shadows back of their hands. But, since the great majority are right-handed, schoolhouses should be built to meet their needs and special provision be made for those who have not been taught the use of the right hand for writing.

But some one may ask: "Why not have windows on both sides of a classroom, for is it not impossible to have too much well-diffused light in a schoolroom?" Until very recently all school buildings were constructed in this manner, and it is still hard to convince some people that lighting from one side is better than lighting from both sides.

Suppose we consider a schoolroom with east and west exposure, with the same number of windows on each side, located in the same relative positions. At 10 o'clock in the morning, other things being equal, the light is stronger from the east than from the west, and the line where the light from each side is equally strong is well toward the west side of the room. This line will shift toward the east side the rest of the day, reaching the center at noon. But at any time in the day there are always two shadows of the hand and pen. These shadows are of equal intensity only at this shifting line of equal light. Here they are comparatively inconspicuous, but still visible. To the left or right of this changing line one shadow is stronger, and hence it is impossible to seat all pupils so as to give them an equally good light for writing. There is no desk in the whole room where double shadows of the hand and pen may not be seen; but those pupils who receive the stronger light from the side opposite the hand used in writing experience less difficulty. If the heavy shadow falls athwart the work and within the focus of the vision, it will fatigue the eyes uselessly. For this reason it is impossible to seat all of the pupils in a schoolroom with bilateral lighting without imposing some slight hardship on all and a serious hindrance on something less than half of them.

There are other reasons why bilateral lighting is not to be preferred. The best place for a blackboard is directly opposite the source of light, and hence it bught to be placed on the wall of one side of the classroom. The common custom has been to place the blackboards between the windows on both sides. Such a setting of blackboards is responsible for an untold amount of eyestrain, headache, and habits of inattention. He who reads these lines and can not recall from his school days a distinct memory of pain from such blackboards will understand the justice of the criticism if he will face an unshaded window and attempt to follow the demonstration of a problem

whose solution is worked out on a board adjoining the window. It must be remembered that the eye is to a large degree an automatic or reflex organ and accordingly accommodates itself to the light entering it. If one looks at work on a blackboard adjoining a window, a conflict in the demands of vision takes place. The strong light from the window causes the pupil to contract so as to reduce the number of rays of light which would otherwise enter the eye and overstimulate and shock the retina. But this is just the opposite of what the eye demands in order to read easily what is written on the blackboard; for when the eye is focused on a dark surface the pupil expands so that all the needed available light may enter. This conflict is the cause of much eyestrain, fatigue, and the accompanying revulsions.

Young children should not spend much time studying work written on blackboards; but we can not do without blackboards nor without frequently directing the attention of the children to work placed on them. It may be argued that there would be space enough on the end walls for all the blackboards needed, and that it is unnecessary to locate them between windows on the sides. Frequently, however, the teacher's end of the room is broken by doors to cloakroom, fuel room, or library, and all the available blackboard there found is needed for assignments and directions. The rear of the room, even if not broken by doors, is too far removed from many of the pupils to make a blackboard placed there effective for class demonstrations. Besides, the light on the end of the room is generally not so good as it is on the wall directly opposite the light. It is a rational conclusion, then, to say that even if unilateral lighting were not in accordance with the demands of hygiene it would still be wise to locate all the windows on one side, so that the other might be used for blackboards.

Contrary to the usual belief, light coming directly from above the desks introduces more disturbing shadows than that coming from the left. For this reason alone lateral lighting is generally preferable in schoolrooms to sky lighting, though the latter is often helpful in cities where tall buildings obstruct the light or where troublesome reflections from outside buildings are likely to overstimulate and fatigue the eyes.

Chapter VII.

PLANS FOR RURAL SCHOOLHOUSES.

The various plans exhibited in this bulletin are introduced for the purpose of furnishing to district-school authorities some specific suggestions to aid them in the planning and construction of rural schoolhouses. The variety of plans corresponds to the varying conditions met with. Some communities are able to construct buildings of ample size; others are limited in means. Some neighborhoods, with small school population, need small buildings; others, whose school population is growing, need larger buildings. Some communities can command the means to equip a building with modern conveniences; others will have to reduce expense to the minimum; and some must think of consolidation and the sort of building and equipment such conditions demand. Problems of rural education are so diverse that no one building can be designated as a standard building. There are some conditions which every building ought to meet and which have been set forth briefly in the earlier chapters of the bulletin; but, in other respects, country school-buildings must be constructed to meet the demands of the particular neighborhoods which they are to serve.

Model No. 1.

The first model presented is that of a one-teacher school building, including one cloakroom, a teacher's room, a library, a workroom for the girls, a fuel room, a toilet for the boys and one for the girls. This building is designed to accommodate about 40 pupils.[1] The plate showing the interior arrangements of the various rooms is from a photograph taken of the model with the roof removed. The number of desks shown in this cut is too great. The desks are properly located, but each will occupy more space than is shown in the illustration.

It is to be noted that in this building the main entrance is on the side. This, as has been said in the discussion on the location of the schoolhouse, is not, in general, the most satisfactory place for the main entrance to a one-teacher rural school building, because in a way it necessitates placing the long side of the building toward the roadway from which the entrance is made. However, school officers

[1] See plate 6.

are sometimes compelled to select a location with east or west frontage, and in such locations, if the main entrance is placed in the end of the building, the broad sides of the rooms would lie north and south, and this would make it exceedingly difficult to secure good lighting. The floor plan of this building was drawn with this difficulty in mind and is designed to help solve it. This plan can be used on a lot fronting east or west, and in either case will get good lighting. The plan contemplates facing west, so that the classroom would be lighted from the east. This will shield the classroom from the north and west winds in winter, and also, to some degree, from the heat in summer. The only difficulty with this orientation would be that the workroom, designed for the girls, would have only north light. If the building were faced toward the east and dependence were placed on west light for the classroom, then the workroom and library would get the south

FIG. 1.—Front elevation, Model 2.

exposure. The choice between the two orientations should depend on local conditions. Either will be, in the main, satisfactory.

In this building toilets are shown for the boys and the girls, the one for the boys being just to the left of the entrance from the outside, and the one for the girls opening off the workroom, which is largely designed for the special work that girls will engage in. Some objection might be offered to opening the girl's toilet into the workroom. It would be better if this could be easily avoided, but since this workroom will be occupied for the most part by the girls, it will be easy for the teacher to maintain proper privacy in it. If, however, it should seem advisable to use this workroom for both boys and girls, the program for the boys can be so arranged that no inconvenience for the girls will arise. Furthermore, the door into this toilet room may be made through the fuel room by slightly enlarging the space for the fuel room and that marked for the girls' toilet, and thus due privacy could be maintained. Of course where running water is not available, the toilet rooms shown could be left out or be used for other purposes.

The boys' room could be easily transformed into an additional cloakroom, and that for the girls be thrown into the fuel room or used as a tool room. The time is coming soon, however, when washout toilets will be more common in country schools, for the pressure-tank system of water supply will meet this demand.

In this building the light for the library comes from two sides, and the room will therefore be well lighted and properly purified by sunshine. Those who read or work in this room can easily adjust themselves so that there will be no need for anyone to face the light. The room is arranged to open only from the classroom and is thereby under constant and direct control of the teacher. Bookcases should be built in the walls. There will then be plenty of room for a reading table and chairs for those who are sent here to do their work. This library room should be made as attractive as funds will permit. The

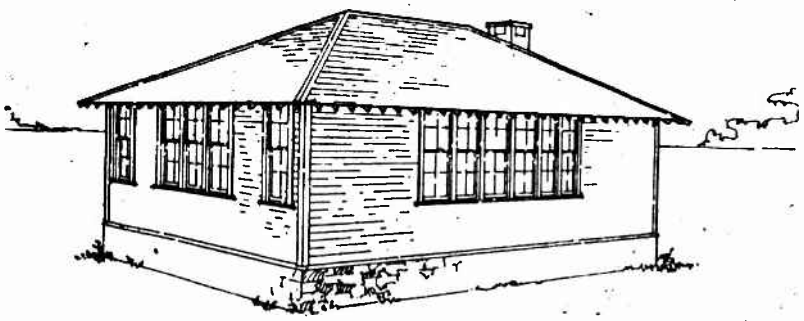

FIG. 2.—Rear elevation, Model 2.

children will consider the privilege of using it as a sort of reward of merit, and the teacher can use it effectively for many purposes.

The use of the workroom will, of course, depend upon many conditions. It will be noticed that the chimney passes up through this room, and hence a small range could be placed in it and the girls be taught scientific cookery. Tables and cases could be located in it for the purpose of teaching the designing, cutting, and making of girls' clothing. If the boys are to be taught also in this room, a workbench could be installed and certain lines of manual work could be engaged in.

The cloakroom to the right of the main entrance is designed for the use of both the boys and the girls, and has a door opening directly into the classroom. By a little careful supervision and proper arrangement of hooks, cases, and shelves, this room should be ample for the number of pupils it is designed to accommodate. If, however, at times the older girls should need a little more privacy, the workroom could be utilized for them.

The teacher's room is located off the front end of the classroom and is designed as a private place where the teacher may keep her wraps, and, if need be, keep the supplies for the school. In this plan, the teacher's room need not be utilized in any way as a reception room, for the library can better serve that purpose.

The classroom receives all of its light from one side, and the windows on this side are placed well to the rear. The bottoms of the windows are 4 feet above the floor, and their tops extend to within a few inches of the ceiling.

The cubical contents of this building between the floor and the main ceiling and the outside walls is approximately 15,700 cubic feet. The cost of construction, of course, will depend upon the kind of material used on local markets, both as to material and labor, and the kind of finish and furniture used on the interior. The model from which the photographs were made was designed and constructed by Messrs. Copper & Bailey, architects, of Boston. There are no difficulties in the way of construction.

The interior floor plan can be modified to some degree without serious disturbance; for example, if the library were furnished with a wardrobe to accommodate the teacher, the cloakroom could be enlarged to advantage. However, it would be a mistake to put anything in the library that would have a tendency to limit its usefulness or disturb the opportunity for making it attractive and beautiful.

As has already been said, if the workroom is to be used for both boys and girls, it would then be advisable to open the door into the girls' toilet from the fuel room. The fuel space could be boxed in, and there would be sufficient passageway through the fuel room into the toilet room. This would make the location of this room less objectionable.

A closer view of this building shows that the front steps are shielded partly by a small overhanging roof. The front door is protected from the weather. The floor of the open passageway should be cement or terrazzo. The only objection to leaving this passageway open to the outside as indicated is the danger of tramps or other disreputable travelers taking advantage of it as a place to tarry at night. If need be, the steps could be set in and double outside doors could be included. In the milder parts of the country this outside door would not be necessary. In colder northern regions the outside should be closed with double doors, thus preventing the snows from drifting in.

It would be a pity to disturb in any way the lines of the exterior, the pitch of the roof, the width of the eaves, the height of the windows, the height of the gables, or the lines of the windows, for they all blend into an almost perfect unity. A building with such delicate lines as

this should not be marred with eaves troughs or leaders. The wall should be protected by a tile drain all about the building located directly under the eaves, as described on a preceding page.

The little touches of art indicated in the style of the window sash may be neglected without any serious disadvantage. The color of the model shown by this photograph is pure white. It would not be at all necessary to follow this color scheme in a building constructed after this model; in fact, the building would be less conspicuous and more beautiful if a darker neutral shade were used for the roof and the sides. A dark weathered brown for the outer walls and a dark

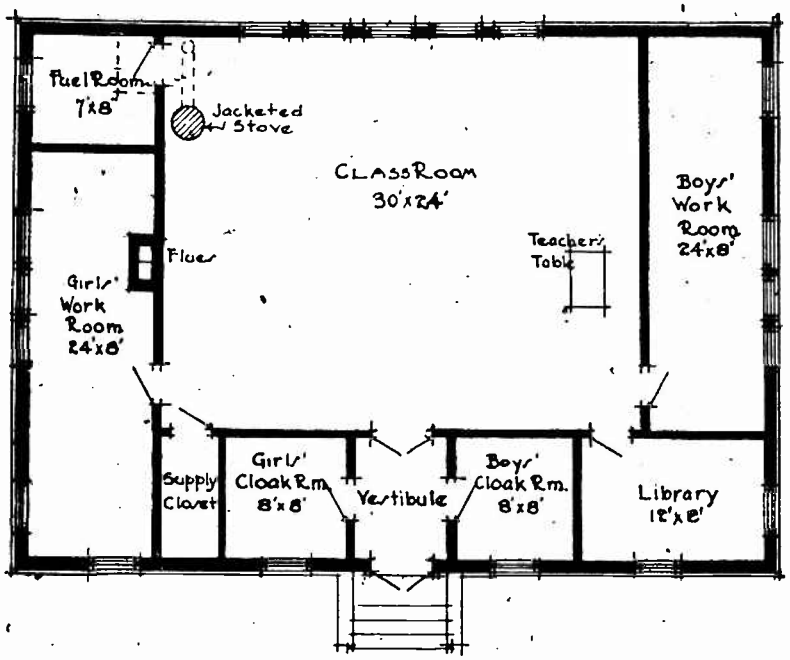

FIG. 3.—Floor plan of one-teacher school, Model 2.

moss green for the roof would make the building blend much better with the average country neighborhood than if it were treated in white. Any carpenter or builder should be able to take the measurements of these drawings and photographs and construct this building in exactly the same beautiful form.

Model No. 2.

The above floor plan of model 2 shows a one-teacher rural schoolhouse, with a classroom in the center of the building, and with the workrooms and library grouped around it on three sides. This building is also designed, as in model 1, to occupy a lot having an east or

west frontage, and to make an entrance in the side of the building. If the front of the building is situated on a lot facing west, then the lighting of the classroom would come from the east, and the boys' workroom would receive the south light, the girls' workroom would receive north and west light, the library would have south and west light, the cloakrooms would both receive west light. However, this building could be located so as to face east and be equally well situated with reference to the lighting. The advantage in facing it west lies in the fact that the classroom would be shielded somewhat in winter from west and north winds. This plan is more elaborate than the first one, because it has two workrooms, one for the boys and one for the girls.

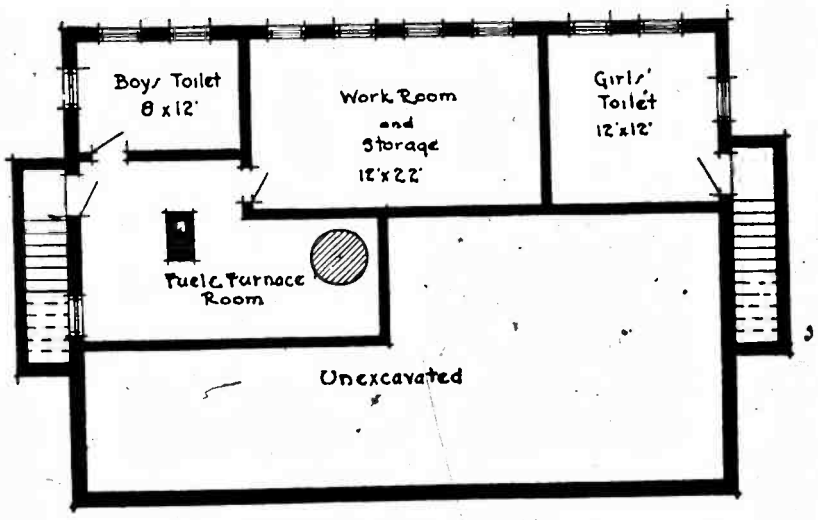

FIG. 4.—Suggested basement for Model 2.

This is a decided advantage. It gives room for different kinds of manual training equipment, and develops a sense of responsibility in both boys and girls by having special rooms for their special work. The library is not quite so large, but there are two small cloakrooms, one for the boys and one for the girls; in addition, there is a fuel room in the rear of the classroom and a small room for tools, drawers, and cases adjoining the girls' workroom.

No toilets have been planned in this building, and the basement would have to be arranged for them or else detached buildings used. The accompanying drawing (fig. 4) shows how the basement could be arranged both for heating apparatus and for the location of toilets and baths and offers suggestions to those neighborhoods with sufficient funds at hand and opportunity to supply running water.

The classroom, as was said, is situated in the middle of the building, with only one outside wall. The windows in this room have been

grouped closely together on the rear and left of the children when in their seats. The windows are set 4 feet above the floor and are 3 feet wide and 8 feet high. The distance from the finished floor to the ceiling is 12½ feet.

Blackboards in this room are set on three sides of the room; none are on the window side. At the front end of the room, near the teacher's desk, the blackboard should be set 3½ feet above the floor and should be 3½ feet wide. On the other sides it is better to set the blackboards 28 inches from the floor and to make them 4 feet wide.

Wainscoting should be placed beneath the windows and beneath the blackboards all around the room. On the window side, this wainscoting should reach to the lower part of the window casing; on the other side to the chalk trough.

The walls above the wainscoting and those above the blackboards should be plastered with the best material and, before the building is used, should be tinted a light grayish buff or a very inconspicuous shade of grayish green. The colors of the red end of the spectrum should not be used in a schoolroom.

If a basement is provided under this building, the entrances to it should be from each end, beneath the workrooms, and these entrances should be guarded by some form of covering that would harmonize with the architectural design of the building. A furnace could be located at the most convenient place in the basement, preferably near the center, and from that point hot-air pipes could be carried to the workrooms, library, and classroom.

If provision is made for a fuel room in the basement, a fuel room on the main floor will not be needed, and that room could be utilized as a teacher's room. The floor plan was drawn on the supposition that no basement would be provided, and the location of a jacketed stove and chimney are indicated. If a basement is provided, as suggested, walks should extend around the building and provision should be made for tile drainage.

The classroom is 30 feet long and 24 feet wide and has desk room for 35 to 40 pupils.

The boys' workroom, situated immediately back of the teacher's desk, is 24 feet long and 8 feet wide. It is lighted entirely from one side and has a door opening into the classroom near the library room. Cases could be built in the outer end of the boys' workroom for tools and models used in connection with the shopwork.

The girls' workroom as shown is approximately 25 feet long and 8 feet wide and is lighted from two sides. A door opens into this room directly opposite the door into the boys' workroom, and thus allows passage along the wide aisle between the last row of seats and the inner wall.

Blackboards should be set in both of these workrooms on the inner walls and should be 3½ feet above the floor and 3 feet wide. These blackboards can be used for many purposes, but are chiefly designed for drawings, lesson assignments, and plans in connection with the work done in these rooms.

The small room adjoining the girls' workroom, marked "storage room," can be fitted up with drawers and shelves for sewing materials and also for kitchen utensils.

The library room opens directly off the classroom, near the teacher's desk. This library is designed to be 10 feet long and approximately 8 feet wide. Bookshelves should be built around the wall in those spaces not occupied by the windows and the door. These shelves should not be more than 9 inches deep, and hence there will be room for a small reading table and a few chairs. The walls above the bookshelves should be tinted the same color as in the classroom.

The cloakrooms, opening left and right from the vestibule, have one door each and are designed to communicate only with the vestibule. Were it not for the fact that the blackboard space on the wall in the classroom opposite the windows would be greatly limited, a door should open into the classroom from each of these cloakrooms. This arrangement would give the teacher better control and would prevent some congestion in the cloakrooms, but unless the blackboards in the workrooms could be utilized for some of the regular class work this change would not be advisable.

To prevent annoyance, all doors opening into the classroom should swing out. This applies to the doors of the workrooms, library, vestibule, and fuel room.

The chimney passes up through the girls' workroom. This will permit the one chimney to serve both the jacketed stove or furnace and a range for the girls' workroom.

The floors of all rooms of this building should be double, except the vestibule, and that should be of cement or terrazzo. The upper floors in the other rooms should be made of hard pine, selected maple, or oak boards.

The wainscoting throughout the building should be stained a neutral brown, so as to reflect no high lights into the eyes of the pupils while they are at work. The roof should be of rather flat construction, preferably hipped.

The windows into the cloakrooms, as will be noticed, are set 6 feet above the floor, so that the walls beneath them can be used for clothing hooks. This provision will give plenty of light, and it also relieves the architectural features of the building to some extent.

The model from which this drawing was made was designed by Mr. William B. Ittner, of St. Louis. The drawing does not show

the real beauty of the exterior. The model was not in condition for photographing, and this drawing had to be made instead.

The dimensions of this building are 46 by 32 feet. In rural communities where there are opportunities for utilizing the school for general social purposes, it would furnish plenty of space. The girls' workroom, the boys' workroom, and the library especially lend themselves to uses of this kind. With a range in the building, light refreshments could be easily prepared, and this, as every one knows, would add greatly to the success of any social undertaking. If a teacher who understands how to organize a district school to meet the demands of the community were located in such a building as this, it is needless to say that she could at once interest the whole community in the rural life problems undertaken in the workrooms as well as in the classroom.

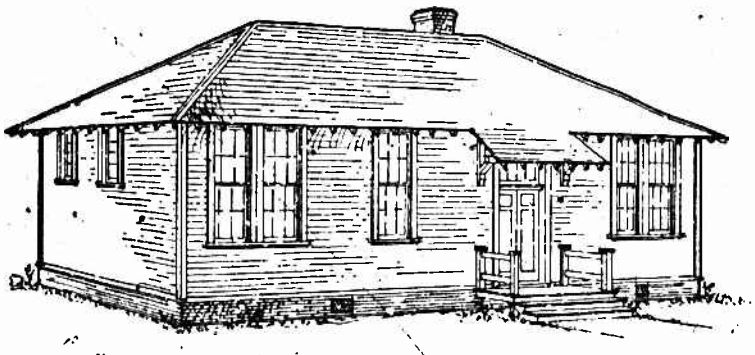

FIG. 5.—Sketch of one-teacher school designed by J. L. Sibley (See p. 107).

Naturally, this building should be located on good soil, with sufficient ground about it for agriculture and gardening, as well as for playgrounds.

Model No. 3.[1]

Model No. 3 represents almost the minimum of rural school equipment. Separate entrances connected with cloakrooms are made for the boys and for the girls. From these cloakrooms doors lead into the classroom, which, as will be seen, is designed for a district with comparatively few children.

The dimensions of the classroom are 18 by 24 feet. The architects have indicated the placing of 35 desks. This would give a little less than 13 square feet of floor surface to each pupil. This would not be sufficient, unless most of the children were of the primary grades. Such a building as this should be used for no more than 30 pupils.

In the rear of the classroom provision has been made for a fuel room, and also for a furnace which would introduce the fresh air into the room at a height of about 8 feet above the floor. The chimney is

[1] See plate 7.

placed at some distance from the furnace on the other side of the fuel room, and is designed to have a vent flue opening from the schoolroom near the floor line, in this way utilizing the heat from the furnace to create a circulation of air in the schoolroom. Possibly it would have been better if the chimney had been placed near the center of the partition, so that the smoke pipe leading from the furnace to the chimney would not be so long, and hence less dangerous, and also to prevent dead air space near the window side of the room. However, this suggestion is not of great importance, because there is less danger of dead air space near the windows than on the opposite side of the building.

The storeroom off the fuel and furnace room is designed simply for brooms, brushes, and such material as a janitor would need. A separate entrance is marked for the janitor. This does not seem at all essential, but does make an easy method of introducing the fuel.

The classroom is lighted abundantly from one side alone. The windows are placed, approximately, 4 feet above the floor and run up to the ceiling. It will be noticed that the ceiling of the cloakrooms and the fuel room will not be so high as that of the classroom on account of the method of roofing. This will be a definite saving and will introduce no serious difficulty.

Two small windows, one in the rear and one in the front of the classroom on the right of the pupils' desks, may be included for the purpose of ventilation during warm weather. If these windows are inserted, they should be placed above the blackboards and so arranged that they may be opened easily from the floor. They are not designed for light, but are "breeze windows." These will relieve the rather bare side of the building, and give a better general effect architecturally.

The rather elaborate steps and overhanging roof give a quaint effect to the building, and would not be at all difficult or expensive to construct.

The light in the cloakrooms is preserved by cutting away the broad eaves immediately over the windows in front of the building.

As noted above, this building is planned for almost the minimum activities of a rural school, and may be of service in those communities which can not undertake to build a more elaborate structure, designed for a larger educational program.

The chalet effect in this building would be especially pleasing on a bench level of a hillside, with the windows facing up or down the valley. Such a position should be chosen only when there is a sufficient amount of level ground to afford playgrounds and such gardening as a school of this size would undertake. The building should face south, preferably, so as to get the west light in the classroom and the south light in the cloakrooms. If it faced north, the classroom would

get east light, which is frequently better than west light, but the cloakrooms would not get as much sunshine.

This building especially lends itself to the clapboard form of construction; that is to say, the weatherboarding could be unplaned lumber fastened to an inner sheathing and then stained some color that would blend with the trunks of the forest trees. The long, flat roof and extended eaves give it beautiful lines, and if the grounds were treated to suit the building it would make a most attractive small rural schoolhouse. This building should not be treated in any other way than in wood; it would not suit brick, stone, or cement.

The cost of such a building ought to be very low, for it would require very little lumber, and the plan is so simple that any builder could easily construct it from the data given in the floor plan and the photograph. These are all drawn to scale, and although they are much reduced in the photograph all the working drawings could be made up from the data here given.

In the classroom in this building the blackboards are on three sides of the room, none at all being on the window side. The main blackboard is on the wall directly opposite the windows. Since this building is especially designed for primary pupils, the blackboards should not be set above 28 inches in height, except at the teacher's end of the room. The width of the board should not exceed 3½ feet.

Model No. 4.

Drawings showing the basement and floor plans of model 4 are here inserted and described. This model was designed for a small village school or a consolidated rural school in which two teachers would be sufficient. The basement plan includes toilets and baths for both girls and boys, with dressing rooms attached, and a fuel and furnace room.

In order to economize space and lessen expense, entrances to the basement rooms are made at each end from the outside of the building. Some simple harmonizing covering should be devised for the stairways leading down into the basement, and walks should be constructed along the whole front of the building and on the two ends leading to the basement steps.

The entrance to the furnace room could be made through the boys' bathroom or a separate door for it could be opened on the outside. It would be simpler and cheaper to open this door through the boys' room, as indicated.

The drawing for the basement shows half of the space underneath the building excavated. If funds permit and the location be suitable, the whole area underneath the building could be excavated, and in addition to the toilets and baths and furnace room, workrooms for boys and girls could be easily constructed. This, of course,

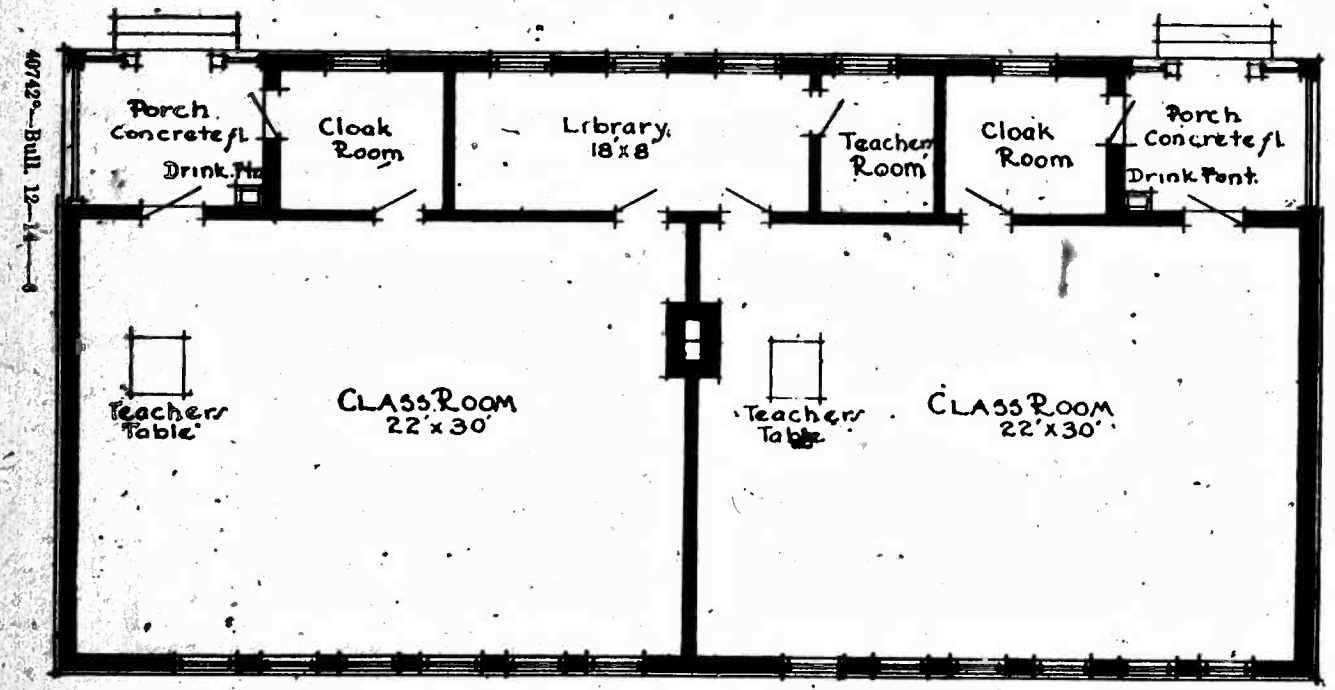

FIG. 6.—Floor plan, Model No. 4. Two-teacher school.

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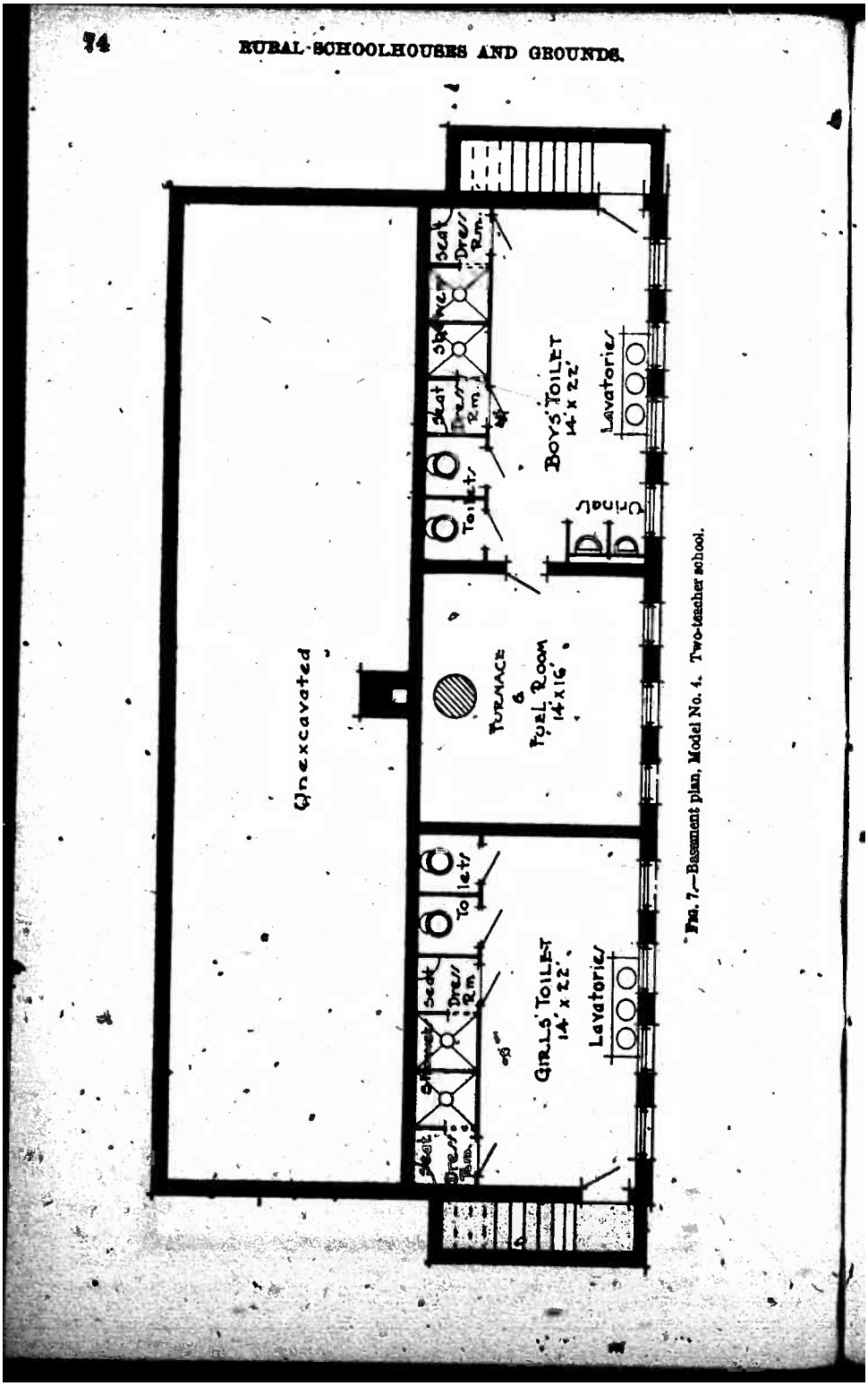


FIG. 7.—Basement plan, Model No. 4. Two-teacher school.

would necessitate lifting the building somewhat higher above the surface of the ground in order that the excavation would not be too deep to interfere with sufficient light and proper ventilation in these workrooms. However, the building should not be lifted much higher above the surface of the ground than shown. Light could be arranged for two sides in each of these rooms. The stairways to the basement could lead into the workrooms rather than into the toilet rooms, and connecting doors from the workrooms to the toilet rooms could be easily provided.

The drawing shows a shower bath and two dressing rooms for the boys, and the same conveniences for the girls. The furnace room is shown sufficiently large for the storage of fuel.

The chimney is set to pass up through the center of the building, through the partition between the two classrooms. If a workroom for the girls is devised in the basement, an additional flue in this chimney should be constructed to accommodate a range.

The basement plan as shown makes provision for the introduction of ample light and sunshine. A basement of this sort, with the sanitary appliances indicated, could not be equipped unless running water and either a sewer outlet or an ample septic tank are available in connection with the toilets and baths.

The floor of the basement rooms should be carefully cemented, and the walls plastered with hard cement plaster; and some form of waterproof paint should be used throughout the rooms.

The ceiling of the furnace room should be carefully constructed, so as to avoid the possibilities of fire from the furnace. If need be, the furnace could be set in a pit a foot lower than the floor of the basement; but, with such an arrangement, especial care should be taken to prevent seepage of any water into the pit.

The drawing also shows that the dressing room, the stalls for the seats, and the urinals all face toward the windows. This will insure better sanitary conditions and will also make it much easier for the teachers to inspect the condition of these rooms.

A fresh-air inlet for the furnace should be built from the window side and the duct be so placed that it will not be in the way of the fuel. The location of this duct will depend somewhat on local conditions; it is therefore not shown in the drawing.

The floor plan (fig. 6) of this building shows two entrance porches, a cloakroom for each classroom, a library connecting with each classroom, and a teachers' room off the library.

The dimensions of the classrooms are 22 by 30 feet, with light entirely from one side. It seems unnecessary to introduce breeze windows into either of these classrooms, because the outer door in each room

opens on a covered porch, and, if a breeze is needed, this door can be left open. Additional help in the way of a breeze could also be obtained through the library by opening the doors from the classrooms into the library and throwing open the windows of the library.

The windows in each classroom are grouped to the left and well to the rear of the pupils when seated at their desks, thus insuring plenty of light. The windows are designed to be 3 feet wide and 8 feet high and to be set 4 feet above the floor. The mullions between the windows are to be not greater than 12 or 14 inches. This arrangement of the windows would give a glass surface a little greater than one-fifth of the floor surface and, with this size of classroom, would insure abundance of light under any ordinary conditions of proper orientation. Sufficient blackboard room is furnished by using the rear and front walls of each classroom and those parts of the inner walls not broken by doors. No blackboards should be placed on the window side.

The height of the classroom should not be greater than 12½ feet from finished floor to the finished ceiling, as indicated in the previous plans. The finishing and tinting of these rooms should follow the general plan indicated in connection with the other models.

If it seemed better to dispense with the teachers' room and instead supply a wardrobe for each teacher, the library room could be enlarged to advantage by including the space marked off as a teachers' room. This would give a library room 24 feet long and 8 feet wide, which could be made the most attractive and inspiring place in the building.

Doors are indicated in the cloakrooms opening out on the porch, so that when children come to school they may hang up their wraps before coming into the classroom. However, these doors could be dispensed with, and the inner door indicated would suffice. This, of course, would make more congestion in the cloakrooms, but it would give the teacher better control, and thus prevent pilfering and carelessness in the cloakroom.

Warm-air ducts are shown in the corner of the library room and the teachers' room. These come from the furnace below and should open into the classroom approximately 8 feet above the floor. The size of these ducts will depend somewhat on the location of the furnace and their complete insulation from the cold air underneath the building. There ought to be also a warm-air duct opening into the library. The location of this is not indicated, but can be easily supplied in connection with the duct already indicated in the library. In rigorous climates foot warmers should be introduced along the front of a seat situated near the front of each room.

The windows opening into the cloakrooms, library, and teachers' room should all be of the same dimensions as those in the classroom and should be located in the same manner.

The porches should have cement floors and, instead of a boxed entrance as indicated in the photograph of the model (plate 9), steps could be arranged partly inside and partly outside the full length of the front side of the porch. The open end of the porch should be shielded by a banister or a solid wall 3 or 4 feet high.

The drawing suggests that a water cooler could be located in the inner corners of the porch. This position also would furnish excellent opportunity for a drinking fountain and would be safe except in extreme cold weather, when the water could be turned off and some temporary arrangement made for supplying proper drinking facilities. Local conditions and climate will have so much to do with these arrangements that only suggestions are possible.

The photographs of the views of model 4 show how the building would appear from the outside. The only difference between the photographs and the description given is with reference to the entrance steps to the porch. While the illustration hardly indicates it, this is a beautiful, simple model for a two-teacher country schoolhouse. These models, used as they have been in many different parts of the country, were not in good condition for photographing, so that they do not appear to the best advantage in the illustrations.

The roof has wide eaves and is comparatively flat. No attempt at decoration is manifested aside from pleasing proportions.

This building could be treated either in wood, cement, or brick in an effective way. If constructed of wood, it should not be painted white, but in a color to harmonize with its environment.

If eaves troughs are used on this building, the leaders should be placed in the rear so as not to harm the effect of the lines of the front. If a tile drain were placed about the house, as indicated in previous discussions, and the steps to the basement were properly and effectively guarded from beating rains, no eaves troughs would be necessary, for the roof is wide and low and the water could be carried off by the drain as fast as shed from the roof.

If a building following this model were constructed on a good location, fronting east or west, and the garden treated to harmonize, there is no doubt that a very beautiful and attractive rural schoolhouse would result.

The writer is indebted to Mr. William B. Ittner, of St. Louis, for constructing this model on a floor plan which was suggested to him.

This plan is commended to those village and country school officers who desire to get a good building with minimum cost. Those who undertake to copy it ought to try to get the same effect in the proportions as here shown.

Model No. 5.

Model 5 represents a three-teacher school building, having a library and a girls' workroom on the main floor, and a basement, including baths and toilets for both boys and girls, a workroom for the boys, and provision for two small furnaces and a coal bin connected therewith.

Entrance to the basement is gained from either end of the building through a vestibule. The girls' toilet and bathroom is not accessible from any other part of the basement. The entrance to the boys' workroom is near the foot of the steps leading to the basement, and the boys' toilet is entered from an adjoining door. Entrance to the furnace room and coal bin is down the stairs used by the boys.

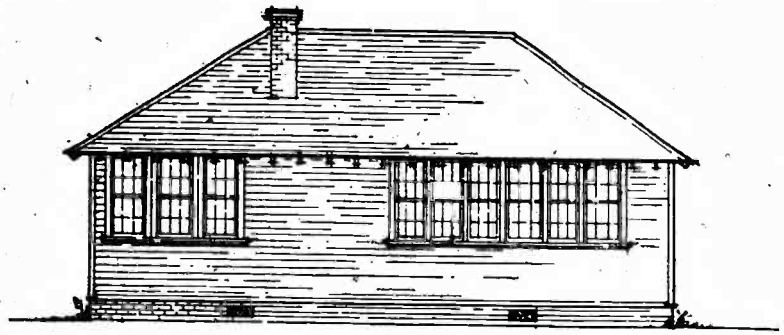


FIG. 8.—Rear elevation, rural school designed by J. L. Sibley (see p. 107).

A three-teacher schoolhouse is one of the most difficult to plan. In reality this building is what might be termed a "four-roomed" building; but the space for one classroom and its necessary cloakroom has been utilized for the library and the girls' workroom. A building of this type would be well adapted for a centralized or consolidated school in a sparsely settled district.

Two furnaces are shown.[1] One large furnace would be ample, and it could be situated nearer the center of the building, relieving the boys' workroom, and making it easy to conduct the heat from the furnace to the various rooms in the building. If this change from two furnaces to one is made, as indicated, special care will have to be taken to provide an ample inlet for the fresh air, and this would probably be done better by constructing a narrow passageway ending near the furnace in a galvanized duct. This would prevent a good deal of friction and insure a better supply of fresh air.

Dressing rooms for the boys could be easily constructed along the inner wall next the workroom.

The illustration shows three showers near the outer end of the girls' toilet room and two near the entrance. It seems that three showers

[1] See plate XII.

would be ample, and that the two squares marked "showers" near the steps could be utilized for dressing rooms.

Ample lighting for the basement rooms is indicated, especially if the small furnace in the boys' workroom is removed and a larger furnace put nearer the center.

If this building is located on a slight elevation, in good soil, the basement can be excavated to the depth of 4½ feet, and the distance from finished floor to the ceiling of the basement would be 9 feet, thus giving windows 4 feet in height on those sides of the basement requiring the greatest amount of light.

The plan has been designed for a consolidated rural school where running water is available, where good drainage can be obtained, and where a septic-tank disposal can be introduced.

Plate 8A was made by removing the roof of the model, raising the model on edge, and photographing it down through the interior.

It will be necessary to face this building north or south in order to insure the proper lighting for the rooms above ground as well as for those in the basement.

The classrooms are 30 by 24 feet, and this photograph of the interior shows provision for 48 desks in each room. This is too great a number; instead of 6 rows, only 5 should be provided. This will give better space for aisles and will not overcrowd the room. In the primary grades, however, if conditions demand 6 rows, they may be introduced, because desks for primary pupils are not so large as those for the upper grades.

Each classroom is lighted entirely from one side, and the desks are so arranged that the pupils get the light from the left side. The windows are placed to the rear and left of the pupils when seated at their desks, each room being provided with 5 windows, 3 feet wide, 8 feet high, and set 4 feet above the floor.

The distance from finished floor to the finished ceiling in all of the rooms on the main floor is 12½ feet.

In addition to the three classrooms, a girls' workroom and a library are provided on the main floor. The girls' workroom is lighted from two sides; the library gets its light from one side only. It seemed better to give the girls' workroom the advantage of the light and ventilation, because such work as they engage in will necessitate in part, at least, better light than would ordinarily be needed in those parts of the library some distance from the windows. The space near the windows in the library can be utilized for reading tables, and the space nearer the halls can be left free for bookstacks and magazine tables.

It will be noticed that the chimney is so placed as to come up through one wall of the corridor and a cross wall between two class-

rooms. This will necessitate a very little amount of projection either into the corridor or into the classrooms.

Provision is made for inlets for the warm air, if a hot-air furnace is used, and for exits on the same side for each room. The arrangement of these ducts and exits should be studied very carefully, so that each room could ordinarily be kept at the same temperature.

By reason of the foreshortening in photographing the interior of the model, the walls seem to be spread across the center and make the floor look a little irregular; but this photograph has been introduced in preference to line drawings, for it shows a great many more features than an ordinary drawing could show.

A cloakroom, opening into the classroom only, is shown at one end of each classroom. These are lighted from the outside and are ample for all of the children in each room. Provision for two doors, opening into the corridor, was made for each classroom. If it should seem more advisable to introduce but one door from the classroom into the corridor, this change can be made without any difficulty.

From the vestibule a series of steps leads up to the corridor and another series down to the basement. Double doors are indicated in the model at the head of the steps leading up into the corridor. This isolates the corridor and the rooms opening into it from any possible contamination of the air from the basement. These doors at the end of the corridor should be fitted with large panes of glass, so as not to obstruct the light. Outside doors are shown at each entrance, and these could be left open during the school session, thus preventing bad air from getting into the corridor or classrooms from the basement. These outside doors show large transoms or windows above. It will not be necessary to arrange these windows as transoms; they are needed simply for the purpose of throwing plenty of light across the vestibule into the corridor.

The photograph (Pl. 5C) showing the front of the model will make the entrance doors clearer, and will also show the method of lighting the classrooms and the front part of the basement. The decorations in the upper parts of the windows opening into the classrooms are not essential to the beauty of the building. They represent little artistic touches which may be introduced if desire prompts. Unfortunately, the pillar on the right of the entrance as shown in the cut of the front of the model was out of plumb, and makes the model appear awkward. Attention should be called to the low, projecting roof, and especially to the extension of the roof over each entrance to the building.

The question might arise regarding the necessity of two entrances, one marked for the boys and the other for the girls. There is no need of limiting the boys to entrance at one point and the girls to another. However, there should be a door in the rear leading out toward the

playground, and since the basement on the girls' side is carefully protected, there is no reason why this door could not be used by both boys and girls, and the same is true of the front entrance.

If this building were located on a lot fronting east or west and if there were sufficient space to remove the building far enough from the roadway to avoid dust and disturbances, it would be entirely justifiable to face the broad side of the building toward the roadway, thus making the two entrances equidistant from the gateway leading from the street or roadway. In fact, this building is beautiful from any point of view and easily lends itself to proper orientation.

The height of the classrooms from finished floor to ceiling should not be over 12½ feet, and the drawing shows the corridor 12 feet wide.

The cloakrooms are drawn 6 feet wide. The location of the doors into the cloakrooms can be seen by studying the cut showing the interior.

The model was designed by Cooper & Bailey, of Boston. The building can be constructed of any ordinary material, but is especially adapted to concrete or stucco. The model is painted white, and hence is shown in the photograph in this color. It would ordinarily blend better with the environment if it were a dull gray or, if constructed of wood, a rich brown. The color of the roof should be made to harmonize with the construction. A building following this plan could be constructed at a reasonable cost, for it demands no superabundance of material and is in every way simple in construction.

Model No. 6.

The floor plans and views of the model here introduced show an unusual type. The model represents a building having four classrooms, with a cloakroom attached to each; two separate excavations for basement, in which are rooms for toilets, baths, furnaces, and fuel; connecting pergolas; and an open-air theater or assembly room.

The accompanying drawing (fig. 10) of the basement plan shows that only half of the space covered by the two parts of the building is excavated and that the entrances to the basements open to the rear and outside of the building. Toilets are located in each case where they will be well lighted, and shower baths and dressing rooms are indicated in each side. The basement rooms are to be lighted from one side and the outer end. A chimney from each basement extends up through the connecting walls between the classrooms and emerges at the comb of the roof. The furnaces can be so placed as to make it easy to secure fresh air, and the ducts leading to the rooms above can be easily constructed. If instead of hot-air furnaces, hot water or low-pressure steam seems preferable, one boiler would be sufficient and the heat could be conveyed in carefully protected pipes underground

from one building across the court to the other. This basement plan could be used only in communities furnished with running water and sewer connection or septic-tank disposal.

The floor plan represents four classrooms and a cloakroom at the outer end of each. These classrooms are 32 feet long and 24 feet

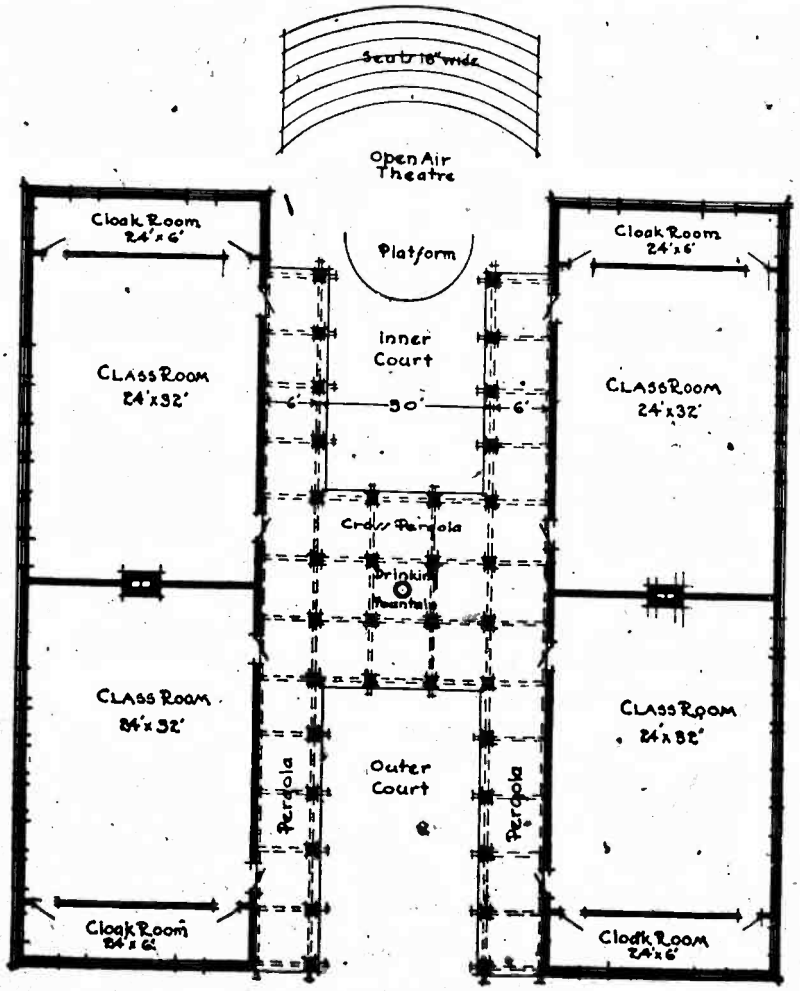


FIG. 9.—Main floor plan, Model 6.

wide. The cloakrooms are 6 feet wide and extend the entire width of each classroom. This makes it possible to introduce windows in the ends of the building for lighting the cloakrooms, thus relieving the architectural features of the building.

The unusual and interesting part of this building lies in the fact that no halls have been provided; their place is taken by pergolas,

connecting the two buildings and opening into the court. There is also shown a series of semicircular amphitheater seats for open-air classes and assemblies. This model was designed for the warmer parts of our country, and especially for those sections of the South and Southwest where the climate will permit much outdoor work. The building can be used not only for school work, but for social and educational purposes by the whole community.

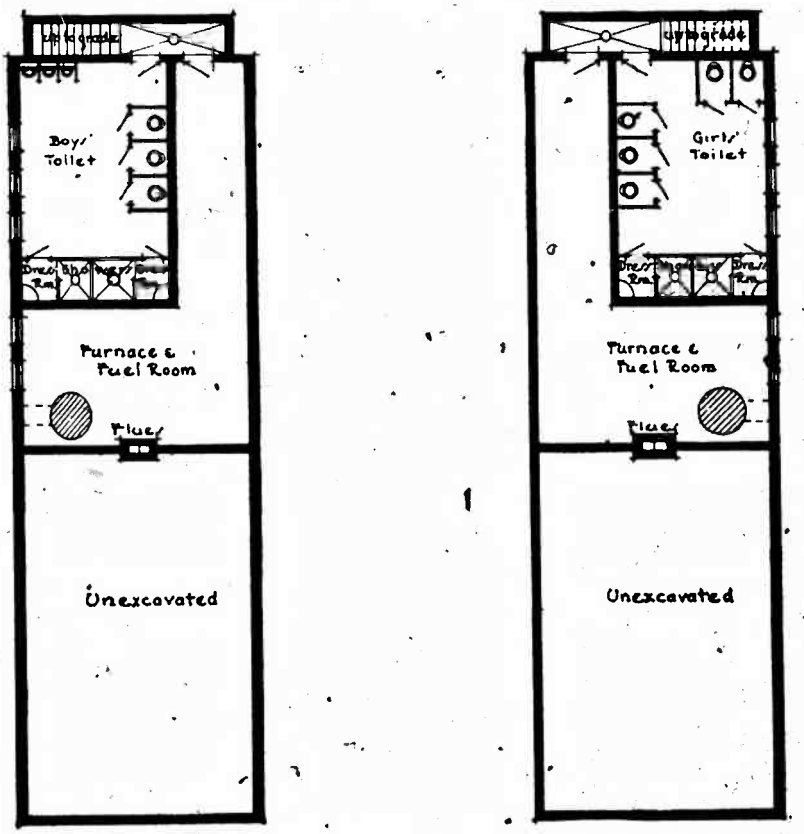


FIG. 11.—Basement plan, Model 6.

The building may face either north or south. In the warmer parts of the country it would be preferable for it to face north, so that an audience occupying the amphitheater seats in the rear would not have to face the sunshine. In the cold or windy parts of the country a good deal of protection could be secured if the building faced south. In no case should the building face east or west, because, if so placed, the classrooms could not be properly lighted.

The pergolas should be covered with vines, preferably grapevines or some hardy perennial, so that in time the whole structure would

not seem to be composed of two parts, but would be blended into a unit.

Two doors are shown in each classroom, one in the front and one in the rear end of each room. These open directly out beneath the pergolas and into the court. The width of the court, as shown in the drawing, is 30 feet. This will not separate the two parts of the building too far, and at the same time it will give sufficient room for the open-air theater and the court to accommodate not only the members but the patrons and friends of the school.

In order to get a little more clearly before the reader the idea in mind in drawing these plans, the following uses of this open-air theater are suggested: In the first place, all the children in the school could be gathered from their classrooms to these seats in a minute or two, because the children of each room could march separately and directly to the theater. Hence, in good weather, the morning's exercises for the whole school should be conducted here. Chorus work throughout the day, or regular classes from any of the rooms where blackboards are not necessary, could be conducted here. Entertainments of all kinds, weather permitting, could be given without any danger of disturbing the school building, and, above all, in the open air. The pergolas offer an excellent opportunity for simple decoration for evening entertainments; two or three dozen lighted Japanese lanterns hung from the beams of the pergolas would make a beautiful picture. The rear court could be used as a stage, and its convenience to cloakrooms and classrooms would easily suggest how these might be used as dressing rooms whence the actors could emerge without the need of curtains. Flowers, plants, and shrubs in this rear court could be arranged with the idea that the space is to be utilized for a speaker's platform, for a theater stage, or for the conductor of a chorus.

Neighborhood clubs, farmers' institutes, and all the social and educational gatherings of the neighborhood might utilize this open-air theater.

It will be evident to anyone considering the proper site for such a building that the amphitheater seats could be more easily and artistically placed if the building were situated with these seats resting against a hillside or a convenient mound about which were vines and shrubs and trees.

The upper tiers of seats in this amphitheater should be about 16 inches high, and the lower tiers should be adapted to the smaller children and be about 12 or 14 inches high. The width of the seat should be great enough to provide space just behind the back rest for the feet of those sitting immediately behind, and thus keep them from interfering with the backs of those sitting one step lower.

No one who has not felt the delight of such an auditorium as this can be expected to appreciate fully the pleasures and comforts it brings. In this auditorium questions of ventilation do not enter, and it would certainly emphasize in a striking way to all the people who might frequent it that there is far less danger of taking cold in the open air, when properly clothed, than in ill-ventilated rooms. Such an open-air "room" as this would be the most useful, the most delightful, and most educational place about the whole building.

The cross pergolas connecting the centers of the two buildings should be 12 feet wide at least, and a bubbling fountain should be erected at their center. The waste from this could be piped directly to a waste-water exit in one of the basements. A fountain located at this point would be easily accessible to all of the children and to anyone else attending exercises in the theater. If it should seem necessary to have more than one fountain, they could be arranged for at the same point.

The classrooms receive light from one side only, to the left of the children when seated at their desks. Each window is 3 feet wide, 8 feet high, and is set 4 feet above the floor. Instead of the ordinary sliding sash, casement windows should be supplied to this building, which would open directly out and be so hinged and guarded that they could be held at any point without danger of being broken by the wind. Plate 26B is inserted to show this window arrangement in one of the semi-open-air rooms of a Louisville school building. This type of window sash calls for special care in construction and arrangement, but can be imitated with success in a rural school.

This building would easily accommodate 140 to 160 pupils of the elementary grades and 100 of high-school grade.

Several serious omissions in rooms needed in such a building as this have doubtless occurred to the reader; no library, no workrooms, and no offices for the teachers have been planned. They have been purposely left out of this plan; not that they are not absolutely essential, but that they could be provided in separate buildings. This form of building permits of front extension without any serious disturbance to its unity. In drawing these plans without these several rooms the thing in mind has been the construction of four classrooms, with the accessories mentioned, at the very lowest possible cost. By referring to the photographs representing the model it will be seen that the hipped roofs of each half of the building are low, with wide eaves, and hence that all the walls are of the same height. If the building were constructed of wood, each piece of studding would be of the same length, provided the foundations were level. Altogether the construction is reduced to its simplest elements, especially as the expense of halls is entirely eliminated.

These plans are offered, not as perfect and complete models, but as hints toward greater utilization of the open air for classes, assemblies, and general social work.

The building should be located on ample ground, and the trees, shrubs, and gardening effects should be made to harmonize with the atmosphere of freedom and space suggested by the courts and the open-air theater.

Thanks are due Mr. William B. Ittner, of St. Louis, for the construction of the model on floor plans furnished him. The photographs do not give an adequate idea of the beauty of the model.

Plate 11A represents a one-teacher rural school in York County, S. C. The floor plan (fig. 11) shows a classroom 24 by 32 feet, a cloakroom 16 by 6 feet, a teacher's room 8 by 6 feet, and a workroom 12 by 24 feet. The open porch is plainly shown in the view. There are three outside doors, two leading into the classroom and one into the cloakroom. The windows of the classroom are well grouped on the left side of the pupils, and two windows open in the rear. The locations of the windows in the workroom and the teacher's room are shown in the floor plan.

This building, though it is far above the average, could be improved in the following ways:

A basement could easily be constructed beneath it. An examination of the photograph shows that the building is resting upon narrow brick piers.

A building like this 50 feet in length, if placed on high ground, or, preferably, ground sloping to the rear, would offer easy opportunity for installing in the basement a furnace which would heat the classroom, the workroom, and the teacher's room. The basement would offer abundant space for the installation of toilets and baths and a workroom for the boys, the workroom on the main floor being reserved for the girls. With this change there would be no reason for the rear door opening from the classroom; hence the space devoted to the cloakroom and the teacher's room could be lengthened 2 feet, the cloakroom shortened slightly, and the teacher's room could then be transformed into a library and teacher's room with more satisfactory dimensions.

The cloakroom would be safer and better lighted if a large window took the place of the door. Pupils would then have to enter the cloakroom from the classroom, thus giving the teacher complete control and preventing many annoyances.

The following drawing (fig. 12) represents a rearranged floor plan for this building. No change would be necessary except to introduce a window in the cloakroom instead of a door, to close the rear door from the classroom, and to widen the window in the library to 4 feet.

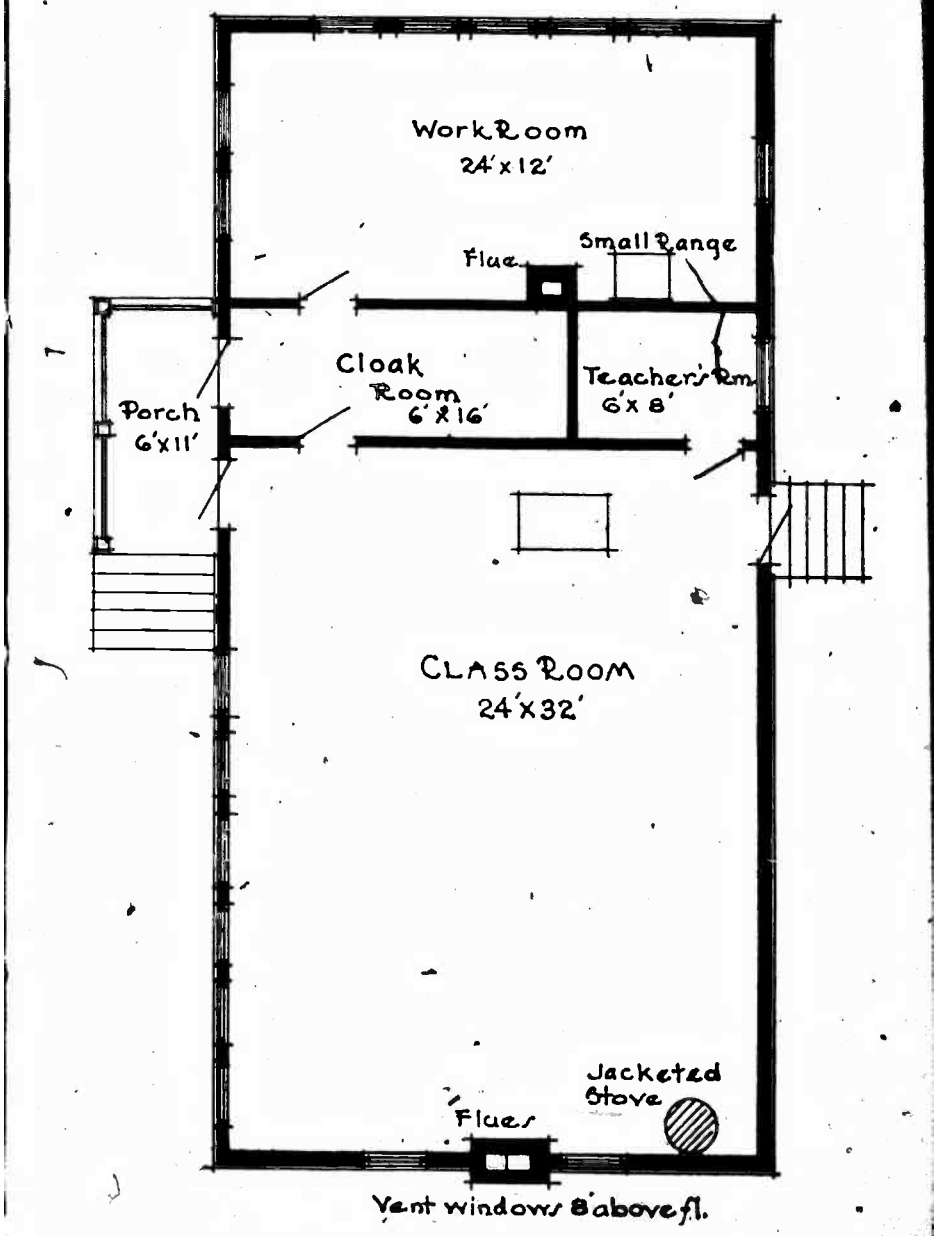


FIG. 11.—Floor plan, one-teacher rural school, York County, S. C.

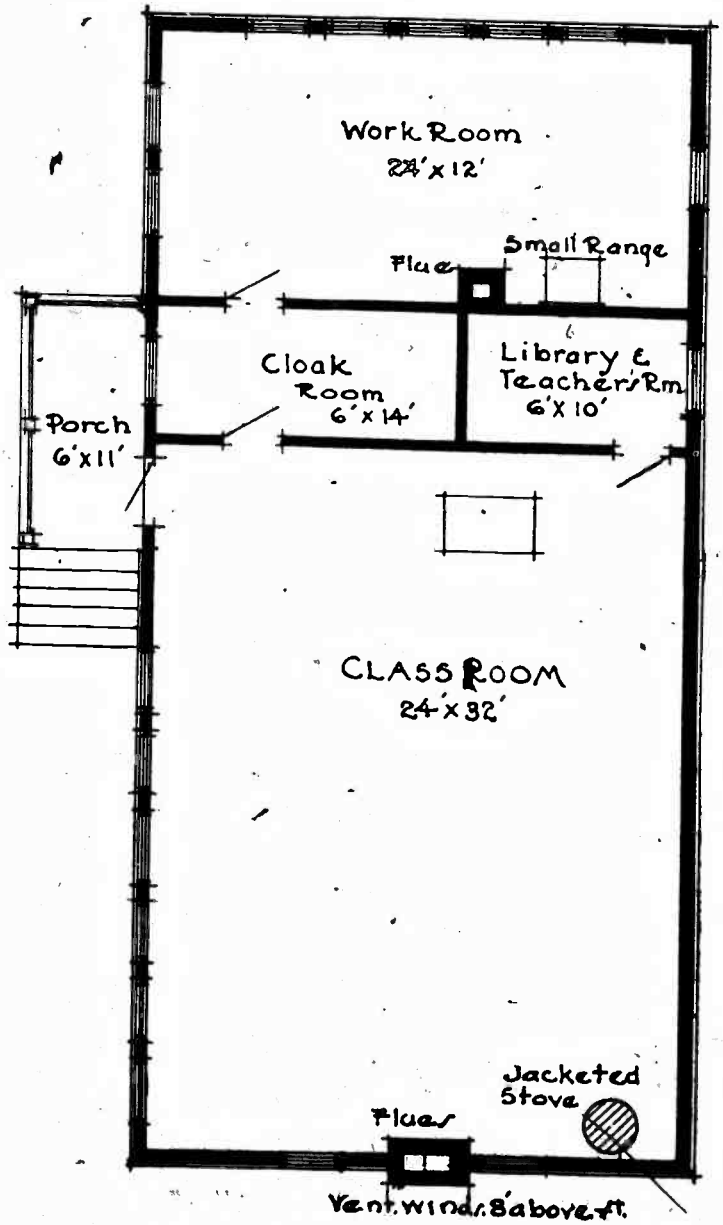


FIG. 12.—Rearranged floor plan of building shown in fig. 11.

Instead of the two windows in the rear being at the same height above the floor as those on the left of the pupils, they should be set at least 6 feet above the floor, so that the blackboard could extend across the rear end. These windows could then be used only for "breeze" in hot weather.

The original drawing shows a platform for the teacher set near the front door. The drawings for the floor plan show no platform, and the desk of the teacher is moved to the opposite side of the room. This is a better position, because the children's eyes are shielded from looking toward the windows when attending to the teacher, and the teacher's desk is out of the way of the children going to and from the cloakroom before and after school; further, it would give the teacher better position for managing the classes and better supervision over workroom, library, and cloakroom.

Some objection might be offered to the length of this building in comparison with its width, and were it not for the simple but rather graceful porch, this objection would carry more weight. As it is, the building does not look out of proportion and shows good lines.

Figure 13 and Plate 40A represent the floor plans and an outside view of a one-teacher rural school designed by J. H. Felt & Co., architects, Kansas City, Mo.[1] These plans anticipate either the construction of a new building or the remodeling of an old building. For example, if an old building in the form of a classroom without any of the conveniences attached were enlarged by adding the hall with its attached cloak racks, the workroom, the niche for the heater, and the various other elements in the front of the building, by rearranging the windows, and changing the doors, it would be an easy matter to make over an insanitary and inconvenient one-room building into this hygienic and modern structure.

There are certain features of this building worthy of attention: The niche in which the heater is placed could be made fireproof at little expense. The fuel need not be carried into the house. The exits for the foul air are brought into contact with the chimney, and in this way the movement of the air is hastened. The workroom is shown with folding doors between it and the main schoolroom. These doors may be left open, or they may be closed in case the work within this room disturbs the pupils in the classroom. A blackboard may be placed under the high windows in the rear, as well as on the wall in the front of the schoolroom. Further, if the windows on the right side of the workroom were placed higher, say 7 feet above the floor, a blackboard could be introduced across the entire end of this room, which would seem desirable. If the windows on the left of the classroom were all moved back nearer the left rear corner, as the children sit at

[1] Thanks are due the architects for the use of this revised floor plan and the photograph of the building.

their desks, better light would be obtained, because less of it would be in the children's eyes.

This plan could be improved somewhat by slight reconstruction, the result of which should be a building with a single workroom for all, one cloakroom, a teacher's room, a library, and a classroom.

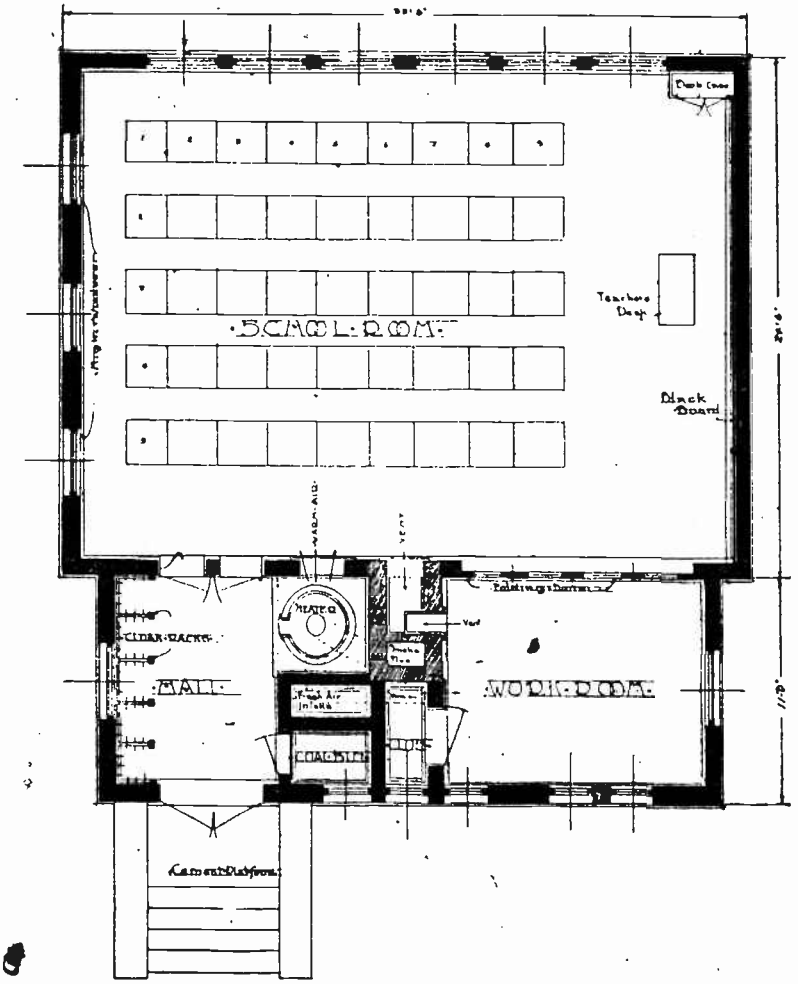


FIG. 13.—Floor plan of model one-room school, showing seat room. J. H. Felt & Co., Kansas City, Mo., architects.

If a basement could be constructed under this building, it could be used for the furnace and such other conveniences as community conditions would warrant. Without a basement a jacketed stove could be set as indicated. A separate flue should be constructed in the workroom to furnish opportunity to use a small range for domestic

science work. If it seemed best to separate the workroom into two parts, a partition could be erected between the door and the [illegible] the workroom.

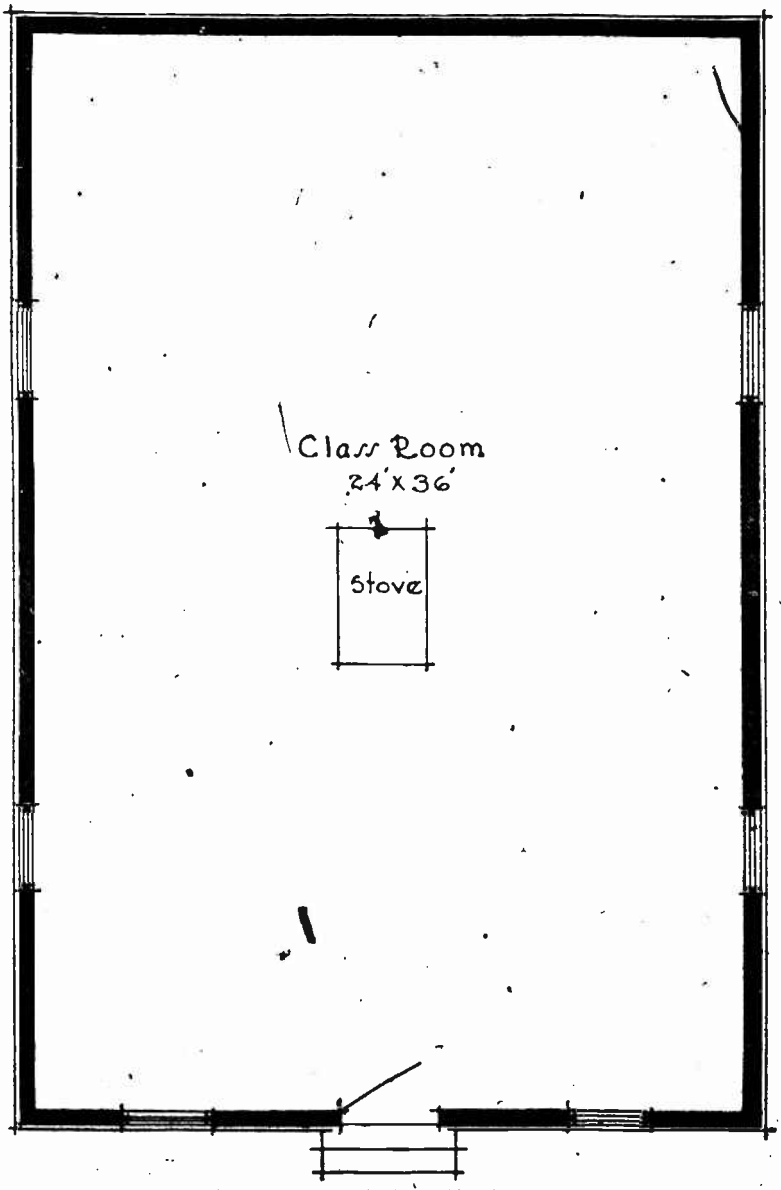


FIG. 14.—Floor plan of a typical old school building (see also p. 115).

Figures 15 and 16 show a building that is not a one-room building, but a one-teacher building.[1] It is really a five-room building. There

[1] Drawn by Hobart & Cheney, architects, San Francisco.

is a splendid workroom, beautifully lighted, with provision for a small range for work in cookery. This workroom is 7 feet wide and approximately 21 feet long and will accommodate all the older boys and girls of the ordinary rural school. The uses to which this room can be put will be limited largely by the ability and foresight of the

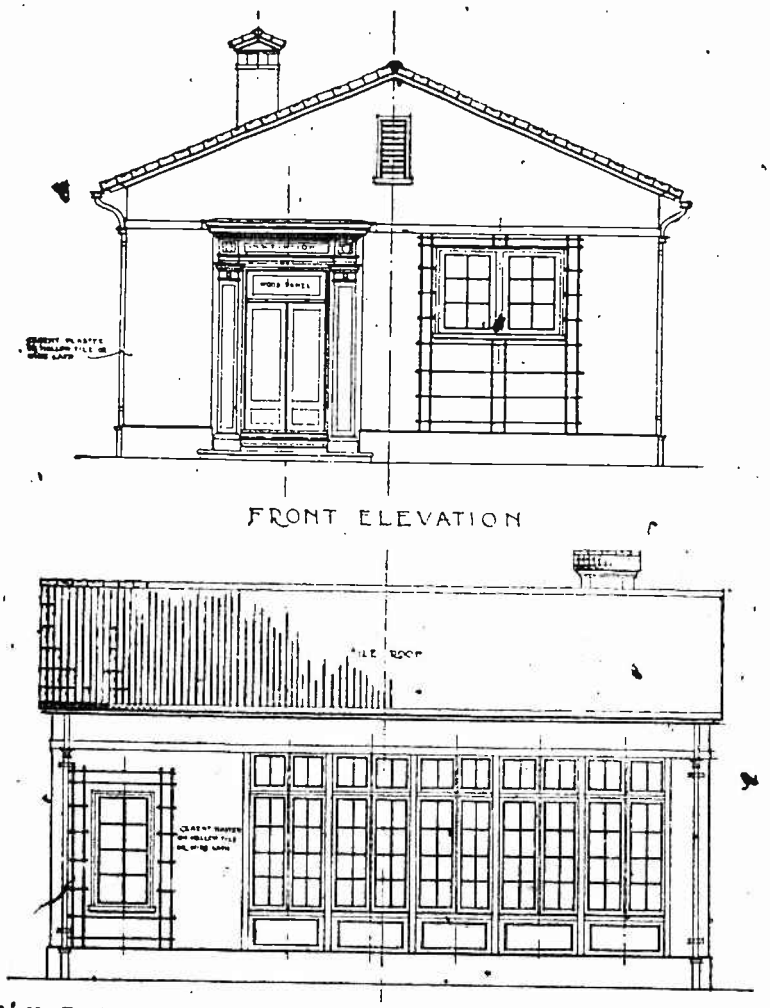


FIG. 15.—Front and side elevation, one-room school, Hobart & Cheney, Architects, San Francisco, Cal.

teacher in charge. Manual training in wood work, all sorts of drawing work; model making for farm barns, farmhouses, and outbuildings; studying germination of seeds and growth of plants; cooking; designing; cutting; sewing; and all other kinds of work relating to home life and school life may be done in this workroom if the teacher has vision and power to outline and direct the work.

The library room should have more light than is here shown. There should be two windows instead of one. These placed (as indicated for the one shown) 6 feet above the floor will permit bookcases beneath and give good light and sunshine.

The two cloakrooms are well situated, and although some objection might be raised to the fact that the teacher's blackboard has

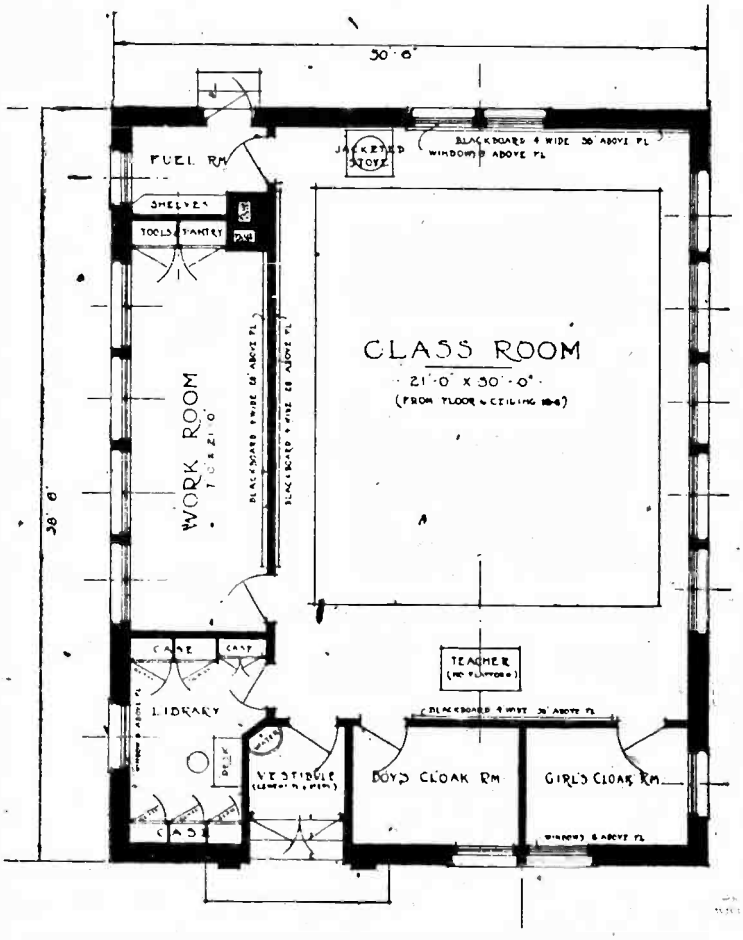


FIG. 16.—Floor plan of one-room school, Hobart & Cheney, Architects, San Francisco, Cal.

been shortened by the doors into these rooms, it is still long enough, especially if it is made 4 feet wide, as it should be.

The windows of the classroom are grouped on the left. Two high windows in the rear (8 feet above the floor) and those in workroom and library may be used to secure a breeze through the room in hot weather. The cloakrooms can be ventilated through their own windows.

If a basement were properly constructed under this building and running water, with the necessary sewage disposal, were available, sanitary toilets and baths could be installed; a furnace also could be used instead of the jacketed stove suggested in this plan. If a furnace is installed, inlets should be set to heat the classroom, the workroom, and the library, which should open from the inner walls about 8 feet above the floor, and the outlets should be near-by at the floor line. The furnace would enable the small room shown in the drawing as fuel room to be thrown into the workroom; or better still, the partition and chimney could be moved farther to the front, and two workrooms, one for the boys and one for the girls, be made.

By studying these drawings it will be seen that the plans contemplate a construction with cement plaster either of fireproof tile or of framed and galvanized steel lath and a tile roof. But the form of this building lends itself to almost any kind of durable material.

The building will accommodate 35 to 40 pupils without crowding.

Should the hinged form of windows shown not be available in the local markets, the ordinary sliding sash can be used. The windows should be set 4 feet above the floor. When the upper parts of the windows are stationary, as here shown, ventilation is not so easily effected; when arranged as transoms, they are out of reach and generally useless. The hinged form of windows here called for will make it possible to turn this classroom into an open-air room by merely swinging all of the windows out. In larger buildings, where forced ventilation is used, the horizontal division of windows is less objectionable.

This plan can be easily adapted so as to make a splendid one-teacher rural school.

Plates 21, 22, 23 are reproductions of photographs of the Crossroads School in Macon County, Ill. The bureau is under obligation to State Supt. Francis G. Blair and the State printer of Illinois for the use of the photographs from which these cuts were made.

The building was designed by Mr. V. C. Zimmerman, of Chicago. It represents an unusually good type of country school and is worthy of careful study by school officers who can afford to construct a building of this size and equip it as indicated. Some features of this school deserve especial attention.

In the first place, from plate 21 and other views one can see that the windows are closely grouped and occupy almost the entire east side of the building. By reference to plate 23B it will be seen that the windows do not extend to the ceiling by about 2 feet. If the front one of these seven windows had been eliminated and the rest of the windows had been set higher from the floor, say 4 feet, and had extended within at least 1 foot of the ceiling, better lighting conditions would have prevailed, for the light then would have carried across the room better and have been better adjusted to

the eyes of the pupils when seated at their desks If the windows had been set as thus suggested, ample glass surface would have been afforded, yet the disturbance due to the light from the front window shining directly into the eyes of some of the children as they attend to the teacher would have been largely eliminated. On the whole the lighting of this building is unusually good, but it would have been more satisfactory if the windows had been arranged as suggested. The narrow mullions between the windows are very commendable and the whole appearance of the elevation is pleasing.

Plate 22B, representing the interior, shows a good arrangement of the desks with one row close to the windows. This gives ample aisle space and serves to introduce without appreciable crowding six rows of desks. But if the lower part of the windows had been placed higher above the floor, there would have been less exposure to the cold on the part of the children who sit on the benches close to the windows.

Plate 23B shows small rear windows which can be used for ventilation in hot weather. They can be easily covered with a shade during the cold winter months when there will be no need for opening them. It is rather unfortunate that no blackboard appears on the side opposite the windows and that the blackboards are placed only in the rear and in the front. There are two spaces on the west side wall that could have been used very satisfactorily for board work by the pupils and that would have made it easier for all to see. However, these are minor points of no great significance. It is evident the blackboards are made of slate and well set. It may be suggested that the teacher's desk should be placed on the west side of the room instead of on the east, as indicated in figure 17. This would prevent those children sitting in the northwest part of the room from having to look toward the windows when attending to the teacher while seated at her desk.

It will be observed that transoms are placed above all the doors. Elsewhere it has been said that transoms in schoolhouses of this type, and for that matter in practically all types, are a delusion and a snare. They are rarely used, nearly always dirty, and generally out of order. In one of these photographs, however, it appears that two of the transoms are open, and the teacher in this school may be able to use them to some advantage.

The warm-air registers in the floor warm the pupils' feet and dry their clothes, but they also introduce a great deal of dirt and dust which falls into them, and after drying rises in the room to settle on furniture and on all ledges. It would have been better if these registers had been placed in the wall 8 feet above the floor, and if some special provision had been made in a convenient and out of

the way place in the room for a fixed bench with a register opening in front for the purpose of warming the children's feet and drying their clothes.

The architect has introduced the usual tower. The building, however, would have been more beautiful if this tower had been left off, the roof would have been more secure from rain, and considerable expense would have been saved. Evidently this tower was built chiefly to accommodate the flagpole. It is better in all places where there is sufficient room, as there is at this building, to put a flagpole in the ground, and thereby make the flag much more

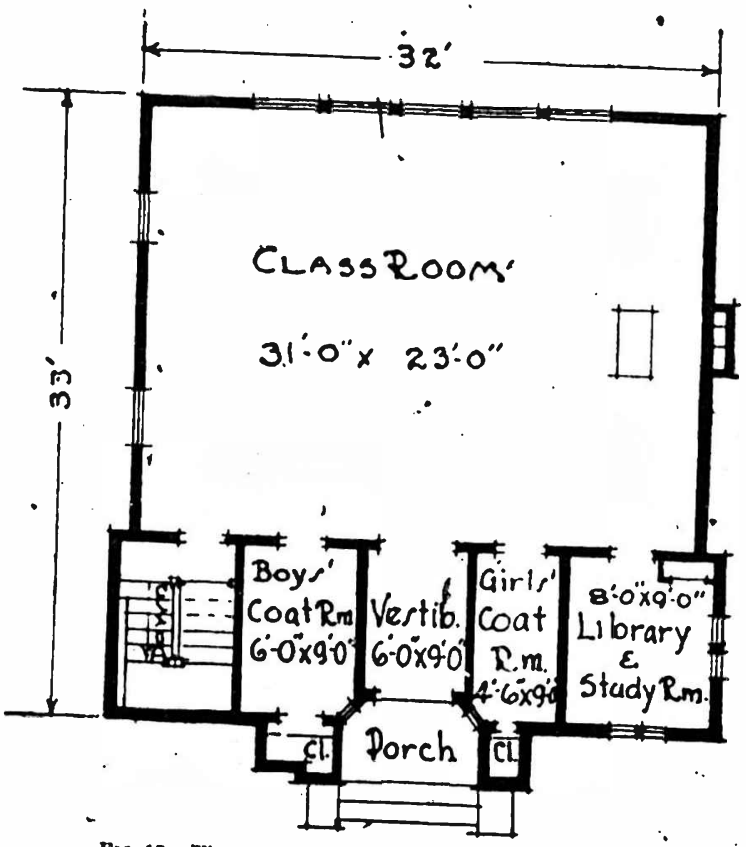


FIG. 17.—Floor plan, Crossroads School, Macon Co., Ill.

visible. The children can then practice flag drills and salute the flag with much greater intimacy than they can when it is far out of reach and more or less out of sight on the top of the building.

The basement and floor plans reproduced are worthy of study in connection with the photographs. The whole space under the building has been excavated and furnishes a furnace room, a coal room, a stairway to the basement, and a large well-lighted room for play and work. It is to be regretted that somewhere in this splendid building provision was not made for interior flush toilets and bathing facilities. The use of the basement for playroom and workshop is a splendid idea, but in the climate of Illinois outside

toilets often necessitate the exposure of the children to inclement and cold weather in winter. The building deserves a septic-tank disposal and a pressure-tank water supply, which would have made possible flush toilets, drinking fountains, and shower baths. In the plan of the basement area spaces are introduced about the windows so as to allow larger windows, and thereby get more light into the basement rooms.

The floor plan of the building shows a cloakroom for the boys and one for the girls, a library, and a vestibule. Evidently when the building was constructed two more windows were added to the

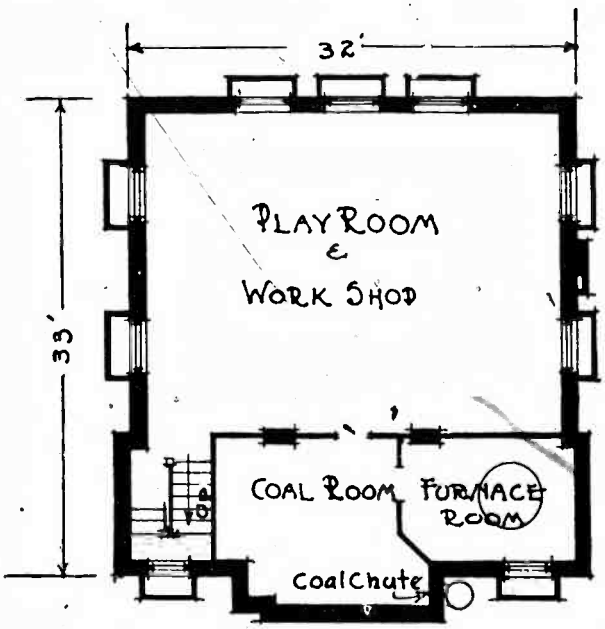


FIG. 18.—Basement plan, Crossroads School, Macon Co., Ill.

east side of the classroom than are shown in the floor plans. It is more than probable that if the five windows shown in the floor plan had been made higher and moved slightly to the rear better lighting would have resulted than now obtains.

The various suggestions herein made must be understood as suggestions, not as criticisms, for this building is unusually attractive and carefully planned, and is to be commended to all who are interested in the construction of a high type of country-school building.

Plate 24 represents an attractive one-teacher rural schoolhouse in district No. 9, Canandaigua, Ontario County, N. Y., and also

the abandoned building which this new building displaced.[1] The floor plan, as will be seen (fig. 19), shows the classroom 24 feet long and 21 feet wide, large enough to accommodate about 25 or 30 pupils of such ages as attend country schools.

The orientation of the building is such as to secure effective lighting from the four windows facing the east. Two full-length windows are placed in the rear on the north. These would be valuable in hot weather, but for the purpose of lighting they are more troublesome than helpful. They must introduce some trying shadows to workers in the rear of the room, and will certainly make it very hard

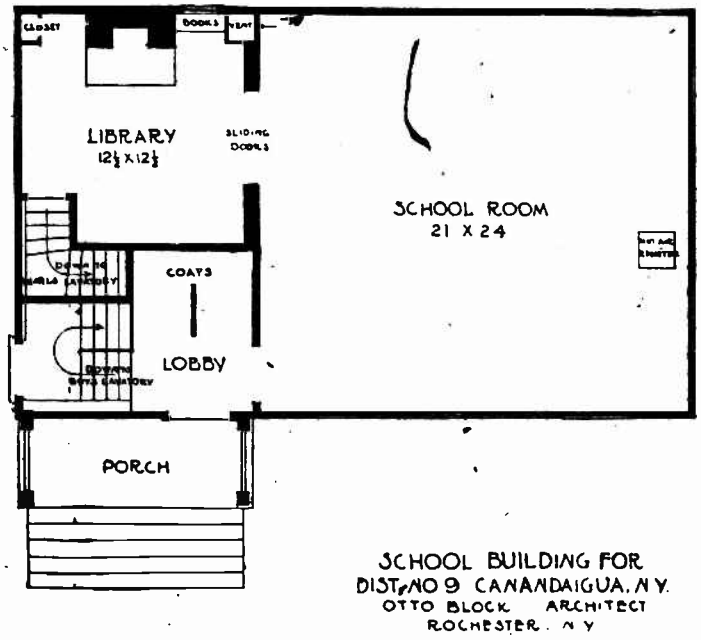


FIG. 19.—Floor plan of No. 9, Canandaigua, N. Y.

on the eyes of the teacher, who must face them whenever she is in the front of the room. It would have been better if these windows had been only half length, with the bottoms 8 feet above the floor. The children then would have been more carefully shielded in winter from the cold winds entering about the sash; the troublesome shadows would have been largely eliminated; opportunity for a breeze would still be afforded; and most certainly the teacher would have been relieved. In addition, blackboards could have been set on this wall under such windows, if additional blackboards should ever be needed.

[1] Used by courtesy of Miss Alice G. McCloskey, editor of the Cornell Rural School Leaflet (see vol. 6, No. 1, p. 175, September, 1912).

The height of the lower sash above the floor and the proximity of the tops of the windows to the ceiling are not apparent, but the grouping of the lateral windows is good, and this small room can be well lighted from the four windows, if the shades are handled intelligently. The interior decoration of the room is tasteful, and the placing of the blackboards excellent. The color scheme used is as follows: The ceiling and the side walls as far down as the picture molding are cream color; the main part of the room is pale green; the library is terra cotta; the fireplace in the library is red pressed brick.

The library, with the sliding doors, fireplace, and furniture, is especially attractive and is, no doubt, the most alluring place in the building to the older pupils and the patrons of the school. The rather unique lobby, the stairways to the basement, and the simple attractive porch are all commendable.

In the drawing the hot-air register is apparently shown opening through the floor. In practice this might become decidedly objectionable. The dirt and dust from the floor would certainly enter such a register and be scattered through the room by the upward movement of the currents of warm air. The proper place for this register is in the central part of the wall between the library and the classroom. This position would not only prevent a great loss of heat through the use of a long duct in the basement (it is assumed that the one chimney serves both the fireplace and the heater), but would prevent the warmed fresh air from short-circuiting over the heads of the children and going directly out at the exit and the fireplace. This would certainly happen if the register is located as shown in the floor plan.

One excellent feature of this building is its simplicity. There are no towers or excrescences of any sort. A country carpenter can build it at a minimum expense for lumber and millwork.

The tasteful treatment of the garden is especially to be commended. There is a hedge of Lombardy poplars forming both a pleasing background and a windbreak on the west. In addition to these, there are 9 elms, 1 white pine, 8 Norway maples, 1 Norway spruce, 3 hemlocks, 1 English walnut, 24 dogwoods, 1 shrub of white honeysuckle, 24 shrubs of spirea, 24 Dorothy Perkins rosebushes, and 24 shrubs of barberry. These names are cited to show what can be done to beautify and instruct in nature work on a school lot of 1 acre.

The spirit that made the Canandaigua school possible is indicated in the following statement by Mr. Booth, the district superintendent:

> My reason for the work in district No. 9, Canandaigua, was that the schoolhouse and its grounds were the most neglected places in the neighborhood. A beautiful lake-shore drive passing homes with all modern improvements, which were a pleasure to look on, presented in marked contrast the place in which boys and girls, the best assets from these homes, were receiving their education. The schoolhouse was built

in 1819, the deed calling for no more ground than that on which the building was to stand. The outhouses were on land that belonged to the public highway.

At the time I took up the work, many of the school patrons felt that the wisest plan was to close the school and send the pupils to town. I do not believe in this method when it is possible to avoid it. I believe that children are better cared for near their homes than when they go to and from school in a carryall, with an indifferent driver and no supervision; remaining in town all day, where, in order to maintain order and a fair citizenship, we must have churches, Y. M. C. A.'s, and a police force.

Very often the reason for closing the rural school and sending children to town is because it is cheaper and the patrons are not willing to assume the duties of the school and dignify those duties by their interest and cooperation. In our district to-day I am happy to say that we are hearing little of the closing of rural schools.

One of the first things I did was to ask Mr. F. G. Benham, who owned the farm of which the school lot was a part, to give us an acre of land. This was at once granted on condition that I could carry out the plan of improvement. I then appealed to the citizens of the village who enjoy the lake drive for help in the enterprise, and received $300. A meeting of the taxpayers was next called, at which a resolution accepting the money and land was passed and a levy of $2,000 made. Then, with the united efforts of school commission and people, we accomplished the election of a trustee in sympathy with the work we were trying to perform.

With the gift of land and money, and $2,000 of the district money, we went to work. We had an engineer of good standing to lay out the grounds, and I think this was a most important step. We next engaged a good architect, who said at once that our plans could not be carried out with the amount of money we had. I told him that I was raised on a farm and never lifted a stone when I could roll one, and I believed we could do it. I proceeded, however, to get more interest and help. The workmen entered into the spirit of the thing, working hard and overtime and deducting a goodly amount from their bills. By the end of the year all was finished and paid for.

But this is not all. Later there was donated to the school a swing, which is a beginning in the interest of recreation apparatus for the boys and girls. We then remembered that we had a friend in the gas and oil business. I asked him if he would like to have the honor of presenting us with a steel flagpole. As a demonstration of his response, we now have a flag flying from a 40-foot steel pole set in concrete. There are many persons who like to do things if they have definite understanding of the need and value of their contributions.

We are now planning for an endowment fund, the interest of which will be used for the care and improvement of the school grounds, the district to look out for the building. The raising of an endowment fund is valuable for the community. It means looking ahead, a consideration of the future.

The following reproductions of photographs of the Silas Willard School, of Galesburg, Ill., are worthy of study by those who are considering consolidation and are seeking the best type of consolidated rural or village school. Some of the features in this school deserve special attention.

In the first place, the classrooms are provided with skylighting as well as with supplemental side lighting. By reference to plate 34, and their effect this type of lighting will be clearly seen. The question whether skylights such as these are necessary or even helpful in this type of school building can not be answered without making certain reservations. There are conditions, in smoky cities

and in localities with much dark, cloudy weather, where skylights are helpful, particularly in one-story buildings. Generally speaking, however, if buildings are properly orientated and if the requisite amount of glass surface is correctly set in the walls, unilateral lighting is to be preferred for classrooms not over 24 feet wide to any combination of sky and lateral lighting.

There can be no doubt, however, that the windows shown in the rear of these classrooms could either have been left out to advantage or have been made half length and set at least 8 feet above the floor. They certainly are not needed for light, and if on warm days a breeze

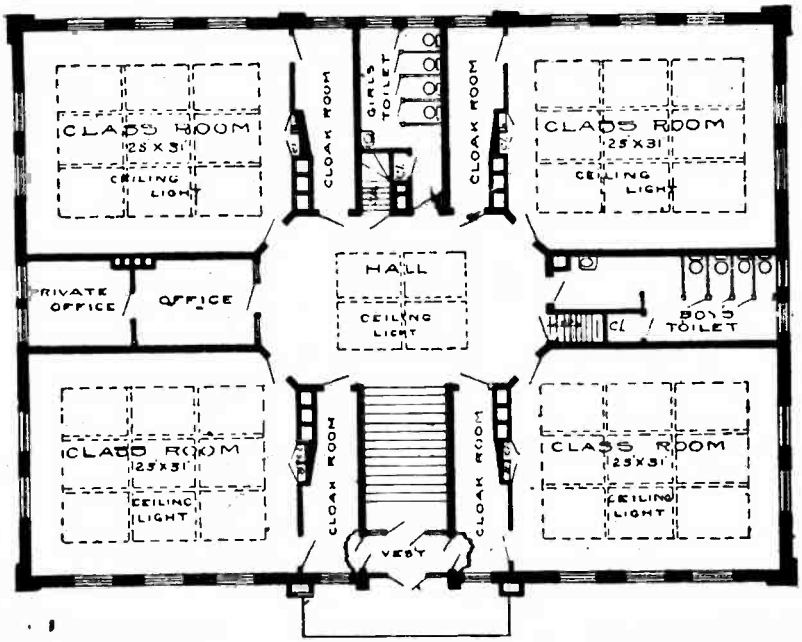


FIG. 20.—Main floor plan, Silas Willard School.

is desirable the small high windows would serve this purpose without exposing the teacher to the glare of these low windows.

These beautiful classrooms could be well lighted by setting in the walls to the left of the pupils one-fifth as much glass surface as there is floor space, provided the windows were set 4 feet above the floor and were extended to at least 6 inches from the ceiling, thus throwing the light well across the room. Close examination of the interior views will show that skylighting does not give as good illumination on the blackboard as on the desks, and the floor. This is not a serious objection for classrooms designed for the upper grades, but it needs to be pointed out. It should be said that the light introduced by these skylights is diffused north light and is very soft.

Another special feature of this excellent building is the well-lighted and commodious basement, designed to be used for assembly and for general community gatherings. It has a stage and an excellent floor for dancing, drills, gymnastic work, etc. A basement is not the best place for an assembly room, but often it is necessary, through ack of funds, to attempt to meet the demands for an assembly room in the next best way. This basement room, as will be observed, is not more than 3½ feet below the level of the ground; and as the building is situated on ground higher than the surrounding territory the room can be so underdrained as to render it dry and wholesome. The basement walls can be built of concrete and either finished to a

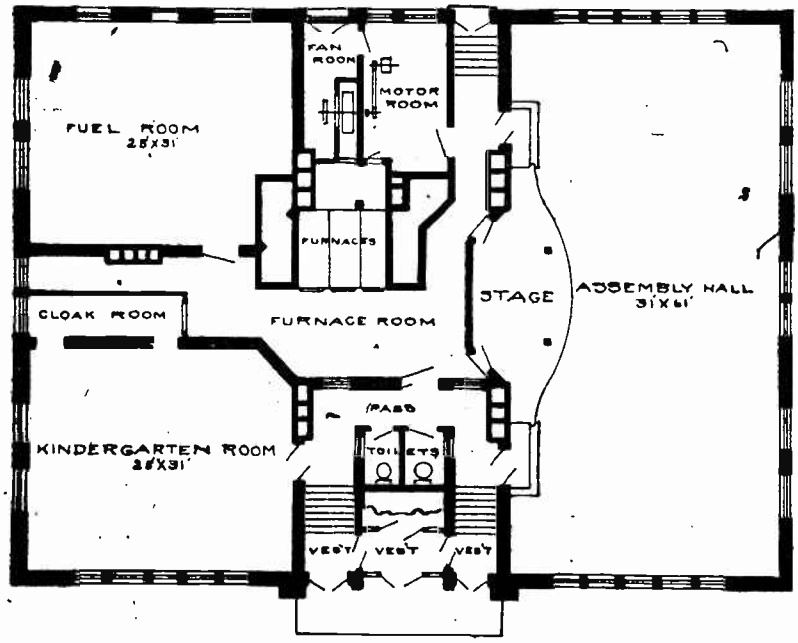


FIG. 21.—Basement plan, Silas Willard School.

smooth surface or faced with light glazed brick or tile. This would improve the illumination and make the room more sanitary.

The arrangement and treatment of the hall deserve a few words of explanation. By reference to Plate 35A it will be seen that all of the rooms open off this one central hall. The skylight gives the hall beautiful illumination without the use of any auxiliary outside windows. The only objection to this arrangement is that the toilets are rather too conspicuous. This objection could be readily obviated in future buildings of this type.

Workrooms and baths are supplied, and a central hot-air and fan system furnishes heat and ventilation. The transoms over the

doors and the glass in the doors could have been left out to advantage and with economy.

Taken all in all, the building is excellent and beautifully simple in construction. It has been introduced for the consideration of those, as mentioned above, who are charged with the construction of small country high schools, consolidated country schools, or village elementary schools.

The interesting school building represented by the accompanying reproductions of photographs and floor plans[1] is in use at Cocoanut Grove, Fla. It is representative of a new type for the South and is worthy the study of all school people who are charged with building

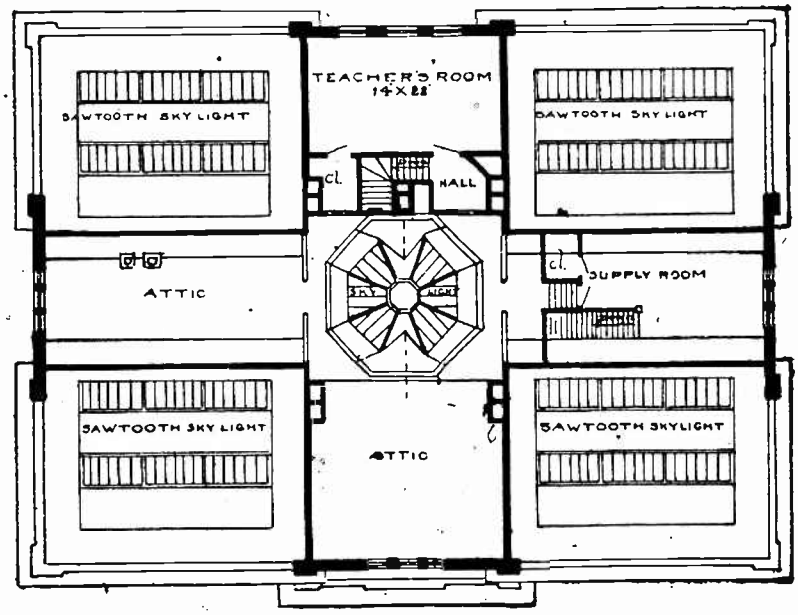


FIG. 22.—Attic and roof plan, Silas Willard School.

village schools, country high schools, or consolidated country schools. It is especially adapted to conditions where the population is increasing and where additions are anticipated, for additions can be added at a minimum of expense and with practically no disturbance to the original building. This is a desideratum of no small moment. For example, the country consolidated schools and the country high schools are still somewhat in the experimental stage, especially with reference to the number of pupils they will ultimately accommodate. This form of building permits additions to meet the needs and without doing any violence to the architectural ideal set forth in the first units. It thus warrants the use of permanent materials, such as concrete or stone, and, hence, in the long run will prove economical.

[1] Plate 19; figure 22.

The one-story court and pergola form of structure eliminates the need for stairways and halls and reduces congestion and noise to a minimum. In warm climates where little or no artificial heat is

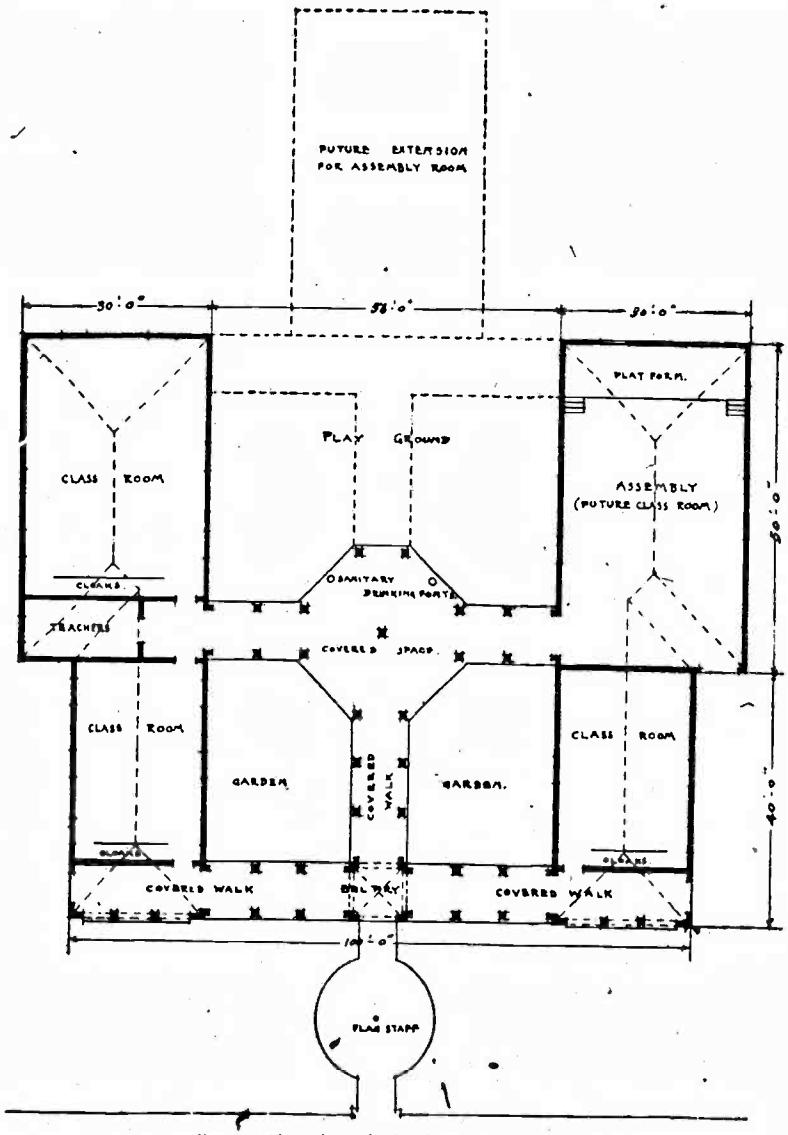


FIG. 23.—Floor plan, school at Cocoanut Grove, Fla.

needed, space and expense are saved by the elimination of basements for heating apparatus. If, however, heat is needed, it can be furnished by a central detached plant for the use of low-pressure steam

or, if the climate is sufficiently mild in winter, fireplaces could be installed at small expense. When the windows and the system of heating are correctly arranged with due regard to the demands of ventilation, fresh air can be introduced by proper manipulation of the windows, and thus much annoyance and expense may be saved.

This brings up the matter of the location of the windows in this building, both as shown in the floor plans and in the photographs. It would have been very much better if the light had been admitted from one side only. If double the number of windows had been placed in one side, and breeze windows—that is, short windows set 8 feet above the floor—had been set on the other side of the classroom, the lighting would have been far more satisfactory and the ventilation more evenly distributed. Unilateral lighting of classrooms is the only justifiable method (see chap. 6). The height above the floor of the lower part of the windows is 3½ feet. For the advanced classes 4 feet would have been better. The lower part of the windows should always be above the level of the eyes of the children when seated at their desks.

If the windows had been grouped on one side of the classrooms, as suggested, and even the same form of sash used as is shown, the classrooms of this building could be almost instantly turned into practically open-air rooms. If the sashes were made in one piece and either hinged at the top and opening in, so that they might be drawn up to the ceiling, leaving the window space entirely open, or possibly pivoted in the center, another advantage would have been gained. In fact some of the windows in this building are pivoted.[1]

On account of the immediate demand for a small assembly room, the classroom opposite has been made too wide for economical construction and classroom work. In low structures of this type the classrooms should never be over 24 feet wide, and preferably 22 feet if the number of pupils in each classroom does not exceed 30 or 35. Those who build after this model would do better to sacrifice the width of the temporary assembly room to the classroom than to expand the classroom for the sake of the temporary assembly room. The two smaller classrooms in front are approximately correct in size and proportion.

The cloakrooms should receive their ventilation and lighting immediately from the outside instead of from the classroom. This change could be easily made by simply extending the partition to the outer wall and opening a window. Doors to the cloakrooms could then be set in the most convenient places.

Aside from the foregoing suggestions, only praise and commendation are to be given to this building for its beauty and adaptability

[1] According to Mr. H. H. Bundy, the architect, to whom thanks are due for the photographs and drawings here reproduced.

to country-school conditions. It suggests the open air, will blend well with almost any setting, is economical of material, easy of access, and wholly inviting. The courts and pergolas unify as well as beautify, and the spirit of it all is quiet, unassuming, and restful.

A final word of suggestion may not be amiss. It has to do with the "future" assembly room. Here is a splendid opportunity for an open-air theater. In Florida there are comparatively few days even in winter when, instead of using an inclosed room for assembly purposes, an open-air theater might not be used, especially for short periods of morning exercises and for general midday gatherings. Let us suppose, therefore, a moderate excavation made back of the court, a series of concrete amphitheater seats and a liberal stage

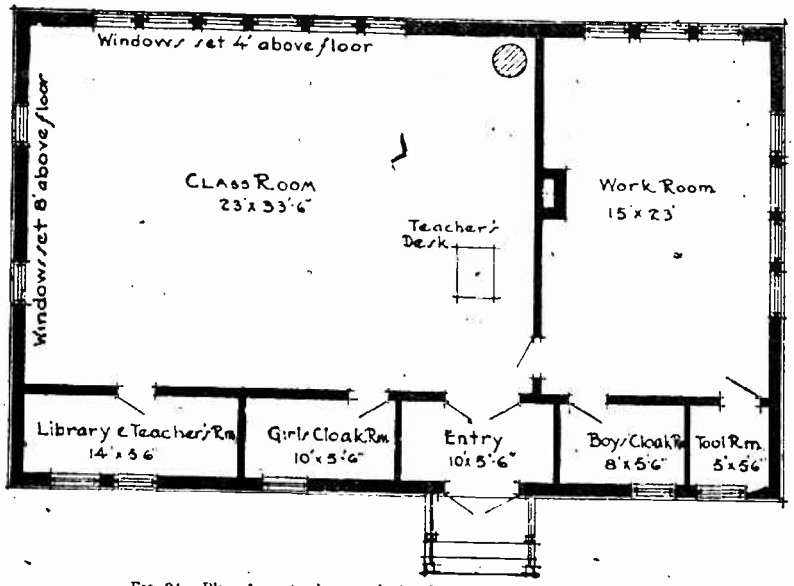


FIG. 21.—Plan of one-teacher rural school, designed by J. L. Sibley.

erected, and all protected from the wind by properly placed walls and from the rain by a roof designed to harmonize with the whole scheme. Such an assembly room would be far more useful and attractive than an inclosed building, however well it might be constructed. Of course this open-air assembly room would have to be adapted to meet local weather conditions. In the section of Florida where this school is located the heavy beating rains of the autumn season would make it difficult to keep the water out of the slight excavation that would be necessary. This might be overcome by drainage in most places or, where it is possible, by taking advantage of a natural slope without excavation. Many parts of the South and West would not have to make such decided efforts to guard against beating rainstorms as would the east coast of Florida.

The one-teacher rural school described in the following specifications and illustrated by figures 5, 8, and 24, is from plans drawn by Mr. J. L. Sibley, one of the rural-school supervisors of Alabama. It is designed to accommodate 40 to 45 pupils, and, as will be seen, has a workroom, a tool room, two cloakrooms, and a library in addition to the classroom. The dimensions of each room are shown on the floor plan. The height of the ceiling is to be 12 feet between ceiling joists and floor joists, making the distance between finished floor and finished ceiling approximately 11 feet 8 inches. Other dimensions will appear in the specifications.

SPECIFICATIONS FOR ONE-TEACHER RURAL SCHOOL.

The building is to be 18 inches above ground. The corner pillars to be 8 by 32 inches; other pillars to be 8 by 16 inches. Sills to be 4 by 8 inches. One sill to pass through center of the building and be supported by 8 by 16 inch pillar. Joists to be 2 by 10 inches, set 20 inches O. C. Studs to be 2 by 4 inches, set 24 inches O. C. Ceiling joists to be 2 by 6 inches, set 24 inches O. C. Ceiling joists over teacher's library, vestibule, cloakrooms, and tool room to be 2 by 4 inches, set 24 inches O. C. Rafters to be 2 by 4 inches, set 24 inches O. C., and well braced by a tie across from rafter to rafter—this tie to be placed about half way of each rafter. Building to be 12 feet between ceiling joists and floor joists. Blackboards to be 4 feet wide, 30 inches from the floor, and to run around three sides of the room where there are no openings.

If no weights are to be used on windows, the window frames are to be made so that the top sash can be let down 12 inches from the top by means of a hinged strip, which forms a part of the blind stop, and is the width and thickness of sash.

The following bill of lumber and other material is required:

Lumber:

9 pieces, 4 by 8 inches by 18 feet—Sills.
4 pieces, 4 by 8 inches by 16 feet—Sills.
62 pieces, 2 by 10 inches by 16 feet—Floor joists.
26 pieces, 2 by 6 inches by 24 feet—Ceiling joists set 24 inches O. C.
13 pieces, 2 by 4 inches by 14 feet—Ceiling joists set 24 inches O. C.
24 pieces, 2 by 4 inches by 20 feet—Rafters.
8 pieces, 2 by 4 inches by 20 feet—Cripples.
8 pieces, 2 by 4 inches by 16 feet—Cripples.
12 pieces, 2 by 4 inches by 14 feet—Cripples.
8 pieces, 2 by 4 inches by 12 feet—Cripples.
10 pieces, 2 by 4 inches by 10 feet—Cripples.
8 pieces 2 by 4 inches by 14 feet—Hipps—spliced.
33 pieces 1 by 6 inches by 20 feet—Ridge saddle and roof braces.
30 pieces 2 by 4 inches by 16 feet—Plates.
100 pieces 2 by 4 inches by 12 feet—Studding.
41 pieces 4 by 4 inches by 12 feet—Studding posts.
18 M No. 2 shingles.
1,200 square feet sheathing.
2,000 square feet No. 2 flooring.
2,850 square feet weatherboarding, ½ by 6 inches.
6,850 square feet ceiling required (approximately); for each room divide as follows: Classroom, 2,685 square feet; workroom, 1,485 square feet; vestibule and teacher's library, 1,415 square feet; cloakrooms and tool room, 1,100 square feet.

Lumber—Continued.
3 pieces 1½ by 12 inches by 10 feet—Treads.
3 pieces 1 by 7 inches by 10 feet—Risers.
1 piece 2 by 12 inches by 14 feet—Stringers.
Windows:
18 windows 10 by 18 inches—12 lights and frame complete.
2 single sash 10 by 18 inches—12 lights and frame complete.

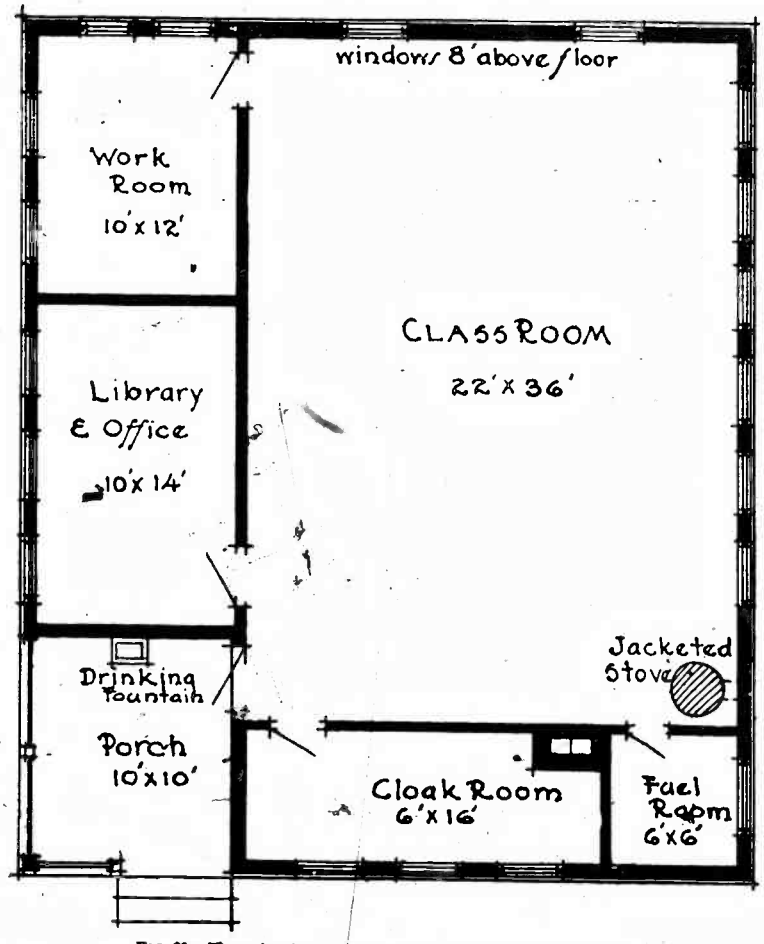


FIG. 28.—Floor plan for one-teacher rural school of minimum cost.

Doors:
1 door 3 by 7 feet by 1¾ inches—No. 2 and frame complete.
4 doors 2 feet 8 inches by 6 feet 8 inches by 1¾ inches—No. 2 and frame complete.
1 double door 5 by 7 feet by 1¾ inches—No. 2 and frame complete.
900 feet of quarter round.
Two 6-inch T. C. thimbles.
Bricks and lime: 1,100 for chimney; 540 for pillars; 1,200 underpinning; 4 barrels lime.

Nails: One keg 20d.; 1½ kegs 8d.; 2 kegs 6d.; 60 pounds shingle; 20 pounds finishing.
Locks: 6 rim locks; 1 front-door lock.
Hinges: 7 pairs hinges, 3½ by 3½ inches, loose pin; 3 pairs hinges, for single sash.
Transom lifts: 3 transom lifts—1 for each single sash.
Paint for house—outside and inside door frames: 100 pounds white lead, 10 gallons linseed oil, 2 pounds lampblack.
Classroom: Walls, 4 packages kalsomine—light buff; ceiling, 2 packages kalsomine—cream.

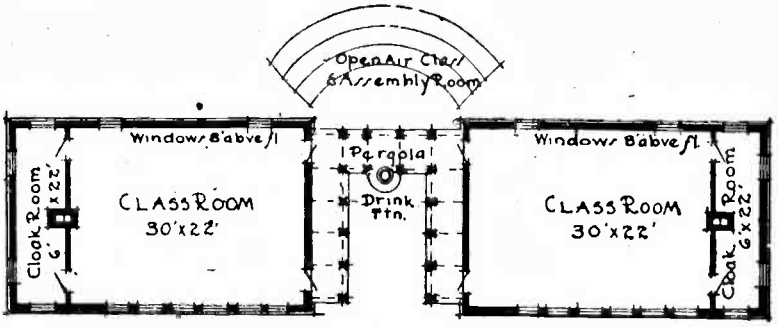


FIG. 26.—Two-teacher rural school; connected by pergola.

Workroom: Walls, 1½ packages kalsomine—light buff; ceiling, 1 package kalsomine—cream.
Teachers' library, cloakroom, and vestibule: Walls, 3 packages kalsomine—light buff; ceiling, 1 package kalsomine—cream.

Figure 25 represents a drawing for a floor plan of a one-teacher rural school reduced almost to the limit of inexpensiveness. It contains a classroom, a fuel room, a workroom, a library and office room, and a cloakroom. The representation for this building should include an uncovered porch and a low, flat roof, with wide eaves.

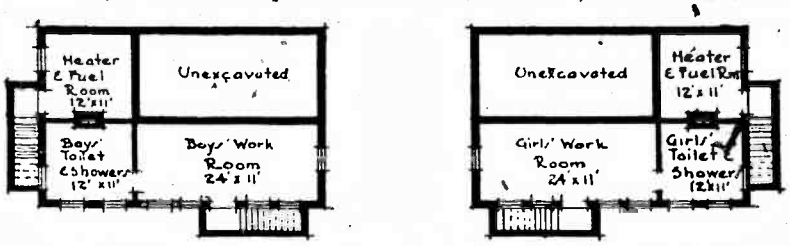


FIG. 27.—Basement plan of two-teacher rural school.

This plan in the hands of an artistic architect would suggest an attractive building and satisfy a community yet unable to supply more than its actual needs.

Figures 26 and 27 represent drawings for floor plan and basement of a two-teacher rural school. As will be seen, these are separate buildings, connected by pergolas or a court. These pergolas can be constructed of rough timber and covered with vines. The court can be

used as a flower garden or grass plat, as seems most suitable. In the center of the cross pergola a drinking fountain is suggested, with a wall about 5 feet high between it and the platform for the open-air assembly room. This arrangement would give privacy to the open-air

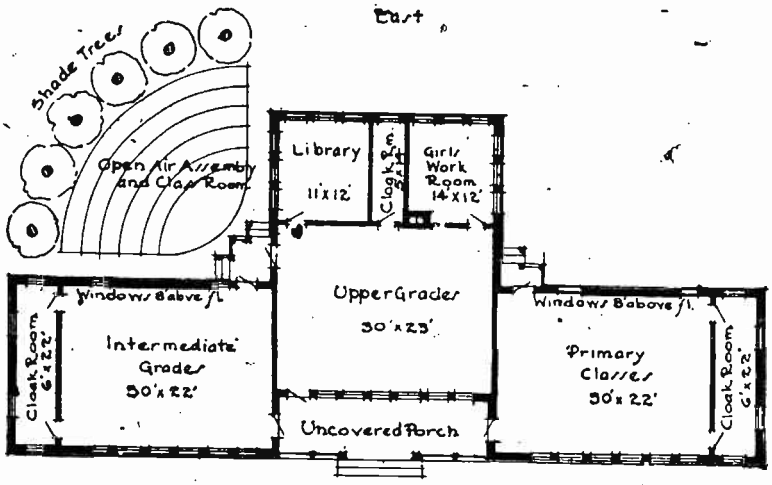


FIG. 28.—Floor plan, three-teacher consolidated rural school with open-air assembly and class room.

assembly room and would furnish a background for a small stage under the pergola. The posts for these pergolas should be at least 8 feet above the ground and may be set at such distance as the

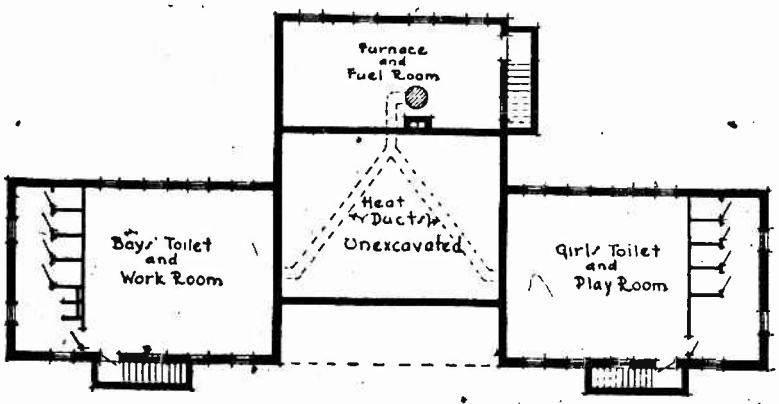


FIG. 29.—Basement plan of three-teacher building shown in Fig. 28.

builder sees fit. The side pergola should be about 6 feet wide and the cross pergola about 10 feet.

The basement is designed to supply a workroom for the boys and one for the girls, with toilets and separate heater in each. The unexcavated area is indicated. These basement rooms should be

well drained and well lighted. The entrance to these toilet rooms should be through the workrooms, thus insuring privacy and preventing additional expense in the way of steps. The entrances to the furnace and fuel rooms are indicated in the drawing.

It would be economical and satisfactory in this building to use a low roof with comparatively wide eaves. No towers or belfries are permissible.

Figures 28 and 29 are floor plans and basement plans designed for a three-teacher consolidated rural school with a suggestion for an

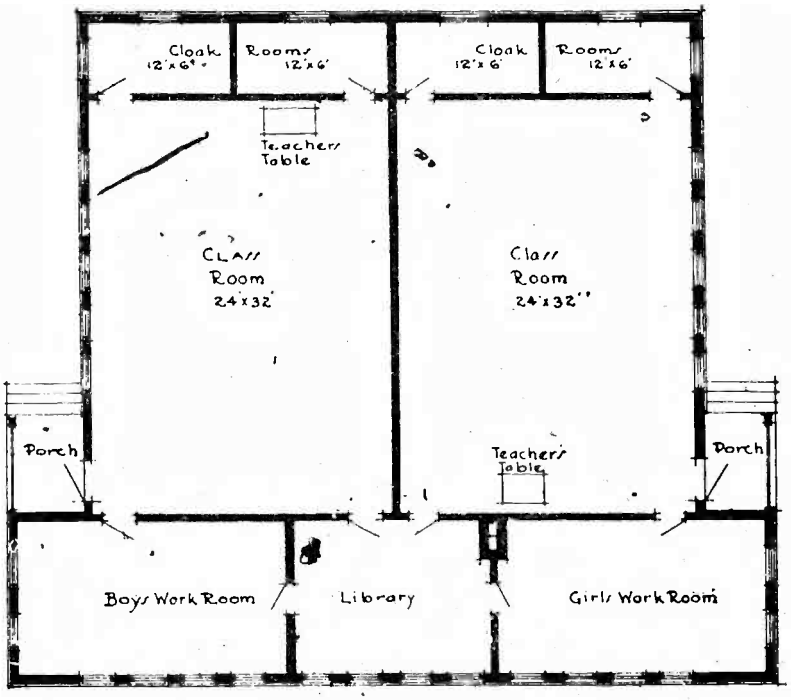


FIG. 30.—Two-teacher rural school.

open-air assembly and classroom. In addition to the cloakrooms opening off each classroom, the floor plan shows a library and a girls' workroom. The basement plan represents a fuel and furnace room and an unexcavated area, boys' toilet and workrooms, and girls' toilet and playroom. The ducts for heating the rooms can be carried under the floor of the central room, or, if a steam or hot-water system is used, pipes can be managed in the same way, thus giving opportunity for a central heating plant for all the rooms. The flue can be made double, to serve both for the furnace and for a range in the girls' workroom. The steps to the basement rooms are indicated on the front of the building and, except in cold climates, need

not be covered if proper drainage is insured. The door to the fuel and furnace room is indicated on the south side. It may be placed at any other point if more convenient. The front porch is to be left open, and the floor should be made of cement, so that it can be cleaned most easily.

If the ground upon which the building is set slopes west, it will be comparatively easy to carry out the suggestions for the open-air assembly room. Naturally the topography of the school lot will determine the best position for the open-air theater. This schoolhouse should be constructed with a comparatively flat roof and

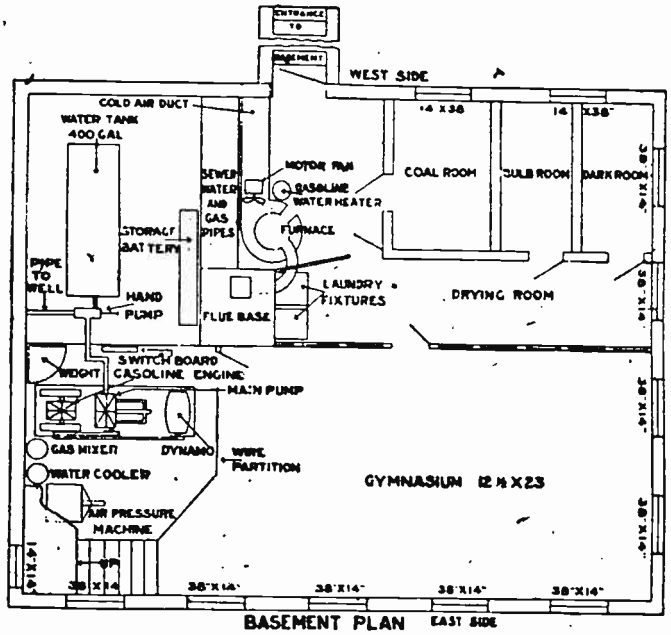


FIG. 31.—Basement plan, model rural school, Kirksville, Mo.

rather wide eaves, and with a little skill on the part of the architect could be made a very beautiful and inexpensive building.

Figure 30 represents the floor plan for a two-teacher rural school building. This plan is designed with two workrooms, a library, separate cloakrooms for the boys and girls of each room, two full-sized classrooms, and two porches. These porches should have cement floors dropped 2 or 3 inches below the entrance to the classrooms. The arrangement of the rooms with reference to each other can be easily made out from the floor plans.

The basement has outer entrances which may be covered with roofs joining to the main structure. The toilets and the bath-

rooms are ample and can be well lighted by using nontransparent, but roughened, translucent glass. This will make them private and at the same time give an abundance of light, especially if area ways are excavated. The furnace and fuel room can be lighted in the same way, or transparent glass can be used in this room. The entrance to the furnace and fuel room is made through the boys' toilet and bath, and in this way expense can be reduced and satisfactory results obtained. As planned, only a part of the area beneath the building is to be excavated. The wall, however, separating the area beneath the workrooms and the library should be solid and without communication to the area beneath the classrooms. The ceilings could be so treated as to prevent the escape of any possible

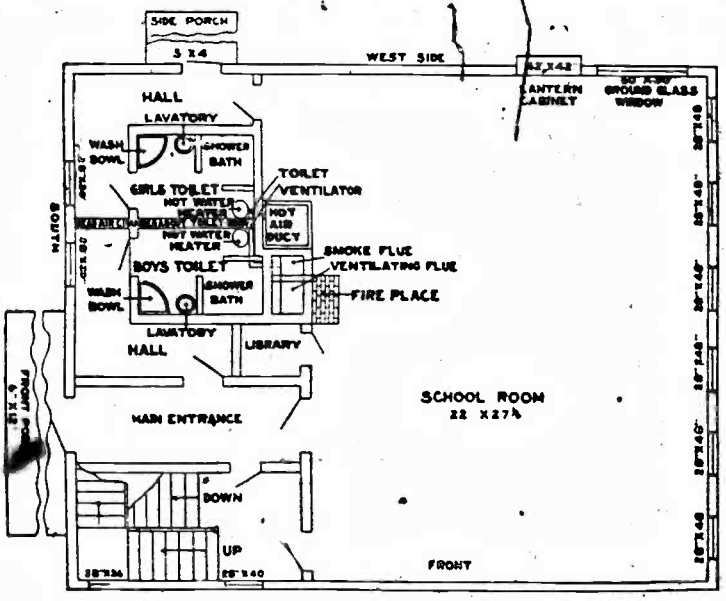


FIG. 32.—First floor plan, model rural school, Kirksville, Mo.

odors from the basement rooms to the rooms above. The toilets and the bathrooms should have cement floors, and a tile drain should surround the building, to prevent any possible seepage into these rooms. Naturally if running water is not furnished either by pressure tank or some other water supply, toilets and baths could not be introduced, and the rooms for them could then be used as workrooms.

If a hot-air furnace is used, the register should be brought up on the inner walls to a point about 8 feet above the floor, and the exits should be at the floor on the same side in order to secure a good

circulation of air. The library and the cloakrooms can be heated and ventilated in the same way. If hot water or steam is used, it would be well to put the radiators on the window side of the classroom in order to insure the best circulation in cold weather and to prevent draughts. The use of window boards with steam or hot-water heating will make it possible to get more ventilation and to insure fairly equable heat throughout the rooms. The radiators in the library and the other rooms can be located to suit conditions.

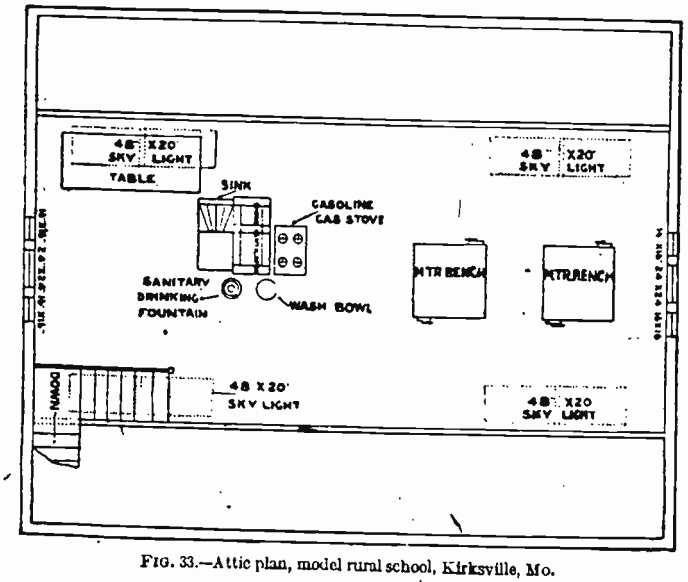


FIG. 33.—Attic plan, model rural school, Kirksville, Mo.

No breeze windows have been introduced into the ends of the classroom, because the door to the library can be left open in warm weather, thus securing a breeze through the library as well as through the doors opening to the porches.

Figures 31, 32, and 33 show the basement, first floor, and attic plans of the model rural school at the Kirksville State Normal School, Kirksville, Mo. Plate 20B shows the machinery located in the basement, by which city conveniences are made possible in a rural school.

Chapter VIII.

REMODELING COUNTRY SCHOOLHOUSES.

If the reader will picture to himself an old building with two or three small windows on each side, a door in the gable end, a high-pitched roof, surmounted by some make-believe belfry or tower, and a small chimney emerging at the comb of the roof near the center of the building, he will have before him the exterior outline of the prevailing type of a rural schoolhouse. These buildings are usually of wood and rest on brick pillars, with more or less open space between the floor and the ground, so that the wind sweeps through without hindrance. The building is generally unpainted, or, perhaps, was once painted. Many of the boards on the side are disconnected, showing the ribs of the structure underneath.

Within the building we shall probably find a box stove in the center, rusty and dirty, possibly hoisted on halves of bricks, or, if a little more caution has been exercised, standing in a box filled with sand, into which the legs of the stove extend. A rusty pipe runs straight up through the ceiling into the central flue. Double benches, ranged on either side of the stove, face toward the back of the room, where a teacher's desk surmounts a useless and troublesome platform. The floors are single, made of rough boards, and the cracks are more or less stopped up with dirt. There is no cloakroom in the rear; hats and wraps are piled up on old benches or hung on nails driven into the wall. Somewhere in this part of the room a dirty water bucket, with its accompanying long-handled, rusty dipper, contains the visible supply of drinking water. It is needless to describe the walls, the appearance of the windows, the kind of blackboards, the condition of the desks. Those who know country schools can fill out this picture in its minutest detail.

Suppose this building is in a fair state of repair; that is, too good to give up and too bad to teach school in. What can be done to make it more beautiful and more inspiring as a place for teacher and pupils? This is a practical question, and should be dealt with in a practical manner. Figure 14 represents the floor plan of an actual building, such as described. Suppose we make a study of this plan and see what could be done in the way of reconstructing or remodeling the building. The first thing to do would be to double the number

of windows on the left side as you enter the door, and, if need be, enlarge them until the floor space to be used as a classroom shall not

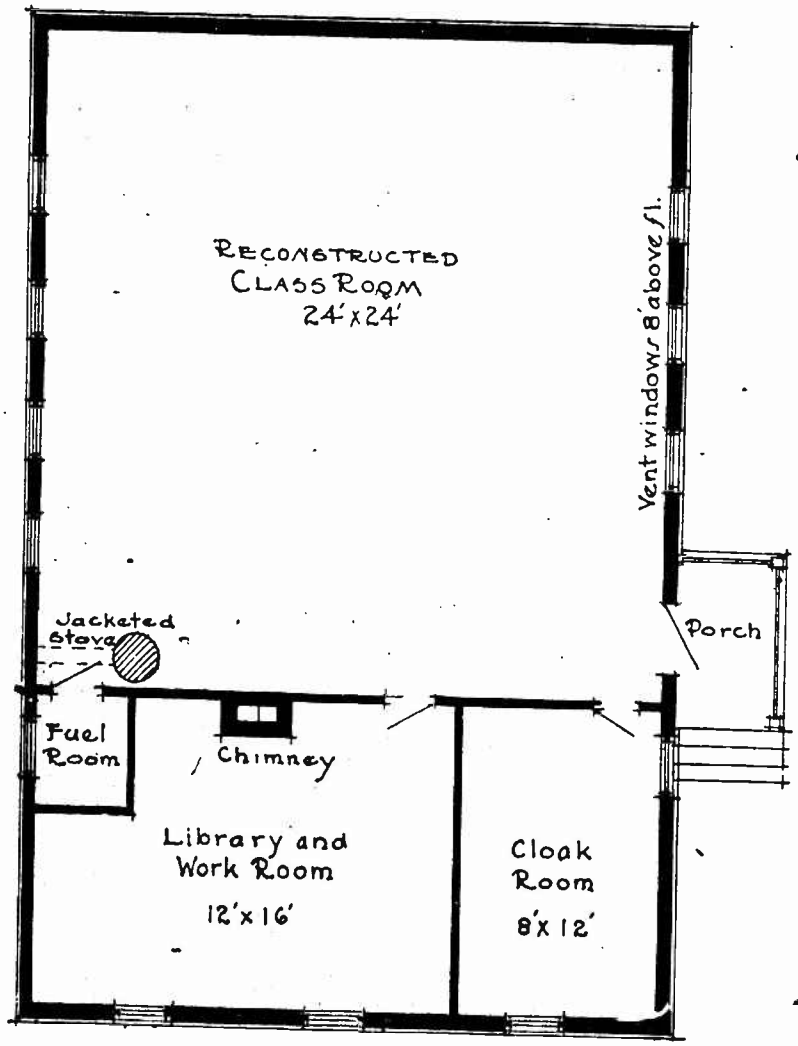


FIG. 34.—Reconstructed floor plan for an old building (based on fig. 14, p. 91).

be greater than five times the area of all the glass in the windows. This is a practical preliminary step to assure economical proportions of light and space, with due regard to hygienic requirements. In all probability this floor plan, which is 36 feet long and 24 feet wide, represents one-third more space than would be needed for a class-

room, if the seats were properly arranged, the stove better placed, and the lighting well adjusted.

In the second place, it will be necessary to study the school population of the district to discover how many children of school age really reside in that district and how many are likely to attend school. Suppose the average attendance for the last three or four years has not been greater than 25, which number represents the attendance in a large majority of the district schools. For this number of pupils the room is needlessly large; hence we ought to reduce it, not by sawing the building in two, but by erecting a partition and utilizing the rest of the floor space for other purposes. If, on the basis of 25 pupils, each pupil is allowed 20 square feet of floor surface—a liberal estimate—then 500 square feet would represent the floor surface of the schoolroom needed for class purposes. The room is 24 feet in width; hence a length of 22 feet would yield 500 square feet and some space to spare. Suppose for good measure and for possible increase in the number of pupils during the winter time the room be made 24 feet square. These dimensions would give enough floor space for approximately 29 pupils, and would still leave a space 12 feet wide and 24 feet long at the rear of the room which, if partitioned off, would make the classroom much more attractive and usable as a schoolroom. The partition would cut off the door, and an entrance would have to be made elsewhere. Probably the best place for it is that shown in in figure 35, for the small porch needed will be inexpensive and the door will be convenient both to and from the classroom. The remaining long window on this side of the classroom could be removed to the other side, and two or three small windows for ventilation could be set 8 feet above the floor. Three ventilators, probably two, would be ample in most climates. In order to get sufficient light, two more windows should be added and set, as indicated, in the left wall. The space occupied by the old door can be readily adapted for an extra window.

Out of the space thus cut off a cloakroom 8 by 12 feet should be made, as shown, and also a small fuel room. The doors should be set as indicated. There still remains a good-sized room to be utilized as a library or as a general workroom.

If it be deemed better to use this space for a library, then the following suggestions may be worth while: The first need is a teacher with some vision and enthusiasm to build up in the district school a school and community library; then some cooperation from the county superintendent or the county board of education, some help from the State superintendent's office, some help from the women's library associations or clubs, a little aid from all in the community willing to lend a book, give a book, or donate sufficient money to buy a book; and the library work begins. A teacher who would undertake this work

would doubtless have some taste. She would want to make this room the most beautiful in the building and would devise ways and means for cleaning and preparing the floor and for obtaining a few tasteful rugs, some inexpensive but beautiful pictures, a reading table, and some chairs. As a result, instead of the disagreeable and desolate appearance of the old schoolroom, there would be an attraction—a

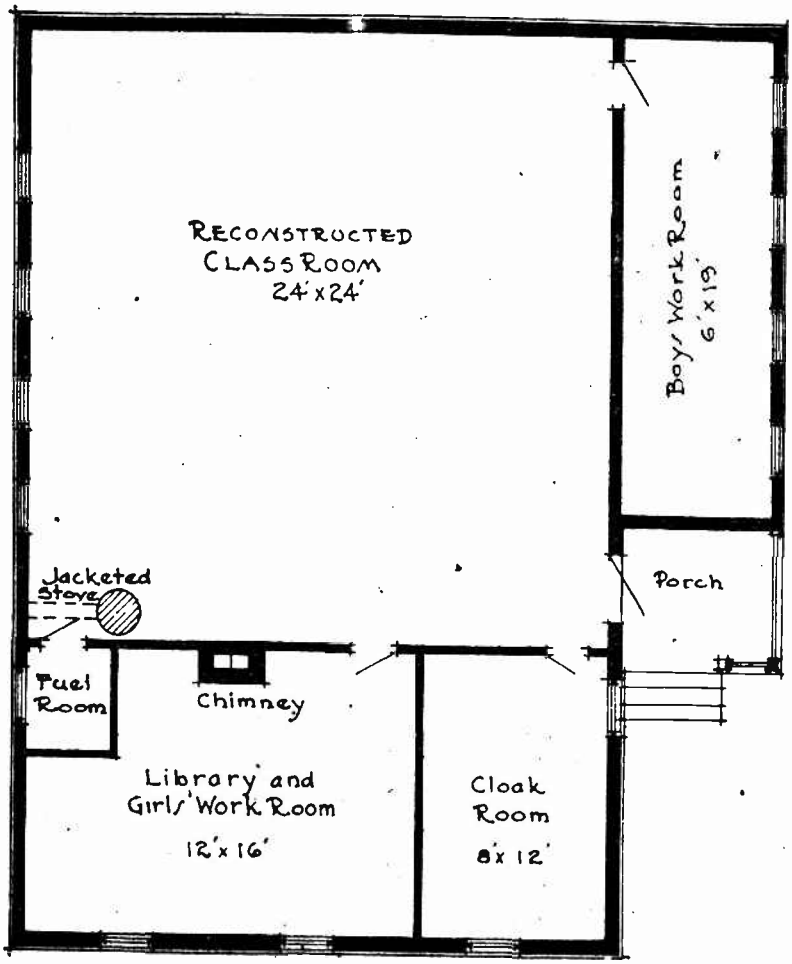


FIG. 35.—Same plan as figure 34 with better division of floor space.

room with books, with magazines; a place for the people of the neighborhood to come, even during school time, to read and borrow books; consequent opportunities for more sympathetic contact with the school situation.

"How much would this reconstruction cost?" This question can not be answered with any exactness, because of different labor condi-

tions in different parts of the country: but surely changing one door, removing one window from one side of the room to the other, adding three large windows, adding two or three small windows and two doors, changing the location of the flue, and replacing the stove could be done at a comparatively small expense. The relocation and grouping of the benches would cost nothing, and the material equipment of the library could grow as conditions permit. The cost of the partition walls and of the new porch would augment somewhat the sum of these expenses.

Of course a regular jacketed stove should replace the old box stove as soon as possible, or the old stove should be surrounded with a sheet of galvanized iron, set 6 or 8 inches above the floor and extending about 8 or 10 inches above the top of the stove. This shield should encircle the stove on all sides save that in which the door is situated, and it need not be over 8 inches distant from the stove at any point. With this arrangement pupils can sit near the stove without being overheated, and the circulation thus set up will enable the whole room to be more equably heated than before.

Imagine if you can, the different spirit that would come over a pupil, say, of the seventh or eighth grade, who was permitted to spend part of his day at work in the library instead of being required to remain in the classroom, listening to the droning lessons of the younger pupils and being distracted in many ways.

This is only one of many methods of remodeling this sort of a district schoolhouse. We might take the same floor plan again and by going to a little greater expense extend the entrance porch and build a workroom 8 or 10 feet wide off it. If this addition were properly proportioned, it would not greatly disfigure the building, for starting with a bad form, we must look primarily toward added usefulness. The expense of making this addition would of course be greater, but it would make a more complete country school. In the workroom thus proposed all of those things pertaining especially to the home life of the children could be undertaken and the curriculum could thus be greatly enriched.

Old buildings are not the only ones which need remodeling. Suppose, as an example of what might be done in increasing the usefulness of a new building, we take the new and in many ways excellent rural school building now in use in West Virginia, represented in plate 15B, which shows its general outside appearance and location. Very slight excavation and the placing of windows and doors in the basement walls would have sufficed to make it possible to introduce a furnace, a fair-sized workroom, toilets, and baths under this building, one side of which is high above the sloping ground of a steep hillside.

If the money spent on the tower had been used in developing the basement, probably there would have been little need of adding to that sum to make the basement entirely suitable for the purposes indicated. In addition to its usual uselessness, this tower is bound to interfere with the chimney draft when the wind blows from the direction of the cupola. A steep roof is not needed on this building, even though it may be in a snowy country; for it is not difficult on a small building of this sort to construct a roof that would withstand all of the weight of ordinary snows.

In the main, the lines of this building are good. The building, as it stands, suggests a tasteful and sanitary interior, in which cloakrooms are furnished, a jacketed stove is employed, and at least some semblance to a library is provided. But note the school ground, the outhouse, the coal piled up in the yard. Telegraph wires are visible, and in all probability a noisy railway is near. What is needed here, in addition to carrying out the suggestions made with reference to utilizing the space beneath the building, is more ground and also more public spirit to keep the garden in good shape and to plant trees. Country school buildings frequently furnish architects a better opportunity for artistic treatment than a large school building in the midst of a great city; for the country environment is frequently more suggestive and inspiring than that possible in most cities. This building would have been much more attractive if the roof had been comparatively flat and if the color of the exterior of the building had been made to blend with the hillside above it.

What can be done in reconstructing an old rural school is illustrated in the series of photographs of the Porter School, near Kirksville, Mo. (Pls. 29 to 32, inclusive.) [1]

Until September 3, 1912, Porter schoolhouse was in a condition of neglect, all too common in rural communities in the United States. The house rested practically on the ground, without foundation. A few of the shutters were still on; tramps had taken the rest for fuel. The chimney flue was at the east end of the building. There was no porch; and the door would not stay shut. Plate 29B shows one of the toilets. Comment on this outbuilding is superfluous. The tramps had used the door for fuel, and as a consequence the outbuilding had been turned into a boys' toilet. For lack of means no change has been made in this building beyond supplying door, lock, and key, and a thorough scrubbing. The toilet is locked and unlocked daily.

Plate 29A represents the Porter School to-day. The photograph was taken from the northwest part of the yard and shows the following improvements looking to the health and comfort of the children:

[1] Data and illustrations furnished by Mrs. M. T. Harvey, the teacher under whose guidance the work was done.

(*a*) A foundation of cement blocks.

(*b*) A temporary porch, steps, and walk, and a shoe scraper so designed that the smaller pupils may support themselves while cleaning their shoes. This device was planned to minimize the dust problem, for mud and dust are plentiful here.

(*c*) Door and window screens, the first, so far as known, in a similar school in Missouri.

(*d*) Spouting or guttering to carry the roof water from the building and insure a dry basement, which is well protected by a tile drain below and outside the foundation.

(*e*) This view does not show provision for fresh-air supply, but this has been introduced.

Plate 32B represents a view in the basement after reconstruction. A good hot-air furnace, with water attachment, has taken the place of the old stove in the middle of the room. A concrete floor keeps the basement dry and sanitary.

Plate 32A represents another view in the basement showing a pressure water tank and its connections with washbasin and bubbling cup. As will be seen, this pressure tank is well under the ground; hence the water does not freeze in winter, keeps cool in the summer, and is free from any possible contamination.

Plate 30B represents a stage in the process of reconstruction. The patched plastering, the lowered blackboard, and the removal of the flue indicate that the building is now ready for the painter and the paper hanger. During the time the interior was reconstructed school was held in the teacher's cottage. The telephone shown in this picture is an interesting attachment to a district school and is very desirable in case of accident or of severe or sudden illness and in time of storm.

Plate 31B shows that the light is from the north and enters the room to the rear and left of the benches here shown. Adjusted shades make it possible to light the room fairly well even on dark days. A light ceiling and soft tan walls contribute to the lighting of the room and give it a pleasing appearance. A bookcase has been built in and is fairly well filled with books.

Plate 31A shows the south wall of the room and indicates how cross lights are prevented by shades in rooms in which windows are introduced on two sides. Note the reproductions of famous paintings, the phonograph, and the reed organ.

Plate 30A gives a general idea of the former dilapidated condition of the interior of the building and shows the bad arrangement of the desks—an arrangement more or less necessary because the stove occupied the main part of the room, and in cold weather it had to be kept so hot that the children could not sit very close to it. Note the dirty and dingy condition of the walls, especially around the flue.

Chapter IX

TEACHERS' COTTAGES.

In Chapter II reference was made to the need of a cottage or a home on the school ground for the rural teacher, and it was there suggested that the establishment of homes for men teachers on school farms would greatly aid in the work of introducing and maintaining effective work in agriculture. It is obvious that unless rural school pupils can actually engage in experimental work in agriculture under the guidance of a competent teacher, what they learn from books will be of little practical value. But since the long vacation is coincident in most parts of the country with growing crops, unless the teacher remains in charge through the summer to guide and direct the work theoretically planned and organized during the winter months it will probably go by default. A school farm, therefore, should not only be at the disposal of the teacher, but a home should be furnished him and he should be employed by the year.

A question arises immediately whether the schoolrooms should be a part of a house designed for both purposes or whether the teacher's house should be a separate building?

In European countries, especially in small village schools, the teacher's house is usually under the same roof with the schoolrooms. In larger schools it forms a separate building, but is situated on the school grounds. While there is always an advantage in the protection of school property in having both buildings under one roof, some disadvantages are encountered. In the first place, the danger of disturbance to the school or the home must be considered. A teacher's family needs privacy; the school children require freedom. The playground should not be encroached upon, neither should the sanitary appliances be used in common by the school and the home. In general, it seems better under conditions in our country to recommend a division of the school grounds into two parts, one for the schoolhouse and playgrounds and the other for the teacher's house and the experimental farm and gardens. If every country school were supplied with 10 acres of good, well-drained land, and 3 acres of it were set apart for playgrounds and school buildings and the other 7 acres for a teacher's home and the school experiment farm, the ratio would be approximately correct

for reasonable needs in most places. The best location of the teacher's cottages, with reference to the needs and demands of the school building, could only be made after careful consideration. Subtracting the land required for garden and for all the buildings needed for the teacher, there should be at least 5 acres of land left for agricultural experimental work. And by experimental work is not meant the wasteful use of the land, but the most profitable use

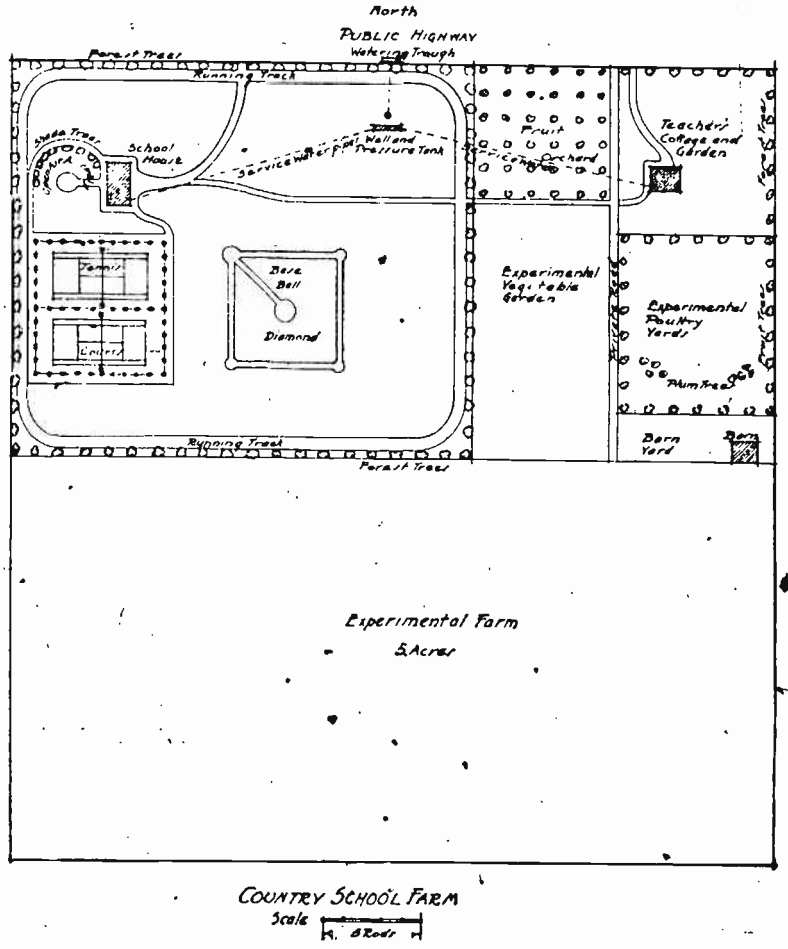


FIG. 36.—Country school grounds, showing farm of 5 acres.

of it. It is as much of an experiment and often far more useful to make an attempt to grow 100 bushels of corn, 2 bales of cotton, 300 bushels of potatoes, or 40 bushels of wheat to the acre than to attempt to grow some crop new to the neighborhood and of doubtful adaptation. Some experiments on new things are very important educationally, but these should not require much ground.

Good experimental farming does not warrant rash experimentation. The proper and wise use of the 5 acres suggested could thus be made to serve not only as an object lesson for all concerned, but to add much to the revenue for the upkeep and the upbuilding of the whole school property. If farmers can see that in their own neighborhood 5 acres well cared for will bring better returns than 20 acres poorly cared for, one of the best lessons in community thrift and intelligent farming will have been learned. Besides, the attempt to make the school farm a model for the neighborhood will be the best possible incentive and responsibility to lay upon a teacher whose specific business it is to be the moral, social, and intellectual leader in the district.

The cottage for the teacher should be as far as possible a model of its kind for the neighborhood. A beautiful, well-planned, and sanitary cottage on the school farm would help in a definite way to stimulate the farmers to build better houses (not more expensive ones) and to reconstruct to a degree those already built.

What sort of cottage should be built? The complete answer to this question must of course be left to the authorities of the district. There are, however, some suggestions applicable:

1. It should be beautiful and as far as possible should harmonize with the general architectural treatment of the school building, if the latter is a modern type. An architect should be employed and the beautification of the useful be insisted on.

2. It should include a living room, a bath room, a kitchen, a dining room, and a sleeping porch. The number of bedrooms will probably not exceed two, and these should connect with the sleeping porch. The plans for the kitchen should receive a great deal of care, especially with reference to modern conveniences.

3. The sleeping porches should be models for the neighborhood. They should be carefully screened against flies and mosquitoes and should open from small dressing rooms, capable of being used as bedrooms when necessary.

To most people in this country it will be a surprise to learn that several States, notably Washington,[1] already have teachers' cottages in connection with many of their country schools. The cuts here introduced will give some idea of the nature and style of these cottages. The good example set by Washington, Nebraska, South Carolina, and other States should stimulate many others to progress in this direction.

In this discussion the importance of cottages for men teachers on school farms has been emphasized, but without any intention of overlooking the need of them for women teachers. Very fre-

[1] The State of Washington now has 83 teachers' cottages (March, 1914).

quently a woman teacher has a hard time to find a satisfactory boarding place in the neighborhood, and for this reason alone will refuse to consider a second term in the school. Often the mere selection of a boarding place involves opposition from others who were in the race for the teacher's preference. Those who have taught in rural schools know how essential to success this matter often becomes.

Mrs. Josephine Preston, State superintendent of Washington, states in a recent communication relative to the development of teachers' cottages in that State:

> The teachers' cottages really came from the failure or refusal of one of the wealthiest districts in my county (when I was county superintendent of Walla Walla County) to furnish a place for the teacher to board. As a result a cookhouse was moved into the yard and banked up by the side of the schoolhouse, and there the teacher lived all winter. Next year the district built a two-room cottage. Pioneering for teachers' cottages is over with us. A teacher must be happy and comfortable in her home life to give the best service in the schoolroom.

Cottages for men teachers on school farms are, however, far more important, if we hope to increase the number of worthy men in the work of teaching in country districts.

Plates 37 to 39 represent teachers' cottages in various States. Plates 27–28 are reproductions from photographs of combination schools and teachers' cottages in Alaska. These are under the Alaska school service of the Bureau of Education.

As has been said elsewhere, if the country school is to do the work now generally demanded of it, teachers' cottages are necessary in many parts of the country. There is no practicable way of making the district school the real social and educational center of a community without keeping the schoolhouse open and the agricultural operations under supervision during the summer months. This will of course mean a change in the plan of hiring teachers, and, more especially, it will necessitate the employment of a greater number of men for rural school work. There are many difficulties in the way, and some of them may seem almost insuperable, but progress in country life demands these changes and in time they must be made.

Chapter X.

CONSOLIDATION OF RURAL SCHOOLS AND SOME SPECIAL NEEDS IN BUILDINGS FOR SUCH SCHOOLS.

The relation of consolidation to schoolhouse construction has received less attention than the subject deserves. Many one-teacher district schoolhouses now unfit for use should not be rebuilt, and would not be if some one who sees in time what should be done would tactfully present to the people of the community the possibilities in consolidation.

A school building designed for the use of consolidated country districts will, of course, conform to the general hygienic and architectural rules for buildings of the size required, and hence there is no need of repeating those details here. But there is need of special emphasis on certain points; for a consolidated country school bears a peculiar relation to the community it serves.

In the first place, an assembly room is of special importance in these schools. The country children will find in assembly rooms the satisfaction of their desire for a wider social contact and companionship. Such rooms will also furnish opportunity for bringing parents together for entertainments, lectures, and civic gatherings. An assembly room is necessary for the morning exercises, and especially for chorus work. Music is much needed in such schools, and, as already pointed out, will appeal strongly to young people who have had to leave school. The difficulty of creating a school spirit and a neighborhood enthusiasm for general progress is greatly relieved by an assembly room.

In the second place, a commodious, well-appointed, and well-lighted library room is especially important in a consolidated school, both by reason of the need for a common center of reading and reference within the school and also because of the opportunity thus afforded to lend books and distribute them through the neighborhood. The books in a school library should be selected for both pupils and patrons, and every legitimate effort should be made to render them most useful. The library may thus serve as a sort of extension school in all that pertains to the interests of the community, in matters of agriculture, home-keeping, and sanitation, and in the dissemination of good literature.

In the third place, manual-training rooms for both girls and boys are needed. This need has been emphasized elsewhere in this bulletin, and it is only necessary to say here that this larger community school should lead in attaching the school life to the home life. In the term "manual training" as used here are included all attempts at creative effort in any worthy field of useful home activity—cooking and sewing, canning and millinery, cabinetmaking and house planning, practical electricity and plumbing, and every other manual activity helpful for country people to know.

In the fourth place, some room or special building should be set aside for experimental agriculture and gardening. The statement has recently been made that if the methods used in seed selection and cotton culture on the demonstration farms in the South were universally applied by the farmers of that part of the country, the cotton crop would be doubled and would add $240,000,000 annual profits to the national income. This is only a sample of the opportunity these schools have.

Finally, emphasis should be laid on the need of an adequate supply of pure running water in order that lavatories, baths, and particularly a system of flushing toilets and of septic disposal of sewage may be installed in every consolidated country schoolhouse. This need is particularly characteristic of the consolidated school. A dignity and an importance never attached to the one-teacher school are attributed by the patrons to the consolidated school. It is their "big school." Even the country high school is rarely so close to the people as the consolidated school may become, because the high school does not touch so many homes directly, and because the average farmer does not understand the high-school curriculum so well as that of the consolidated elementary school.

Not long since the writer had an opportunity to travel over a portion of one of the Southern States in company with the several State officers of public education. One-teacher schools and also several central or consolidated schools were visited. Opportunity was afforded to talk with many farmers as we passed through the country, and the one lasting impression brought away was the personal pride everywhere exhibited by these country people in their "big schools." In all their conversation about them an eager interest was manifested, for the schools were opening to their children opportunities they themselves had never had. This sentiment is general. Along with this interest and trust in the school go the corresponding responsibility and prestige of the school in the community, because of which the community is inclined to adopt and employ what it finds in operation in the school.

Now, it is possible to supply schools and farmhouses with running water at no great expense, although the farmers will have to be

shown how this can be done, and actually see the plan in operation before they will take much interest in it. Not only, therefore, for the sake of the children at school, but as an educational agency for the community, all consolidated schools should be supplied with the best of sanitary fixtures and with pure running water.

Consolidation of schools does not always imply the necessity of the expense involved in transporting children from the abandoned districts to the central school. This is usually necessary only in sparsely-settled communities, where many schools have combined into one, or in rigorous climates, where walking would be dangerous for the children. In some parts of the country the question of transportation is often negligible, or nearly so. Generally speaking, if three schools in adjoining districts are combined into one, the children can still walk to school without danger or inconvenience.

Obviously the cost will be less to transport the children of two schools to the consolidated school when the number of children in the two schools will not total more than the number which one teacher can handle effectively, for the cost of a teacher and the maintenance of an extra building will more than pay the expense of public transportation.

Experience shows also that a saving in cost of operation may be effected if several one-teacher schools, with a small enrollment in each, are combined into one central building, in which the work can be done more effectively with fewer teachers. Here, as in the case suggested above, the saving in salaries, fuel, insurance, and repairs may be more than enough to pay the cost of transportation. Such a possible saving will depend largely on the distribution of the children in the districts, on the condition of the roads, and on the opportunity afforded for securing transportation of the pupils at a reasonable cost. If the school authorities are compelled to furnish wagons and if the combined distance is such that it is not possible to use fewer wagons than the number of schools abolished, the cost of transportation will easily exceed the saving.

For all schools in which the number of teachers employed would be equal whether consolidation were undertaken or not, the expense of transportation would likely overrun any immediate saving due to consolidation.

If new buildings are necessary in several single districts, and if instead of building a number of one-teacher schools the districts combine to build a central school, the immediate expense would be lessened. In the more densely populated rural districts many of the children from abandoned districts may be able to walk during a part of the year to and from the central school without serious hardship, and a definite saving in administration may be effected. Since the conditions are so diverse in different parts of the country, due to

climate, to lack of good roads, and to social distinction of one sort or another, the financial outcome of any scheme of consolidation must be very largely a local problem.

A comparison of the immediate expense incurred for each school does not, however, always tell the chief part of the story. Sometimes consolidation actually costs more, dollar for dollar, and yet there may be a saving. The cost of schools should always be considered in the light of the results attained. A consolidated school offers better opportunity for effective grading and classification of the pupils, than a one-teacher school, but above all it gives each child more of the teacher's time for personal help and guidance. A teacher whose school hours must be divided among the pupils of seven or eight grades, with 25 to 30 recitations a day, can not use her time most helpfully to her classes. Especially is this true with the younger children, who make up a large proportion of pupils in country schools. Young children need adequate guidance and abundant drill in their work. This is possible only where the teacher is not overburdened with a great number of classes. It may easily happen, therefore, that a dollar spent for work in a one-teacher school, where all grades are represented, will not and can not bring as good returns educationally as one-half of that amount spent under better conditions in a consolidated school.

The consolidated school, with fewer grades for each teacher but with larger opportunities for drill in essentials, opens therefore an encouraging prospect for some relief from this lamentable weakness in average rural communities. In this particular alone the added cost of consolidation, if there be any, may and ought to increase the educational efficiency of the schools to such a degree as to more than warrant the extra expense. This is just one phase of the increased advantages which may be derived from consolidation. In addition, more ground can be covered in all subjects, more specialization can be demanded of the teachers, better hygienic conditions can be secured, better supervision will be possible, and particularly the civic life of the community will be quickened in many ways. Wherever consolidation has been wisely handled the people have usually kept their children in school longer and more regularly. Many consolidated schools have thus been able to bring to the rural communities the advantages of one or two years of secondary training, and in some places a full high-school course, which was impossible before consolidation. Thus in a certain consolidated school far out in the country four teachers are teaching in one building all the children that before consolidation had required six teachers and six buildings. In addition to all the usual subjects of the grades, there are in this central school, which is presided over by a vigorous well-educated

man, classes in Latin, French, geometry, algebra, physics, and general history. Literary societies have been established and, perhaps most interesting of all, one teacher has regular classes in music and is training the children in chorus singing. A new piano, a product of community enthusiasm, dignifies the assembly room. In such an environment as this, civic life is engendered and local patriotism is fostered.

In what has been said with reference to the advantages of the consolidated country school there is no desire to underestimate the value of the one-teacher school in the life of the community. With a good building, well arranged and well located, and with a well-paid teacher, the one-teacher school may serve its patrons and all the people within the district boundaries as well as a consolidated school. This excellence will depend on the initiative and wisdom of the teacher with whose rare leadership it is indispensably associated. Such a teacher is hard to find and hard to keep. But the consolidated school has opportunity for larger cooperation, and can more readily command the services of teachers who have proved themselves leaders.

One consolidated country school in Wake County, N. C., has a cotton patch on the school grounds, planted and cultivated by the pupils. From the proceeds of the sale of the cotton grown on the grounds, furnishings and equipment were purchased for the school. On the second floor of the building there is a small but convenient assembly room in which is a good piano purchased by funds from the school-garden products. In this school several high-school subjects are taught, literary societies have been organized, and community interest has been developed. It is worth a great deal more for a pupil to attend this school than a smaller school, even though the subjects taught be the same, for here he comes in contact with a larger neighborhood environment, enlarges his acquaintance, gets the help of better teachers, and is brought into healthy competition with more children of his age and general qualifications. The attitude of the neighborhood people toward this school and its work is interesting; they feel that it is their "big school" and that their children are honored in attending it.

Chapter XI.

SANITARY AND CONVENIENT WATER SUPPLY FOR COUNTRY SCHOOLS.

The two most important sanitary needs of country schools, outside of the school building and its requirements, are sanitary toilets and a safe and abundant water supply. The results of the investigations of water supply for country schools detailed in Chapter III, as well as the results of other similar inquiries, make it clear that the drinking water furnished the children is often impure and dangerous. The experience of most country-school teachers will bear out this statement.

Springs and farm wells are the usual sources of water supply. The springs are usually at some distance from the schoolhouse, and generally on lower ground. They are often poorly shielded from immediate contamination, and often receive the drainage from swampy ground, much-used pasture lands, or other defiled areas. In fact, they furnish merely slightly purified surface water. In general, they issue in open pools. These pools are depositories for leaves, dust, and dirt; insects find lodgment therein; various animals share in their use. Despite all these sources of pollution most people are brought up to believe that no water is so pure as "spring water." To be sure, there are many springs which furnish fairly pure water, and many others which if properly cared for would be safe, but the number of these is small in comparison with the number that are unsafe. Bacteriological and chemical examinations made at frequent intervals are the only safe guides. Possibly of all springs the small intermittent, dribbling ones are the most dangerous, for, getting their supply from the immediate surroundings, they discharge surface drainage which has had small opportunity for purification, either by filtration or by any other means. Springs in limestone regions are often subject to contamination by reason of the fact that the underground channels through which the water flows are often connected with sink holes partly filled with water and used as a water supply for cattle, hogs, and other domestic animals. Water from such sources may be carried long distances with limited opportunity for aeration, filtration, or purification of any kind.

All these facts, and others which might be mentioned, emphasize the need of caution in the use of springs as a source of water supply

for either country schools or country homes. Possibly the chief danger arises from the fact that any sort of spring is used and is generally poorly cared for. Further, many opportunities are afforded for pollution from dirty buckets and careless methods of transportation before the water is put into a sanitary receptacle in the schoolroom.

When farm wells are depended on for drinking water, the school authorities rarely have any direct control over them and rarely make any investigations to determine whether the water taken from them is wholesome and safe. Many farm wells are improperly cared for and receive infected surface drainage. The logical conclusion is that unsafe water from them is frequently supplied to school children. Just as in the case of springs from which water is carried in pails to the schools, the supply from such wells is open to serious objections. It is troublesome to have always at hand fresh water, and consequently children are often required to drink water which has stood for hours in an open bucket. Furthermore, dependence is placed on the boys to fetch the water, but they are [illegible]t careful, and not infrequently return with a half pail of water [illegible]re or less contaminated by their carelessness.

Whenever attempts are made to furnish a well for these schools the objection is usually urged that wells at schools, because they are used only about half the year, are soon in bad condition and are more dangerous than farm wells. There is truth in this contention, but it is owing largely to the fact that the wells are improperly located and improperly constructed in the beginning.

A dug well can be made a safe well, provided all the water flowing into it comes from a pure source; but it will cost more than many school officers are willing to appropriate to make it safe. A driven well can often be sunk to a much greater depth, thus insuring better filtration; it can be so cased-in as readily to cut off surface drainage; and it frequently costs less than a properly constructed dug well; hence the driven well should be preferred for country schools.

There are, however, many erroneous notions concerning the purity of the water from a driven well. There is no difference between the purity of the water from a driven well and of that from a properly guarded dug well of the same depth. If both are shallow and are so placed as to gather surface drainage from infected soil, they will be equally dangerous. The only advantage such a driven well would have over the dug well would arise from the fact that, unless the dug well were securely covered and the casing made water-tight to the lowest water line, surface infiltration into the driven well would be accomplished more slowly and more opportunity would be offered for purification. The main source of supply would be the same in each case.

If a driven well is forced through an impervious stratum of hard clay or other material into a deep-lying water-bearing stratum which has no direct connection with the surface of the locality, and if the boring about the pipe where it is driven through the impervious stratum is securely sealed against infiltration from above or pressure from below, local insanitary conditions would have very little or nothing to do with the purity of the water obtained. The problem then would be to determine if possible the source from which the deep-lying water-bearing stratum gathered its supply. This might be from a long distance. A study of the geologic formation of the district would be necessary to determine where such water entered, for it must be remembered that all ground waters, whether near the surface or deep seated, were once surface waters and came from rains or snows. A flowing or artesian well may be dependent on surface connections hundreds of miles distant.

Sometimes, especially in mineral regions, a deep driven well will draw its supply from highly mineralized waters, and hence may furnish water disagreeable to the taste and even dangerous for drinking. Some mineral waters are wholesome and healthful, but it is always safe to know the chemical constituents of suspected water before using it freely.

Ordinarily a driven well with a force pump is the safest well, other things being equal, that can be provided either at the farm home or at the country schoolhouse. Of course, it is not always possible to supply this kind of well on account of the geologic formation. But wherever a good water supply can be reached at a good depth, the driven well is safer, because there is less opportunity for defilement.

When a driven well is properly placed and is sufficiently deep to warrant a supply of pure water, a drinking fountain can be attached to the pump, as indicated in figure 37. This will necessitate a good cement foundation about the pump and about the drinking fountain, ready means of carrying away the waste water, and such an attachment of the fountain to the pump that the pressure tank will be below the freezing line and also deep enough to keep the water cool in the summer. Plate 43 represents such a fountain in use. If the well is a driven one, an excavation sufficiently deep to place the tank and its connections well below the surface of the ground may be made, and the attachment be made to the pump in the same fashion as shown in the cut.[1]

If a large pressure tank were substituted for the small one shown in figure 37, not only could a drinking fountain be supplied, but lavatories, flush toilets, baths, laboratories, and a faucet for hose as pro-

[1] Thanks are due to the manufacturer and to State Supt. Francis G. Blair, of Illinois, for the privilege of reproducing these cuts.

tection against fires, or for general garden use could be installed, because all that would be needed would be the necessary pipe connections. Naturally the drinking fountain, the tank, or any outlet from this pressure tank could be located in the most convenient and acceptable place.

Figure 37 shows a cross section of the well with the pressure tank and valves and all necessary fixtures. By operating the pump

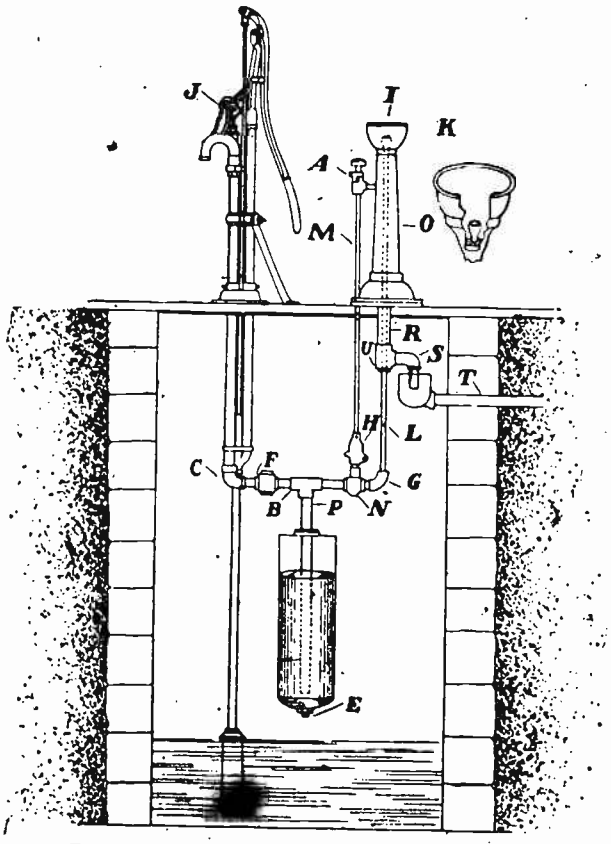


FIG. 37.—Cross section of drinking fountain attached to pump.

handle the water is forced in at the bottom of the pressure tank, thus compressing the air at the top of the tank. With each stroke of the pump handle the tank receives more water, and the air at the top is more compressed. A check valve placed between the pump and the tank relieves the pump from all back pressure. A self-closing valve is placed between the pressure tank and the supply pipe leading to the bubbling cup. To get a drink of water the child turns the little handwheel at the side of the bowl, which opens the valve below.

The air pressure in the tank forces the water to bubble up through the bubbling cup. In the course of the process the waste water escapes through the outer pipe at R and out through the pipe T. It will be necessary to make these waste pipes water-tight, so that none of the waste water would fall back into the well. The waste pipe shown at T should be carried to a safe distance from the well, so as to prevent any possible infiltration.

The same care should be exercised in carrying away drainage from a driven well as from an open well, though, of course, the danger of rapid infiltration is not so great with the former, unless the wall casing and covering of the open well are made impervious as far down as the lowest water line.

Experience has proved that individual drinking cups do not satisfy the demands for good sanitation at schoolhouses and that the only sanitary and convenient contrivance is some form of drinking fountain.

It is a common habit where individual cups are used, for one pupil to exchange his cup with another pupil and to feel it a sort of honor to have others drink from his cup. The children often carry their cups in their pockets, or expose them so as to receive the dust from the schoolroom, and in many ways they offer opportunity for contamination. Theoretically, individual cups would seem to satisfy all requirements, but in practice they do not, simply because neither the children nor the teachers, however careful they may be, can be certain that exchanges are not made and that the cups are kept in a clean condition.

There is a simple form of fountain not dependent upon running water which is usable in country schools. This consists of a receptacle to hold a supply of water; the water is thrown up through the bubbling cup by the force of gravity, the waste running into the bucket shown below. There are several adaptations of this kind of fountain. The chief requirements are some means of keeping the water cool, a ready means of catching the waste water, a tight cover to prevent the entrance of dust and dirt, and a possible adjustment of the bubbling cup to the various heights of the children. Naturally the water served in such receptacles must be taken from a pure source and be kept from contamination. It is possible, with this form of fountain, to boil and cool the water before it is introduced into the receptacle and thus to insure its safety. The practice of putting lumps of ice directly into the water is questionable, unless it is certain that the ice has been made from pure water.

In practice these fountains are not always kept in sanitary condition, not being thoroughly and satisfactorily cleaned often enough Despite everything done, a sediment from the water and possibly

also vegetable matter will gather on the sides of the receptacle, and make it insanitary.

Fig. 38 represents a well incased with large glazed sewer tile and dug in a place where the dip of the impervious strata is clearly marked. Under such conditions it is evident that one side of this well needs more careful protection than the other. If an unpro-

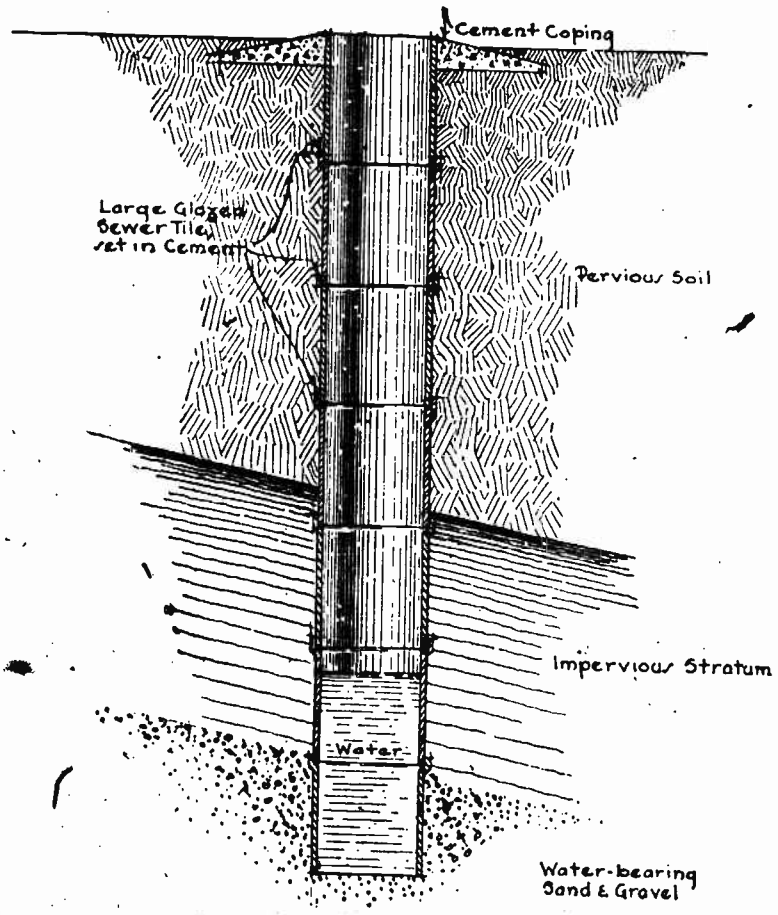


FIG. 38.—Well incased with glazed sewer tile.

tected privy were situated on the side where the impervious strata lift toward the surface, there would be danger of infiltration, even if it were placed at a comparatively great distance, whereas, if it were placed at a reasonable distance on the other side, the danger would be small. This cut, of course, is not meant to represent usual conditions, but it does represent conditions met with at times in various parts of the country.

Chapter XII.

SANITARY PRIVIES FOR RURAL SCHOOLS.

From the point of view of decency and sanitation the toilet facilities of great numbers of our country schools and country homes are bad. This statement is based on data obtained from the teachers of two counties of each of 18 States representing as nearly as possible typical conditions, from the report of a survey of farmhouses made by the various State agents of the Rockefeller Sanitary Commission for the Eradication of Hookworm Disease, from a report of a school sanitary inspection of 3,572 district schools by the Pennsylvania State Department of Health, from an investigation made under the direction of the joint committee of the American Medical Association and the National Council of Education, and from data gathered by various other more or less local surveys.

By reference to Chapter III of this bulletin it will be seen that in 631, out of 1,232 schools reporting, the toilets were adjudged insanitary, and that these 1,232 schools were probably typical of the whole country. The tabulations made of the results of the Pennsylvania survey make it clear that at least 50 per cent of the privies of the 3,572 schools inspected were in an insanitary condition. The Rockefeller sanitary commission found, as the result of a survey of 103,346 farmhouses in 11 Southern States, that 50,637 of them have no privies at all. The report does not make specific mention of the sanitary condition of the privies that were observed, but it is probable that a large majority of them were and are insanitary.

More than a hundred photographs of both exteriors and interiors of rural school toilets, and careful notes made on the ground by the field agent of the joint committee of the National Council of Education and the American Medical Association make it clear that less than 5 per cent of the toilets of the 109 rural schools examined in Connecticut, New York, Vermont, Maryland, and New Jersey [1] are sanitary or even passably decent. One privy, typical of many, was fairly new; and the schoolhouse was not old. The privy was within 3 feet of the schoolhouse. When examined in the summer of 1913 by the field agent of the joint committee, the privy was used by both boys and girls; it had no partition; the door had no lock. Eleven obscene

[1] See p. 29.

pictures were found on the inside. The feces fell on the surface of the ground and were exposed to flies; there was an offensive odor; and apparently no attempt was made to clean, deodorize, or disinfect the building. Many worse privies than this were found. By most teachers and officers of rural schools these data will not be questioned, because all who have worked in country schools and are familiar with country life know by experience that the sanitary conditions ordinarily prevailing at country schools and farmhouses are very bad. Those who are engaged in the attempt to eradicate hookworm disease from our country have concluded that, although they may relieve and cure great numbers of people by the proper use of thymol, their work will never end unless sanitary toilets on the farm and at the school are constructed; for as long as the soil about homes and school buildings is continually contaminated, these depleting parasites will continue to infect and reinfect the children.

But this is not all. We know that typhoid fever is a germ disease, and that insanitary toilets, through the agency of flies and infected water, are among the chief means of spreading this dangerous disease, in cold as well as in warm climates. Proof has been brought forward again and again to show that where absolute cleanliness in this regard prevails typhoid fever generally disappears. Doubtless other diseases also have their origin in the lack of sanitary privies, but it is surely enough for our purpose to know that this lack bears to those two dangerous diseases the close relationship of cause and effect. Considered merely from the economic point of view, typhoid fever costs enough each year to go a long way toward paying for the construction of sanitary and decent toilets at every farm home.

Aside from the danger to health, common decency demands relief. Possibly there is no better test of the real sensibility of a people than that of cleanliness. Wherever you continually find filthy gardens, nasty barnyards, and unwholesome school conditions, you are certain to find crude and uncouth people. If country life is ever to surpass the best of city life in comfort and refinement, and there is no fundamental reason why it should not, these conditions must be changed, and country school teachers must play a large part in bringing about this change. Country schools must teach the truths of sanitation, and they must also set the example of building sanitary toilets and of keeping them in good condition. They must complete their teaching through demonstration of theory by fact, through cooperative activity with the people.

The first question for practical consideration is this: What are the essential requirements of sanitary toilets for country schools?

The first requirement is that the toilets be convenient and easily accessible to the children, so that in cold or inclement weather there

shall be attached to them no thought of exposure and no feeling of reluctance.

The location of toilets in country schools is a troublesome matter. If they are detached from the school building, they must ordinarily be removed some distance for the sake of both propriety and wholesomeness. But to locate these necessaries outside of the school building is to incur the difficulties connected with inconvenience, bad weather, and the dangers of neglect, and to invite indecent liberties of various sorts. Even when washout or flush toilets are located outside, it is difficult to prevent defilement, rough usage, and unchaste, if not immoral, practices in connection with their use. Although all these results do not necessarily follow outside location, the most rigid supervision is requisite to prevent these outbuildings from becoming insanitary and loathsome.

When dry-vault toilets or those with septic tanks are used, it is best to locate them at a distance from the school building. As these are the only forms of sanitary toilets that the great majority of rural schools will be able to supply, the twofold problem of their location and construction must be considered carefully. The small size of the country school lot makes the problem more difficult. The usual half-acre lot can not well be divided by a hedge or fence into two equal parts, for such division would destroy all possibility of a fairly good playground. On the other hand, unless some screen is introduced, the lack of privacy in the use of toilets during the intermission periods, when they are most used, is serious and indelicate, to say the least. Such lack of privacy often causes much reluctance, annoyance, and distress.

The usual locations selected for these toilets are the two opposite corners in the rear of the school lot. Under no condition is it advisable to make a single outbuilding, using one half for the boys, the other half for the girls. The buildings must be well separated. Screens of vines can be used to great advantage in most climates in summer, but as the main part of the school term is in the winter season, in cold climates evergreen shrubs so planted as to shield the buildings and to inclose the walks leading to them are more helpful. In the Southern States the English ivy stands the winters very well and is an ideal vine for covering such buildings and shielding the approaches to them.

Basements afford the most economical and on the whole the best location within the buildings for flush toilets. These can be connected with sewers or with septic tanks elsewhere described.

The second requirement for outside sanitary privies is to construct them in such a manner that the soil around and underneath the school building shall be kept free from contamination. This precaution is necessary on small lots; especially where a well furnishes

drinking water. The ordinary privy set over an excavation in the soil that is not water-tight is dangerous, because of possible contamination of the water-supply. Many rules have been given for regulating the distance from the well at which such cesspools may be located; but, obviously, no safe general rule can be formulated, for the character of the formation, the kind of soil, and the dip of the impervious strata will in all probability be different in each school lot. Sandy loam, with an impervious substratum dipping toward the well, would allow the passage of pollution through a long distance, especially in rainy weather. On the other hand, a clay soil, with an impervious stratum dipping in the opposite direction, might be safe, as far as infiltration is concerned, at a comparatively short distance from the well. Unless absolute assurance can be given that there is no danger of infiltration and that proper protection in every way will be afforded, a cesspool should never be allowed on the ordinary country school lot.

In order to emphasize the seriousness of the cesspool form of toilet at country schools, the following extract from a recent letter by Dr. W. J. Kernachan, health officer of Lauderdale County, Ala., is given:

> In making a health survey of the rural school children of this county recently, I collected a sample of the water supplied to each school. An examination of these specimens by the State pathologist reveals the fact that 19 out of the 20 collected contained fecal matter.

Dr. Kernachan does not state the source of the water supply, whether from house wells, springs, or wells on school lots. But it is evident that either at the schools or at the farm homes, or at both, the most elementary principles of sanitation are neglected. Open cesspools or even worse conditions must prevail to bring about such a condition of the water supply.

The discussions that follow, and the figures introduced, have been prepared with the hope that they will afford country school officials and country people in general some suggestions in regard to the construction of more sanitary toilets, both at schools and at farm homes. No attempt has been made to illustrate all the possible forms of the sanitary privy, but a sufficient number of cuts and descriptions have been introduced to meet the varied conditions found in different parts of our country. Details with reference to plans, specifications, and cost are not given. Conditions are so diverse, and the cost of materials and labor varies so much in different parts of the country, that such details would not be of general value. Most country carpenters under direction of teachers or school officials can carry out these suggestions or adapt them to local conditions.

The accompanying description of a form of dry privy, and the cut represented by figure 39, are taken from the leaflets sent out by the superintendent of public instruction of Virginia:

Two dry closets shall be constructed similar to that indicated. These closets shall be located at or near the opposite corners of the rear line of the school lot, and should be at least 150 feet from the school building. Proper construction is of the greatest importance. The house should be well built, so as to be comfortable in winter, and have a sound roof so that the interior will always be dry. A house of this size should not have more than two seats. These should have tight-fitting hinged covers that would stay down, except when in use. In a corner of the house there should be a bar-

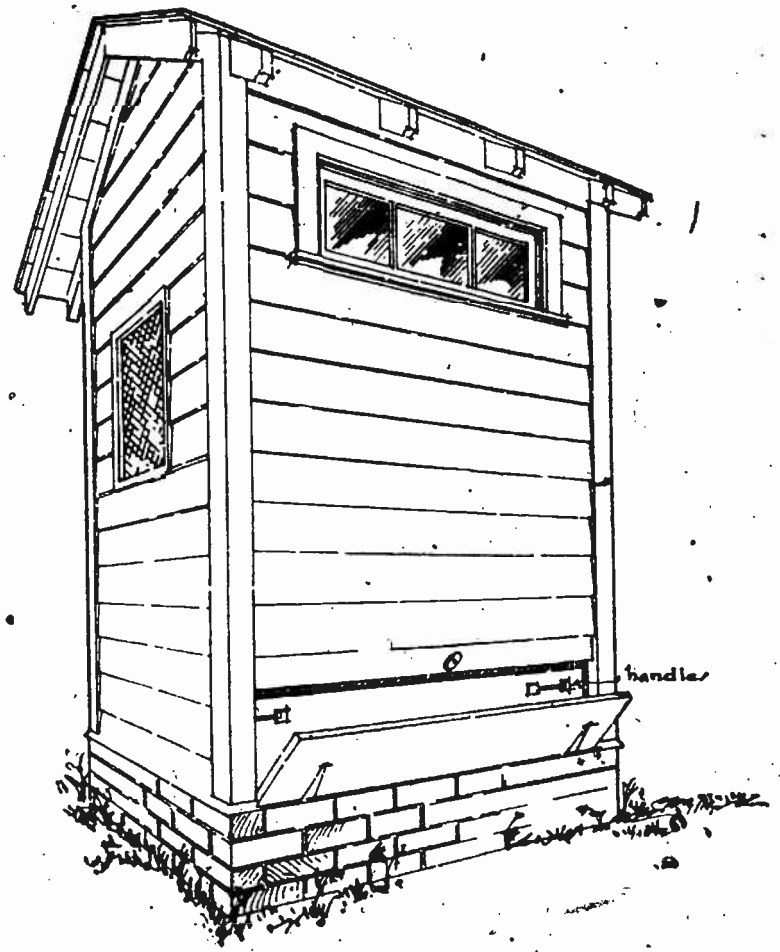


FIG. 39.—Form of dry privy recommended by Virginia State department of public instruction.

rel of powdered surface soil that has been dried in the sun, and a scoop holding about a pint. The door should fit tightly, and any windows or apertures should be screened with fine wire so as to absolutely exclude flies. The construction under the seat may be of several kinds, any of which will be safe, provided a few points are observed.

The "night soil" must be kept in some receptacle which can be kept dry and off the ground, and so constructed that it can be easily removed and cleaned. The contents of the receptacle must be protected against flies. These are the important

points. A box made of sound, heavy timber, well braced, and tight enough to prevent leakage, will be good. It should be set close under the seat, and the opening back of it protected by a door which closes tightly enough to exclude flies. This is shown in the accompanying drawing. The floor of the box should be covered with about 4 inches of dry earth before it is used. Each person using the closet should empty on the contents about a pint of the dried earth. If the earth is used in abundance, the material will in a short time become relatively inoffensive. When not more than half full, the box should be placed on a wagon and moved to some distant field and the contents be dumped into a hole and covered with earth.

The chief difficulty with this arrangement arises from the likelihood that the box will not be emptied often enough. If the box were set on runners, sled fashion, handling would be easier and more expeditious. In this case the box should be made particularly strong. From the sanitary point of view the chief requisites are the use of plenty of dust, complete exclusion of flies, and safe disposal of the contents of the box.

One seat should be about 11 inches high, to accommodate the smaller children, the other about 15 inches high to accommodate the larger pupils.

The district school officers must hire some one to remove and empty this box at regular intervals, without the necessity of the teacher calling his attention to the need of so doing. The teacher should inspect these buildings often and should see that all sanitary requirements are regularly carried out.

Figure 40 represents a boys' double toilet with partition between the two seats. The seats are of different heights; one to accommodate the smaller boys, the other the larger. Each stall is 4 feet wide, 5 feet deep, and 7½ feet from floor to a line on a level with the eaves. Doors are to be 2½ feet wide and 6½ feet high, swinging out. The seat boxes are each to be 2 feet in length from partition to dust bin, one 14½ inches high, the other 11 inches. The width of the seat board should be 15 inches. The dust bins should be 3½ feet and 2½ feet high, respectively; 2 feet wide from seat box to outer wall, and 16 inches from front to back. The ventilators above the doors are set to be sheltered by the wide eaves from driving rains and are to be carefully covered with a good quality of fine wire screen. The high windows should be fastened and are not to be opened. The floor and the roof must be made tight, both to protect against inclement weather and to keep out flies. The lids of the seats should close automatically after use. The doors should be well made and hung with strong hinges to prevent sagging. It is always well to set the doors in such a way that they will close of their own weight. Good locks should be used instead of the ordinary hooks generally used on the doors of such outhouses. This will prevent the doors from being left open for the entrance of flies and the privies from being used by tramps when school is not in session. Ventilators should be

set in the rear as in front. Either buckets or a dry pit, like that in figure 41, should be used to receive the night soil. The height of the dust bins will prevent the boys from using them as urinals. Those in the girls' building may be made lower, if desirable. Some practicable scoop should be supplied for each bin. If preferable, an opening at the bottom of the bin can be made for taking out the dust,

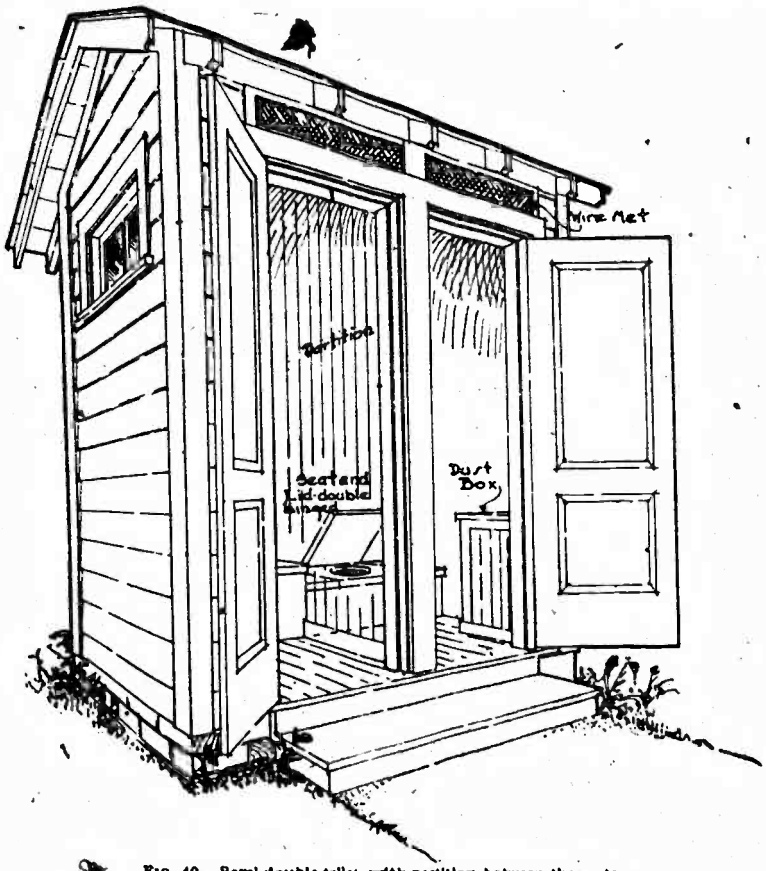


FIG. 40.—Boys' double toilet, with partition between the seats.

and a lid be fastened over the top. This would help to prevent defilements of any sort.

The form of dry toilet shown in figure 41 will be satisfactory and sanitary only when sufficient dry loam dust is used to absorb all the moisture and to neutralize all odors and septic matter introduced. It will be observed that the pit is to be made of brick and concrete and hence will be practically water tight, to prevent leakage and also seepage from the ground. This form requires the selection of

sloping ground upon which to build the privy, otherwise it would be difficult to remove the night soil from the pit. The lids to the seats should be made to fit closely and to close automatically when the seats are not in use. The lid closing the opening of the pit in

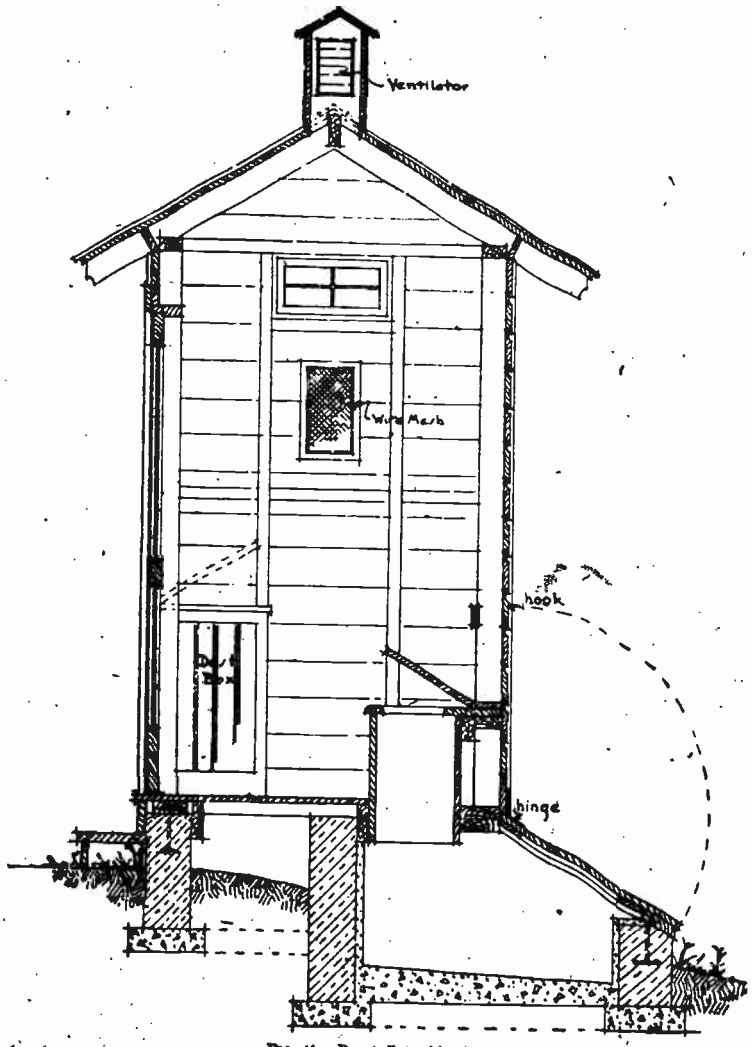


FIG. 41.—Dry toilet with pit.

the rear should likewise be carefully made and adjusted, in order to prevent leakage from beating rains and also to prevent the entrance of flies. The pit should be cleaned as frequently as safety and decency dictate. Cleaning may be accomplished in this form of toilet by shoveling the night soil into a box placed in a wagon and

then carting it to a safe distance in some neighboring field and burying it. The night soil should never be deposited in a field where vegetables are grown, and always at a safe distance from a well or spring.

A well-built bin at least 3 feet high should be located inside the toilet for the purpose of storing a good quantity of dust where it is readily available. Sand should not be used. Dusty loam from dirt roads is excellent. In default of this, well-pulverized dry soil taken from a neighboring field will serve. Some objection might be raised to the height of the bin, on the ground that the smaller children could not readily and easily get at the dust. Although this height may be open to this objection, it will tend to prevent in the boys' privy a more serious difficulty, for if a lower bin is put in, some of the boys will use it for a urinal; furthermore, an outflow for the dust can be made near the bottom of the bin and the lid fastened. Then, too, this height will make it possible to provide more room for storage without encroaching too much on the floor space. Furthermore, while it is useful to instruct all the children in this method of sanitation and to urge them to use the dust without fail, children will forget, and the teacher should see that dust is applied daily. Otherwise insanitary conditions will prevail. The school officers of the district should be charged with the duty of seeing that the pit is cleaned as often as necessary, the teacher reporting to them.

If two seats are made in each room, one should be about 11 inches and the other about 15 inches high. The seats and lids should be kept clean, and sanitary toilet paper should be provided.

Figure 43 represents a slightly different form of dry toilet with a box for dust in the end, one seat 15 inches high for the larger boys, one 11 inches high for the smaller boys, and an open-air urinal trough delivering into the vault. The urinal trough is shown 14 inches above the ground near the outlet and 26 inches at the upper end. This arrangement will give good drainage, as well as accommodate both the smaller and the larger boys.

The partition between the seats will serve to give more privacy. The door is made to swing either way; but it should be provided with an interior latch, and a lock on the outside so that when school is not in session the building could be kept locked to prevent it from being used by tramps or other passers-by.

In this as in all other forms of dry toilets, the two essentials for sanitation are the regular use of dust to cover excreta and the safe disposal of the refuse. Small openings covered with fine wire screen should be made for ventilation. These can be introduced in the front, near the roof. Every precaution should be taken to exclude flies and

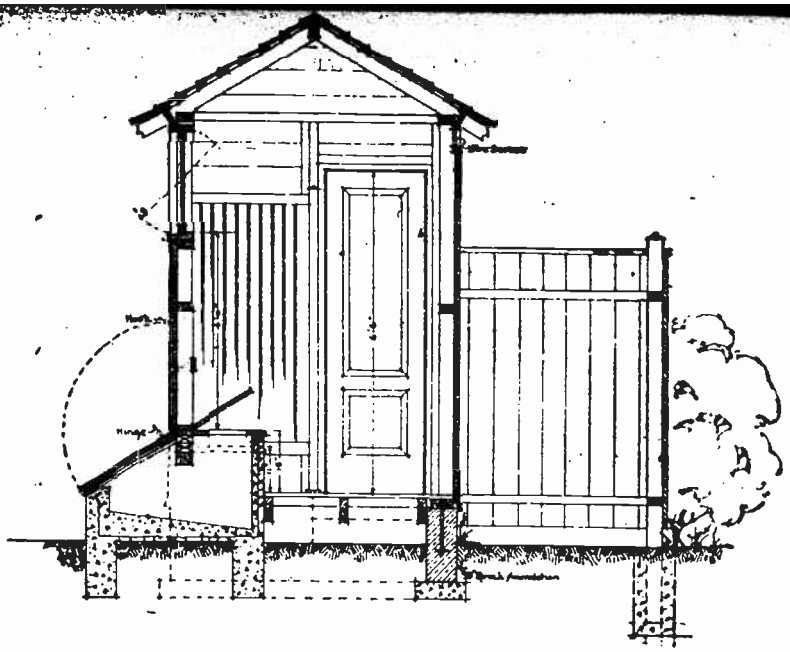


FIG. 42.

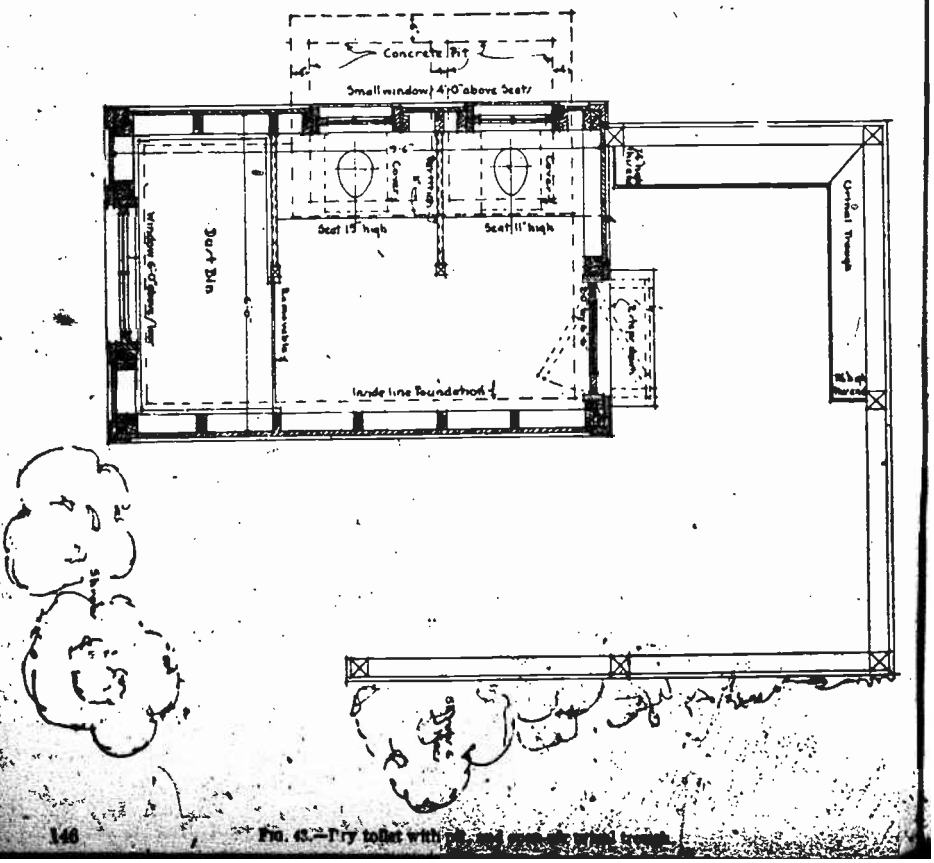


FIG. 43.—Pit toilet with [illegible]

mosquitoes. The lids carrying the seats should be so placed as to close automatically.

Figure 44 suggests a form of dry toilet with buckets for catching the night soil, thus making it necessary to dispose of the collected material oftener and also making it possible to do this more expedi-

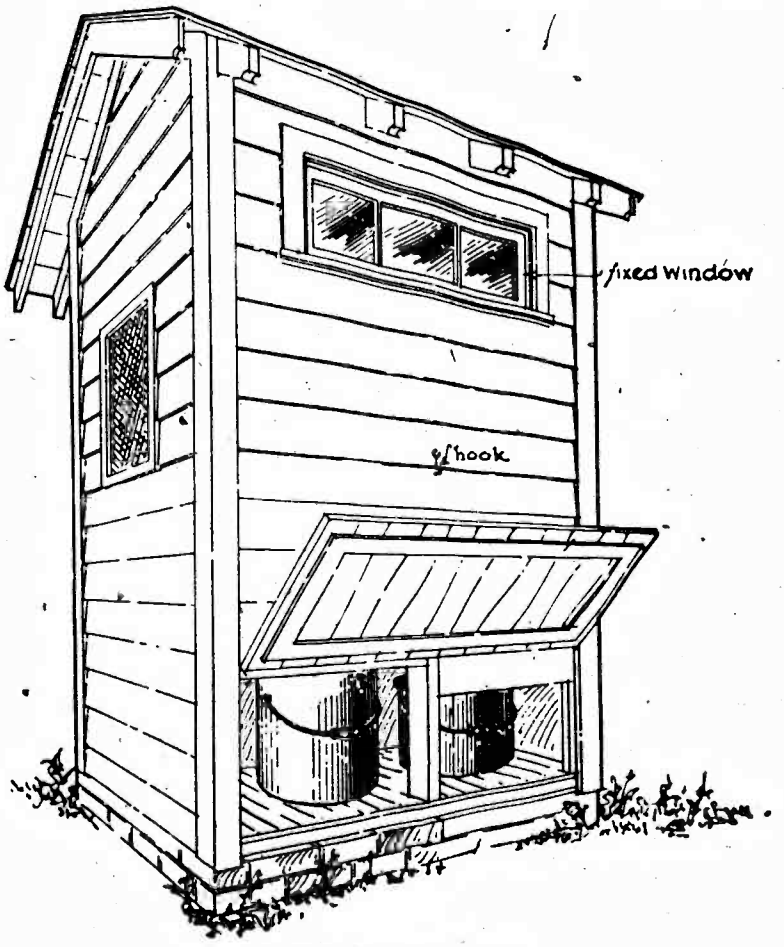


FIG 44.—Dry toilet with buckets.

tiously. Those who attempt to follow these suggestions should be sure that the buckets are large enough and high enough to reach sufficiently close to the seat to prevent defilement.

These buckets should be removed and well cleaned before they are completly filled, and then 2 inches of dry loam dust should be thrown into them before they are replaced for use.

One of the buckets is about 4 inches shorter than the other. This fact, of course, will suggest a corresponding difference in the levels of the two seats, the higher one being approximately 15 inches from the floor, the other about 11 inches. The lids of the seats should be made to fit and to close automatically. The trapdoor in the rear should

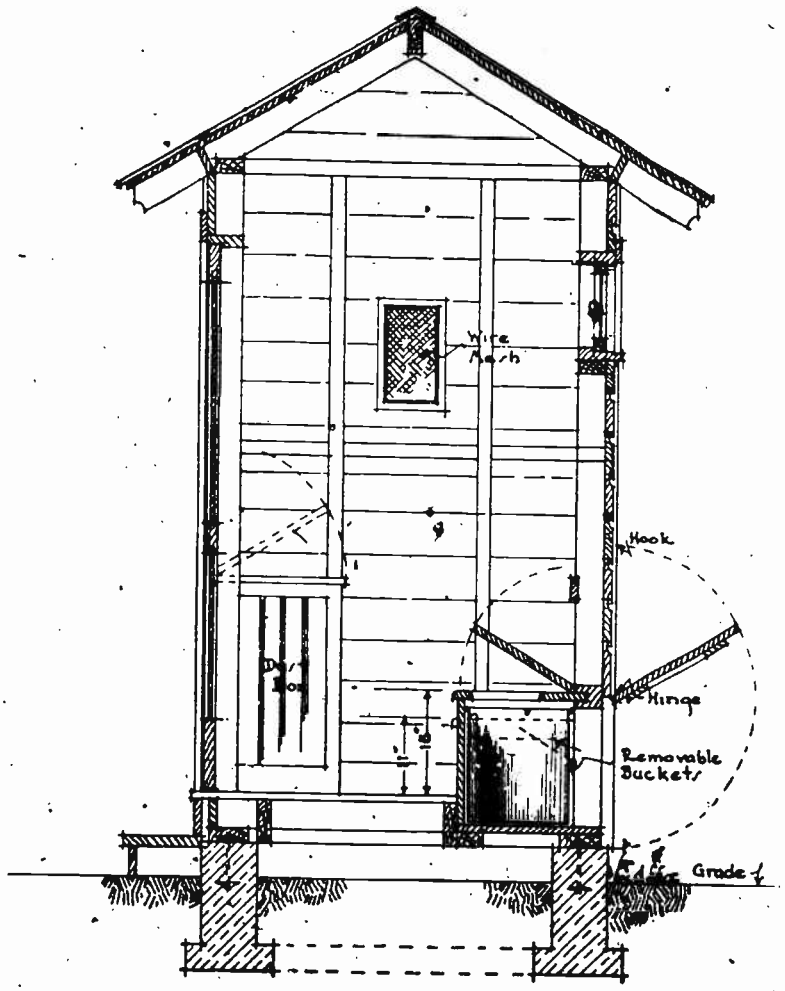


FIG. 45.—Section drawing of privy shown in fig. 44.

be kept securely fastened and to be opened only when the buckets are to be emptied. The whole structure should be neatly built and carefully finished, dust bins included, as described in connection with figure 41. The drawing is meant to represent a building 7½ feet high at the eave lines, 5 feet wide and 8 feet long, outside measurement.

Separate stalls should be provided in this and other detached buildings of a similar type, so that one side may be used by the small boys, the other side by the larger boys. The same suggestion should be followed for all detached buildings for girls.

The form of toilet known as the "L. R. S. privy" was devised by Dr. Lumsden, Dr. Roberts, and Dr. Stiles of the United States Public Health Service. One of the simplest forms of it is represented by figure 46. This form consists of a water-tight barrel with seat arrangement fitted over the top and a connecting T pipe leading from the barrel to an outside effluent tank made of a bucket or a barrel and securely covered to prevent mosquitoes and flies from entering it.

The house covering this toilet will leave the small tank on the outside, which will be adjusted to the floor line as shown in the cut. This will necessitate placing the barrel in a pit or sinking it in the ground so that the top of it will be flush with the floor of the toilet building. It is important that the building be made proof against flies and mosquitoes and that it receive sufficient sunlight to keep it wholesome. The theory of the action of this toilet is exactly the same as that in any septic-tank disposal system. In the beginning the barrel should be filled with water up to the level of the outflow, then, to aid the action of the liquefying bacteria, a small quantity of well-rotted stable manure should be thrown into the water. The action of bacteria upon the excrement is to liquefy it, and, as the water line in the barrel rises, this liquid will flow out into the outside tank, which can be carted off and emptied in a safe place. The simple form shown in this figure makes it possible for this toilet to be constructed at a smaller expense than any other form of septic tank. It, however, necessitates the removal of the outside effluent tank and discharging the material. Chemicals which would destroy the liquefying bacteria should not be used.

Figure 47 represents the same form of privy built in concrete so as to be permanent. In this form, however, instead of being movable the effluent tank is stationary, and the fluid must be pumped or drawn out and carried away in separate vessels.

There is no reason why this form of toilet should not be connected with subsurface drains, like the other septic-tank disposals mentioned further on. If the ground upon which the toilet is constructed is properly sloping and the soil sufficiently porous to permit the proper purification of the subsurface through which the drain tiles are spread, then the necessity of carrying away the liquid material would be obviated. Experiments made with this form of toilet prove fairly conclusively that the fecal matter is liquefied; that there is comparatively little odor about the building; that if the structure is carefully built both above and below ground it may be made safe

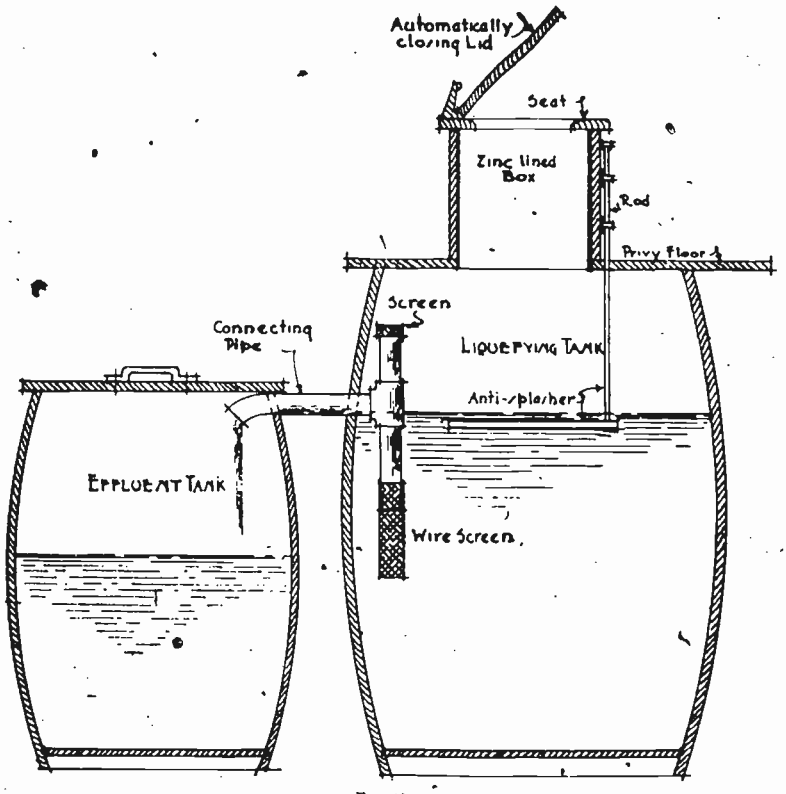
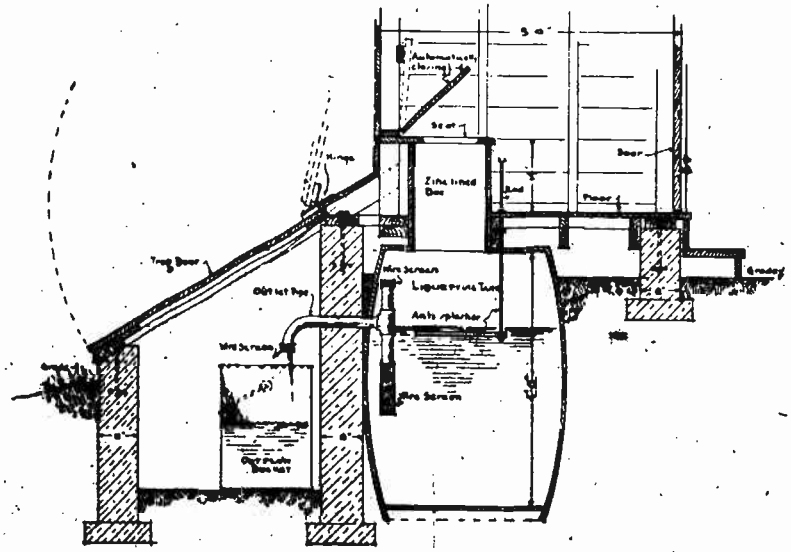


FIG. 46.



AN ADAPTATION OF THE L. R. S. PRIVY.

FIG. 47.—Forms of the L. R. S. privy.

from flies and mosquitoes; and that the labor of cleansing is slight compared with that of any of the dry-toilet systems.[1]

The success of any form of septic-tank disposal depends to a large degree on the slope of the ground carrying the drain tiles, the nature of the soil, and the extent of ground through which the drain tiles may be carried. If the ground is nearly level, the drain tiles must of necessity be placed too deep in the ground to insure rapid absorption and purification of the liquid. On sloping ground it is an easy matter to bring the tiles within 18 inches of the surface, or at most

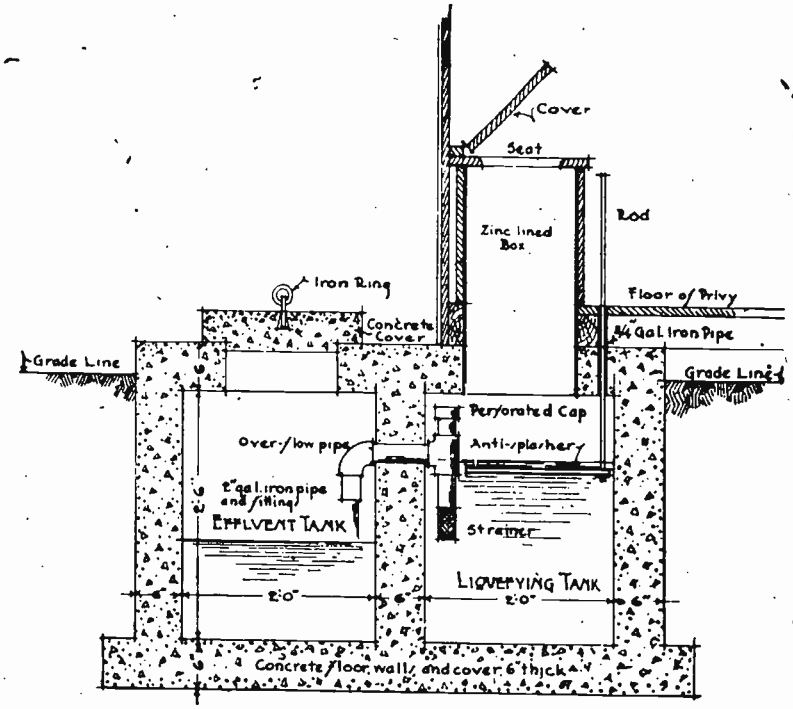


FIG. 48.—Section through concrete tanks and seat; L. R. S. method.

just below the freezing line. Thus located, the tiles discharge the liquid in reach of the active bacteria, and the absorption and evaporation of the liquid thus discharged is increased. Moreover, if a few trees or shrubs are present in the absorption field, but far enough away to prevent the rootlets from choking the tiles, the capacity of the ground to care for the outflow will in general be increased. Naturally, a wet absorption field should not be chosen, for good drainage and rapid drying are essential. The drain tiles should not be laid in ditches with too much fall, for the effluent from the tank would rush

[1] Thanks are due Dr. John A. Ferrell for the reproduction of these cuts from his bulletin on the sanitary privy, issued by the North Carolina Board of Health.

too quickly to the lower ends of the tiles and hence overwork those parts of the absorption field. The fall should be such as to equalize as nearly as possible the demands on various parts of the absorption field.

No one can be sure that material laden with typhoid germs will be rendered inert by a septic tank of this sort, but if the absorption field

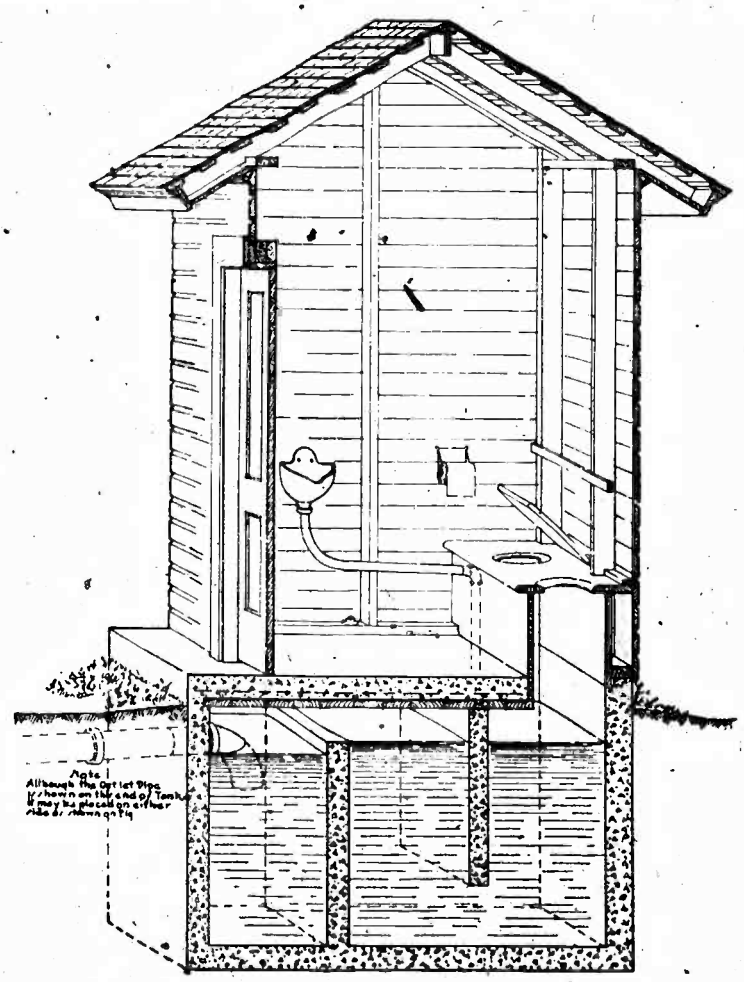


FIG. 49.—Vertical section of tank and house. Kentucky sanitary privy.

is of the right sort and is large enough and if the subdrainage is carefully guarded, it is probable that there is less chance for infection than where sewers are used which open into small streams and infect water for long distances. This statement would not hold true if

wells were so situated as to draw into them the seepage from the absorption field described above. (See Chapter XI on water supply.)

Through the courtesy of Dr. A. T. McCormack, of Bowling Green, Ky., secretary of the State board of health of that State, the cuts

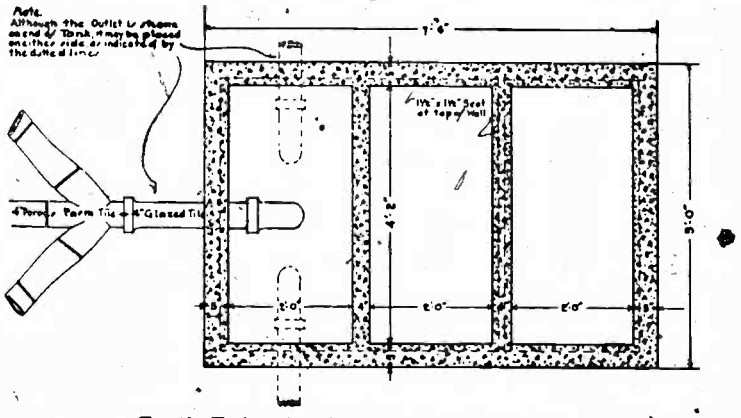


FIG. 50.—Horizontal section, Kentucky sanitary privy.

(figures 49–51) of the latest form of the Kentucky sanitary privy are reproduced, with the accompanying description and a few suggestions

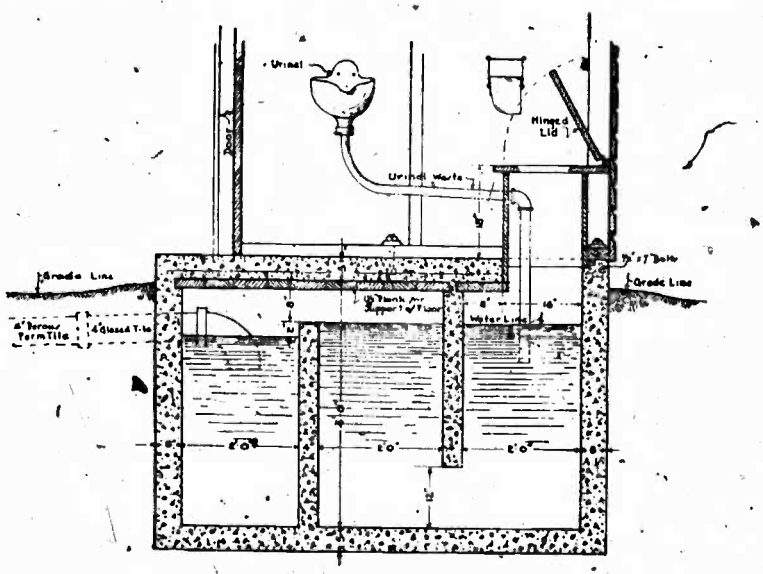


FIG. 51.—Vertical section, Kentucky sanitary privy.

regarding its construction and use. It is a pleasure to present this form of toilet, because it seems to come nearer meeting common conditions and health demands than any septic-tank disposal within the

reach of all communities. Attention is called to the urinal here introduced. As has been said elsewhere, the chief difficulty with the ordinary seat arrangement for boys' toilets arises from the lack of urinals, and as a consequence the boys are not careful to lift the under lid, and hence are almost sure to defile the seat itself. Consequently, they will next stand on the seat, and still more serious defilement ensues. Photographs of the interior of more than a hundred country school privies exhibit these defilements as a result of the lack of proper urinal facilities. The height of the urinal needs careful study. When properly placed for the smaller boys, it is likely to be too low for older ones. A narrow bench may be used to advantage.

The other features of this toilet will be easily understood from the description which follows.

These cuts represent the self-cleaning, fly-proof, septic-tank privy which the State board of health, after three years' experimental work, recommends for country and town homes, hotels, railway stations, schools, and other places where no sewer connections are possible. The details have been worked out with extreme care, and if the directions are followed to the letter the privy may be placed within 10 feet of the house, but never inside of it. Toilets and bathrooms from the house may empty into the tank, but kitchen sinks should never do so on account of the grease.

Pit and forms.—The size and depth of the excavation for the pit or tank are clearly shown in the cuts. The earth walls, if the digging is carefully done, will make the best outside forms for the concrete except where plank are needed above the surface of the ground as a form for the top of the tank walls. The inside forms can be made by any one of ordinary skill of any lumber which can be closely fitted so as to retain the moisture, and the lumber may be used over and over again for an entire community if care is taken in putting it together with light nails for easy removal.

Concrete.—The proportions for the mixture are: 1 part of good, fresh Portland cement, 2 parts of sand, and 4 parts of gravel or finely crushed rock, with enough water to bring it to the consistency of soft batter. For the tank of the size shown in the cuts, 15 bags of cement, 1 cubic yard of sand, and 3 cubic yards of crushed rock or gravel will be required. The floor of the tank should go in as soon as the digging is done. After this has set for 24 hours the forms should be tacked together and put in place, care being taken to have no particles of trash or dust under them where the walls and floors are to join. The concrete should then be poured in, tamping constantly with a thin-edge board next to the plank forms so as to give a smooth finish to the inside walls. After the walls have set for three days the forms should be removed and the surfaces of the inside walls and floor coated over well with a mixture of cement about the consistency of thick cream, put on with a whitewash brush. The seat should then be put in place and the tank covered with 1½-inch or 2-inch lumber so as to permit concrete to join concrete over the walls and entirely around the seat. The concrete top, which is to be the floor of the privy, should be reenforced with one or two layers of galvanized iron fence wire, and finished to a smooth surface which may be easily kept clean.

Drains.—The drains of porous tile should extend in the aggregate about 100 feet, depending upon the character of the soil, should be laid below the frost line and away from the well or spring, should have a sufficient fall, should discharge entirely underground, and the surface over them should be utilized for a flower bed or rose garden, to be benefited by the constant irrigation and fertilization.

Filling and inoculating the tank.—Before the house is put in place and bolted down, the tank should be filled with water and five or six shovelfulls of old, well-rotted

stable manure put in to inoculate the fluid with the liquefying germs upon which everything depends, a supply of toilet paper should be provided, and it is ready for use.

Aftermanagement.—A bucket of water should be poured through each hole in the seat and one through the urinal every day in order to break up the mass of fecal matter and toilet paper. The floors, and especially the urinals, should be well scrubbed daily, and care should be taken that the lids close down automatically after use.

If care is taken to make the tank water-tight, it will never need to be filled but once, and if no disinfectant of any kind is ever used except camphor balls in the urinals if the water is poured in daily as directed, and if the pipe from the urinal extends well into the water, there should be practically no odor, and in years there will be little accumulation of solid matter at the bottom of the first tank.

The accompanying cuts (figures 52, 53, and 54) of a septic-tank disposal plant designed for a washout inside toilet for a country residence or a small one-teacher country school, and its description, are reproduced through the courtesy of Prof. C. A. Haskins, engineer for the State Board of Health of Kansas:

The septic tank shown (figure 53) is constructed of concrete, but it may be built of brick or masonry just as well. If of concrete, the mixture should be 1:3:5, mixed not too wet, and well tamped into place. If the tank is built of brick, the brick should be laid in rich cement mortar, all joints well filled, and the cross wall bonded in with the side walls at every alternate course. In either case, after the mortar or concrete has had time to "set," the excess earth from the excavation should be well tamped around the sides, and the inside of the tank should be plastered with ½-inch coat of rich cement mortar. The inlet and outlet pipes and the siphon should be carefully set to the proper elevation shown on the drawing. It is important that the inlet and outlet pipes extend down below the water level to escape clogging by the scum which forms on top of the sewage. The top may be of concrete or wood, although wood is preferable on account of the fact that it may be so constructed that it may be all lifted off, affording ingress to the tank in case of stoppage. Ordinary 2 by 12 inch cypress lumber, with suitable 2 by 6 inch braces, are often used for roofs, with hinges on one side and a hasp on the other, for holding it closed. In case concrete is used for the roof, a manhole should be placed in both the tank proper and the dosing tank for ingress to the tank. In any event, the ventilating pipe should be in place as shown. The siphon is necessary to the proper working of the system, for if the sewage is allowed to trickle out into the drain tile as it comes into the tank from the house, most of it will leach out into the soil at the first few open joints, causing the ground there to become sour and foul smelling, and the full efficiency can not be obtained. With the siphon working properly, the effluent will be held in the dosing chamber until the proper elevation is reached, when it will all be rapidly discharged into the drain system.

In order that a more complete description of the method of operation of this form of siphon might be furnished than was given in the original published article (see Bulletin of the Kansas State Board of Health, No. II, November, 1913, pp. 215–219), a letter asking for this information was sent to Prof. Haskins. The following excerpt from his reply (December 17, 1913) will make its action clear:

The siphon operates in the following manner: First, the siphon is set in the dosing chamber of the tank exactly to its proper position. Then the trap is filled with water, both legs holding water level with the top of the small leg. The bell is then placed over the top of the long leg. As the water rises in the tank it reaches the bell, com-

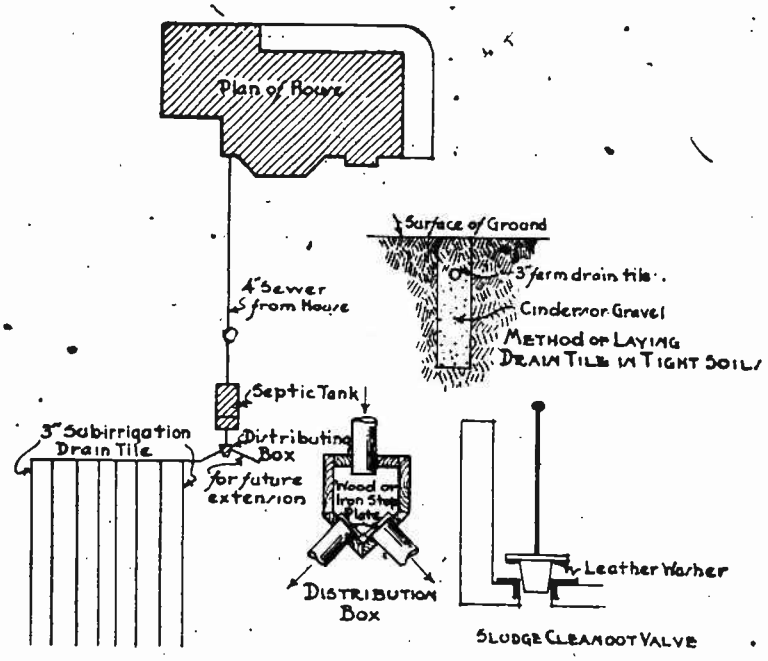


FIG. 52.

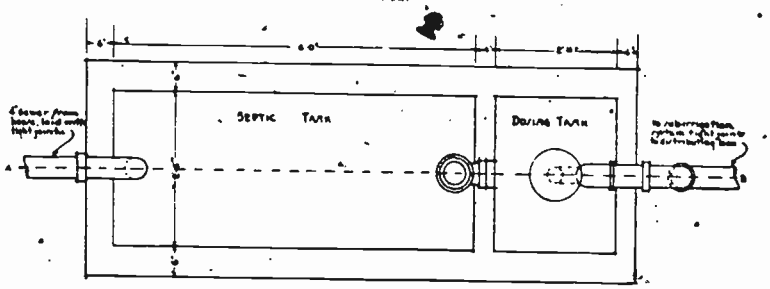


FIG. 53.

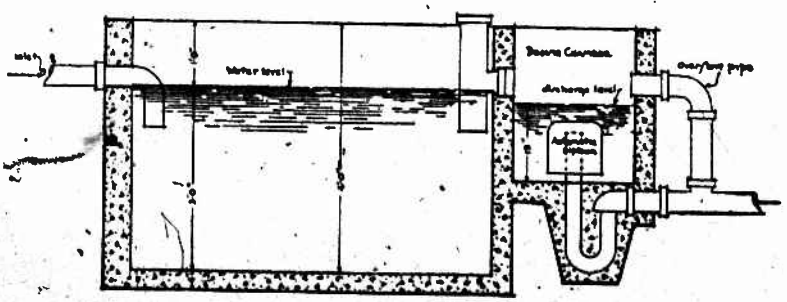


FIG. 54.

Septic tank. Sewage-disposal plant for single residences and country schools.

fining a certain volume of air in the bell and the long leg of the trap; and as the water continues to rise, the confined air starts to push downward the column of water in the long leg to the trap toward the bend at the bottom. During the period of filling the tank the column of water in the short leg is slowly spilled out by the pressure of the air and the column of water in the long leg, so that when the predetermined discharge level in the tank is reached we have the water line (the compressed-air column being behind it) just at the flattened bend at the bottom of the trap, the water line inside the bell being near the top of the long leg. Hence a balance of water columns exists, if no further water is admitted to the tank. This equilibrium is upset if a small amount of water is added to the tank, so that the air compressed in the trap by the water expands at the bend at the bottom and finds its way into the waste-outlet tiles, while the original pressure exists in the tank. As soon as this air escapes, the water in the bell suddenly rises and the siphon is set into action, the water in the tank being drawn rapidly down and discharged. When the water reaches the bottom of the bell at the discharge, air is introduced, breaking the vacuum, and a complete circulation is established and the siphon is completely air-locked again, the trap is primed, and everything is ready for a second dose to be held back until the high-water line in the tank is again reached, and the discharge operation is repeated.

The connection from the house to the tank should be of 4-inch vitrified sewer pipe of the bell-and-spigot type. It should be laid to an even grade and alignment, and great care should be taken to see that all the joints are well filled with cement mortar, with a full bevel. This is especially important if the line passes through a grove of trees or through a swamp or low land—in the first case to prevent the entrance of fine roots, which will in time clog the pipes; and in the second case, to prevent the infiltration of ground water.

The pipes for the distribution system should be sound, hard-burned, 3-inch agricultural drain tiles, in 1-foot lengths. If necessary to reach a desirable location for the subirrigation system, the siphon may discharge into a 4-inch sewer, laid the same as the house connection, but on a grade of not less than 2 feet in 100 feet, to a diverting box or manhole, out of which the drain tile may lead in one or more lines. They should be laid at a depth of from 1 foot to 18 inches below the surface of the ground, and should be laid on a grade of 3 inches in 100 feet. This matter of grade, or "fall," should receive careful attention, since if the grade is too great the lower end of the pipe will receive more than its fair proportion of sewage, while if the grade is too small the upper end will receive too much.

The length of this 3-inch pipe should be proportioned according to the nature of the soil. If the soil is quite open and sandy, approximately 200 feet will be sufficient for the sewage from an ordinary residence, while if the soil is of a closer texture, 300 or 400 feet, or even more, will be necessary. The system is not well adapted to very tight and retentive clay soils, though it has been used successfully for a time in soils of this character. A desirable, though somewhat costly, modification that has been successfully used in tight soils consists in digging the trench about 4 feet deep, filling the lower 3 feet or so with cinders or gravel, and then laying the 3-inch distribution tiles at the surface of this porous filling material and covering them with about a foot of earth. The total length of distribution tiles deemed necessary for any particular installation may be laid in one or more single lines extending out from the dosing chamber, or a single line may be divided into two or more branches, as indicated in the drawing. In case more than a single line is used, great care should be taken to see that each line receives its fair share of the septic-tank effluent. Where the natural slope of the ground is steeper than the grade required by the distribution lines, these may be zigzagged down the hill.

It should be the expectation that once in one to four or five years the tank will require cleaning out, the frequency depending largely upon the character of the sewage.

The sludge taken from the tank at these cleaning periods will be found to be relatively small in amount, and may be best disposed of by running it into a trench or furrow and covering it over with soil. This cleaning out should be done in the fall of the year, if possible, as at this season the sludge in the tank possesses less odor and is less objectionable to handle than at other times. The sludge clean-out valve shown in the illustration may be built for this purpose, but it is not essential, as an ordinary "pitcher" pump may be used.

It should also be expected that every few years the distribution tiles will have to be taken up and relaid in a new trench a few feet away from their former position. This is simply because there is a gradual choking up of the open spaces in the soil, with the result that the soil immediately adjacent to the pipes may become water-logged and sour.

Particularly for those States where the rainfall is such that the water of the sewage, as well as its fertilizing constituents, has an appreciable value, the disposal schemes outlined above may have a considerable economic as well as important sanitary value. It is quite possible by this method to maintain in the driest region a large, well-fertilized and well-watered lawn. The process should be carried on entirely without odor, though, of course, the septic tank should be located at some little distance from the house—say 100 feet or more—if possible. Especially, the disposal plant should not be near any open well which is used as a source of water supply.

This plant is automatic in operation, but, nevertheless, will require some care. It should be carefully inspected occasionally to see that the pipes are not stopped up, that the tank itself is not completely sludged up, and that the siphon is working properly. However, if the plant is carefully built, according to the drawing and the directions included herein, it should give good general satisfaction.

Recently a chemical toilet has been developed which is designed for indoor use where flushing toilets can not be introduced on account of the lack of water supply or of sewage disposal. The closet is constructed, as will be seen by the illustrations (Pls. 41 A–B) of a steel cabinet finished to resemble wood. This incloses a galvanized container with a lid and the necessary handles for removing it and carrying it away. The toilet is prepared for use by introducing into it a chemical which is claimed to be "a powerful germicide, deodorant, and disinfectant." A circulation of air and an exhaust are provided, so that no odors escape. Such a toilet as this, if really practicable, may be introduced into a special room in a country schoolhouse and the excreta may be carried away and deposited where no danger of odors or infection is possible. This device has perhaps not yet been tested for a sufficient length of time to warrant the statement that it will satisfy all sanitary conditions, but it is worthy of careful consideration.

APPENDIX.

A HEALTH PROGRAM FOR COUNTRY CHILDREN.

In their efforts to improve hygienic conditions in the schools and in the community, teachers frequently find some assistance in a simply worded health program or creed for the individual child to apply to his own experience. The following is not intended as a final or exhaustive statement of such a program, but it is believed that by means of it the rural teacher may be able to drive home certain fundamentals in hygiene and sanitation that will ultimately mean much for good health in home, school, and community and make a direct contribution to the movement for better schoolhouses in the country. It is assumed that the teacher will select such of these items as seem most useful for her purpose and supplement them with illustrative examples from real life.

LEST I FORGET.

I believe that good health and a strong body are essential, and that the only real wealth is good health. In order that I may be strong and well, therefore, I will endeavor to observe the following rules of health:

1. I will keep my teeth clean by using my toothbrush every day.
2. I will drink no coffee or tea before I am 20 years of age, and no sort of alcoholic stimulants at any time in my life, unless ordered to do so by a physician.
3. I will chew my food thoroughly.
4. I will sleep at least nine hours each night in well-ventilated rooms winter and summer, or in an open-air sleeping porch.
5. I will bathe my whole body at least once a week and keep my face, hands, and nails clean.
6. I will strive daily to acquire a habit of self-control, habits of anger being not only wrong but unhealthful.
7. I will strive to help make my home as clean and sanitary as possible, especially to prevent contamination of the milk and drinking water.
8. I will do all I can to prevent the development of flies about the house in which I live, since they carry the germs of typhoid fever and other diseases.
9. I will do all in my power to prevent mosquitoes from breeding in or about the house I live in. I will bury or destroy all old tin cans, barrels, or other vessels which catch and hold rainwater and offer a place for mosquitoes to breed. I will help to drain all stagnant pools near my home or put kerosene oil on them once every 10 days during summer.
10. I will try hard to kill all rats and mice about my home, since they are both troublesome and dangerous, carrying, among other things, the bubonic plague, one of the most deadly of all diseases.
11. I will do all in my power to help secure sanitary toilets throughout the whole neighborhood.

12. I will strive to keep the backyard of my house as clean and tidy as a front yard should be kept.

13. I will take no patent medicine, and will do all I can to teach people that most of it is both useless and harmful.

14. I will keep my personal life clean and pure, for it is a duty I owe to myself and to all who live now and may live in the future.

15. I will take good care of my eyes, taking special pains not to strain them by reading at night or in bad light.

16. I will be careful about spitting, since disease is often spread in that way.

17. I will do all I can to help make our schoolhouse more attractive and to keep it clean and neat at all times.

18. I believe the best investment I can make for myself and my family is to invest in good health, a good education, and a clean moral life.

19. I will strive with all my power to make country life more healthful, more enjoyable, and more beautiful. I believe life in the country is finer and better than life in any city.

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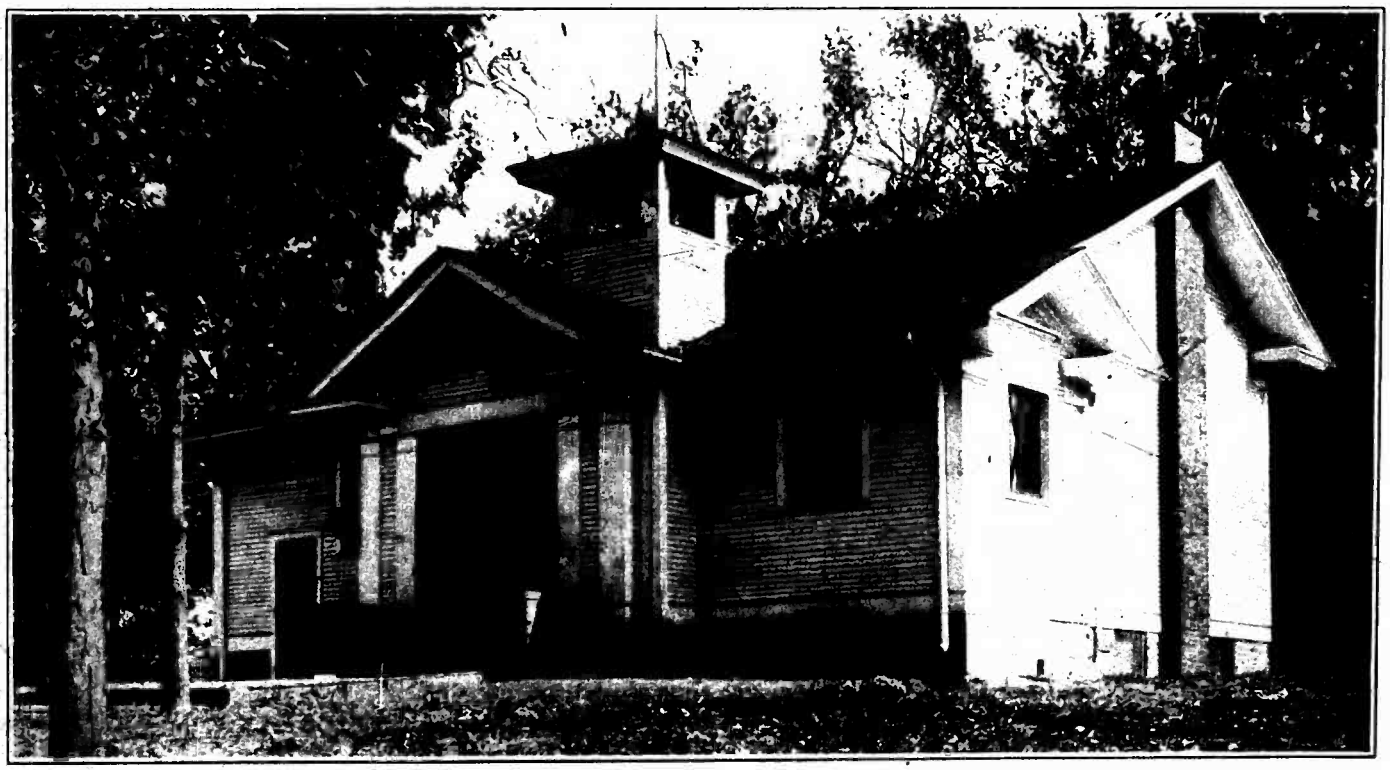
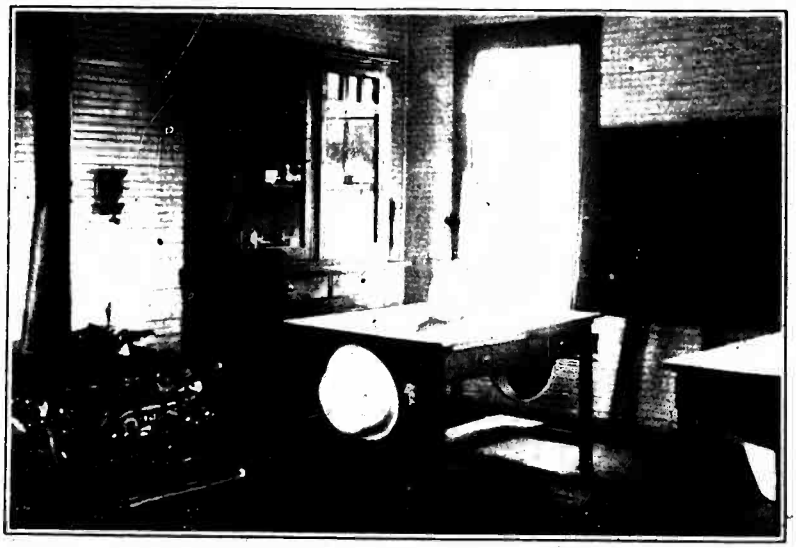


THE CROSS ROADS SCHOOL, MACON COUNTY, ILL.

A. MANUAL TRAINING UNDER DIFFICULTIES.

B. FOREST SCHOOL STUDENTS AT WORK IN THE LATH HOUSE IN THE RAJA YOGI SCHOOL, POINT LOMA, CAL.



A. CORNER OF KITCHEN, RURAL SCHOOL IN LOUISIANA.

B. DOMESTIC SCIENCE, RURAL SCHOOL IN LOUISIANA.

A. NEGRO SCHOOL, CAROLINE COUNTY, VA. A PRIZE GARDEN.

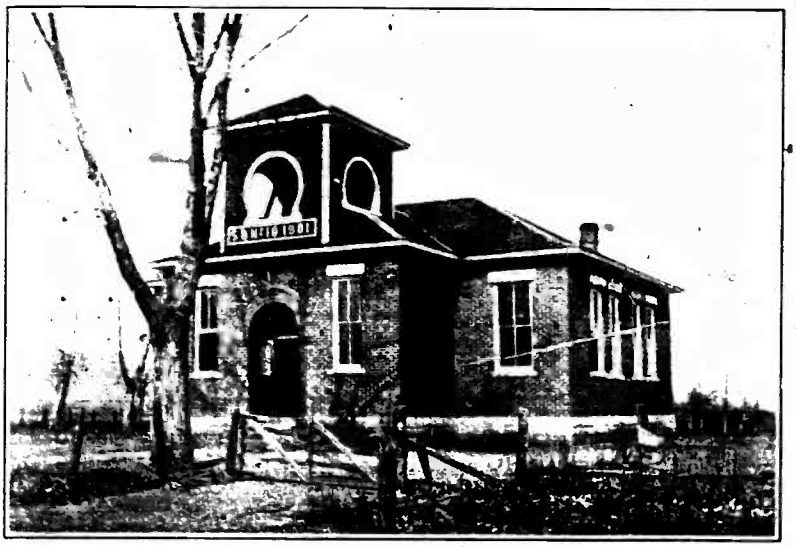
B. SEWING. INDUSTRIAL WORK IN VIRGINIA COLORED SCHOOLS.

A. MASONVILLE DISTRICT NO. 13, YAMHILL COUNTY, OREG.

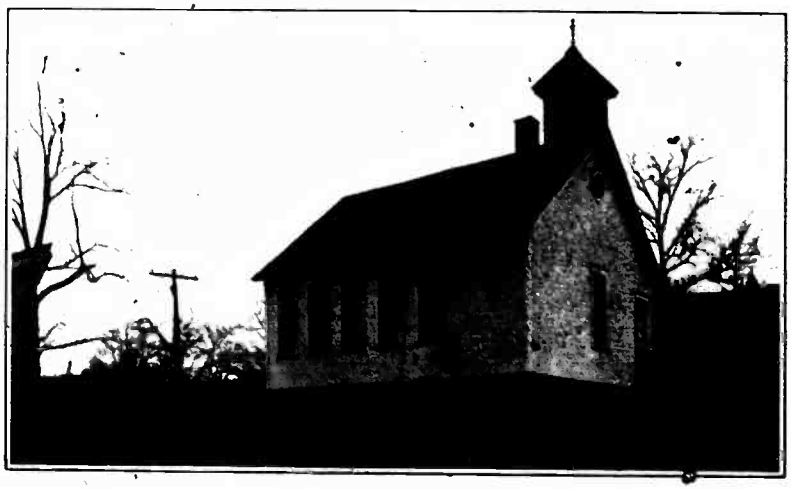
B. HIGH HILL SCHOOL, DARLINGTON COUNTY, S. C.

A. RURAL SCHOOL AT MARBURY, ALA.

B. COMET SCHOOL, ISLE OF WIGHT COUNTY, VA.

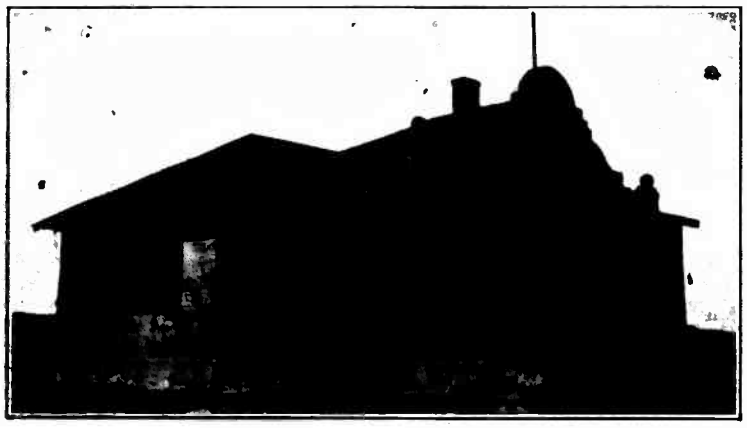


A. DISTRICT NO. 10, BOULDER COUNTY, COLO.



B. LOGANSPORT, W. VA.

A. DISTRICT NO. 28, MOWER COUNTY, MINN.

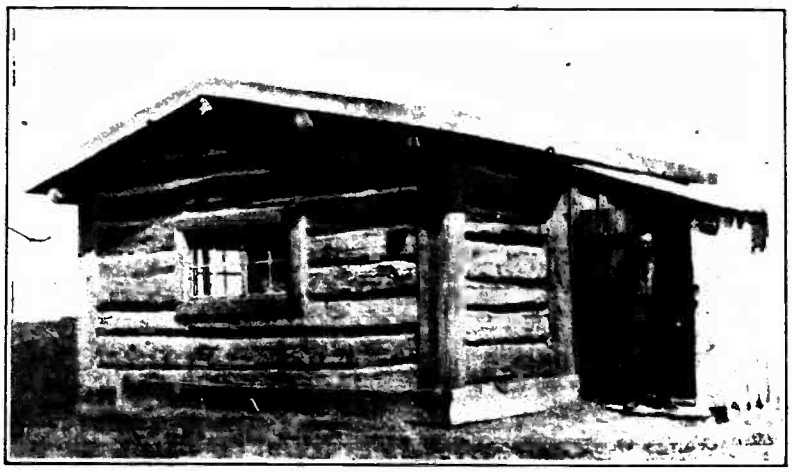


B. LOS PADILLAS, BERNALILLO COUNTY, N. MEX.

I. DISTRICT NO. 31, BOULDER COUNTY, COLO.

R. POTTER COUNTY, PA

The ever-present cupola, which the new rural school is avoiding.

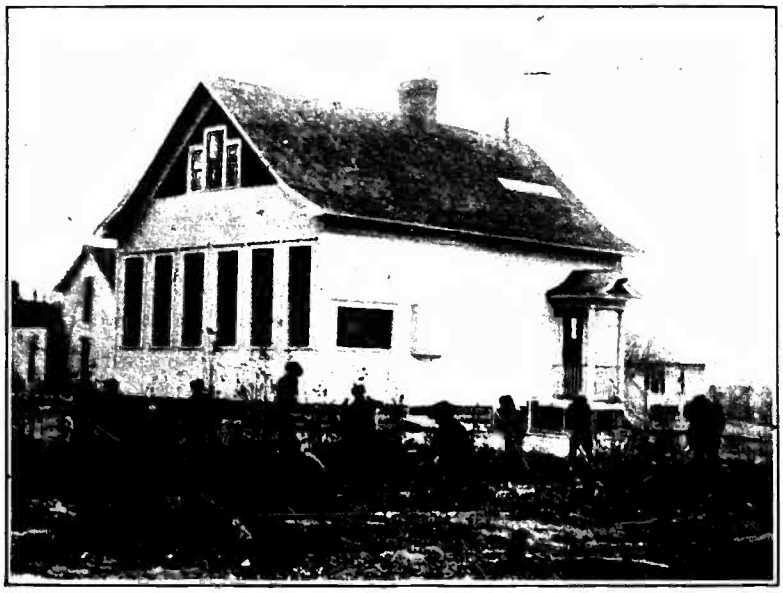


A. A RURAL SCHOOLHOUSE ON THE PLAINS, DISTRICT NO. 21, CUSTER COUNTY, MONT.

B. LACK OF SIMPLICITY MARS THE EFFECT OF AN OTHERWISE ATTRACTIVE BUILDING.

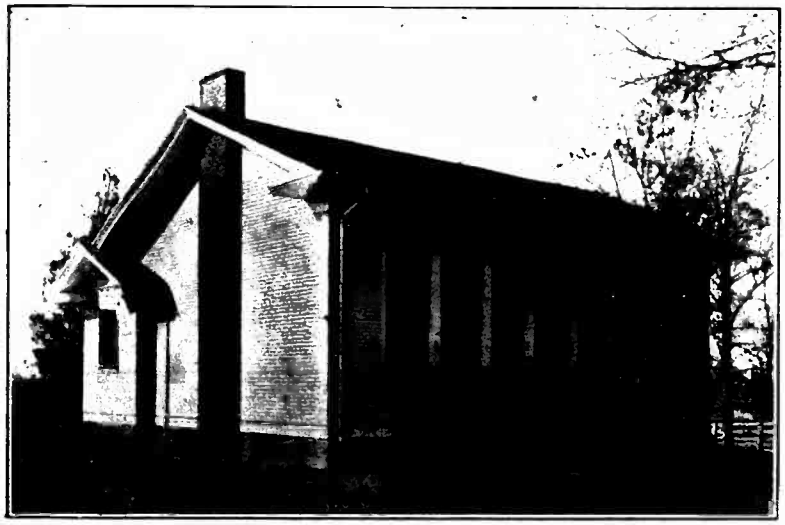
A. MODEL RURAL SCHOOL, CORYELL COUNTY, TEX.

B. THE NEW WILLOW DISTRICT SCHOOL, MENDOCINO COUNTY, CAL. BUILT IN 1911.

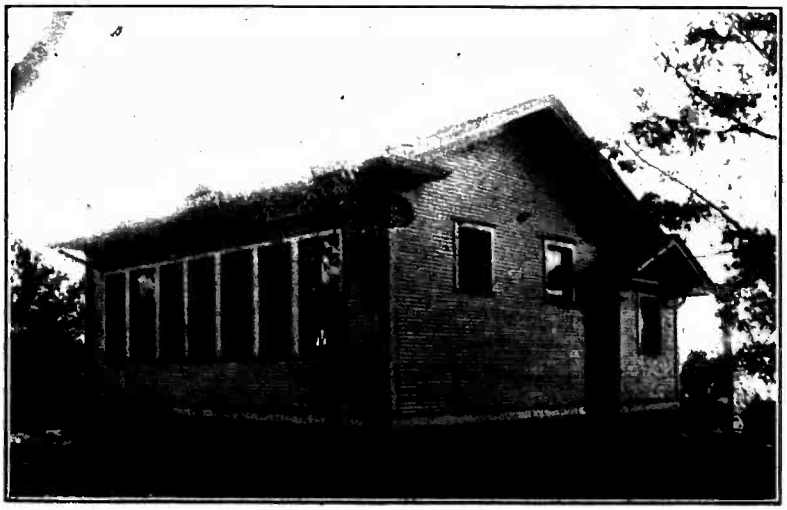


A. MODEL RURAL SCHOOL, KIRKSVILLE, MO

B. MACHINERY IN BASEMENT OF MODEL RURAL SCHOOL, KIRKSVILLE, MO.



A. REAR VIEW (SEE ALSO PLATE 1).



B. SIDE AND REAR, CROSS ROADS SCHOOL, MACON COUNTY, ILL.

A. CLASSROOM, SHOWING LIGHTING, CROSS ROADS SCHOOL.

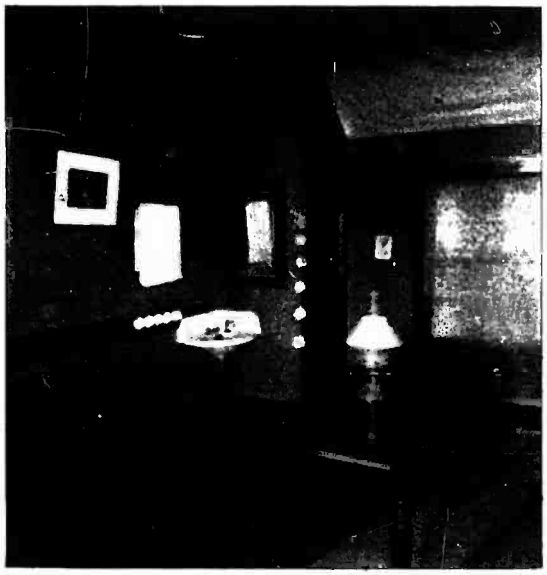
B. FRONT OF CLASSROOM, CROSS ROADS SCHOOL.

A. LOOKING INTO LIBRARY AND CLOAK ROOMS, CROSS ROADS SCHOOL.

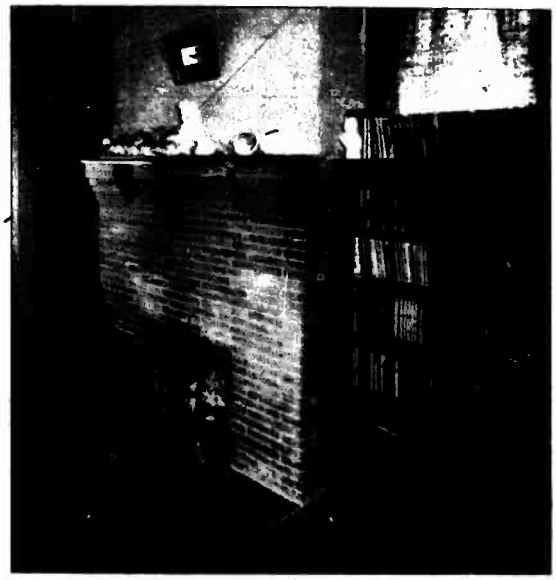
B. SEATING ARRANGEMENT, CROSS ROADS SCHOOL.

A. "THE OLD AND THE NEW." DISTRICT NO. 9, CANANDAIGUA, N. Y.

B. CLASSROOM IN CANANDAIGUA SCHOOL.



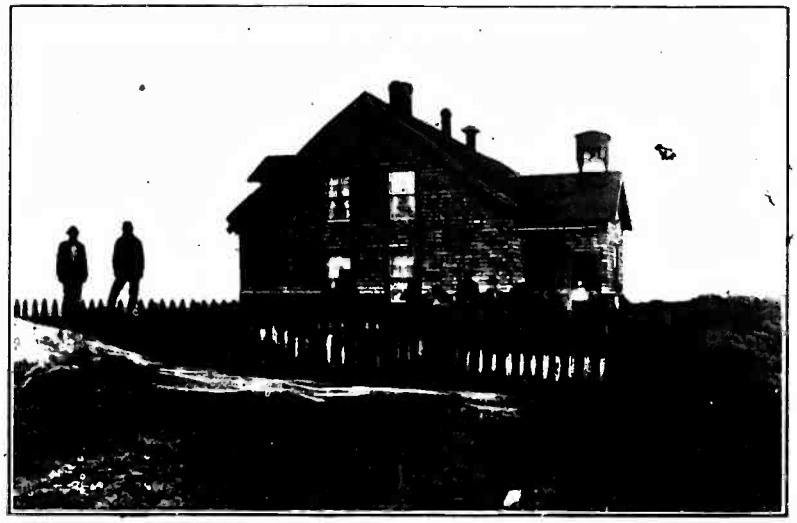
A. CORNER OF THE HALL, NO. 9, CANANDAIGUA, N. Y.



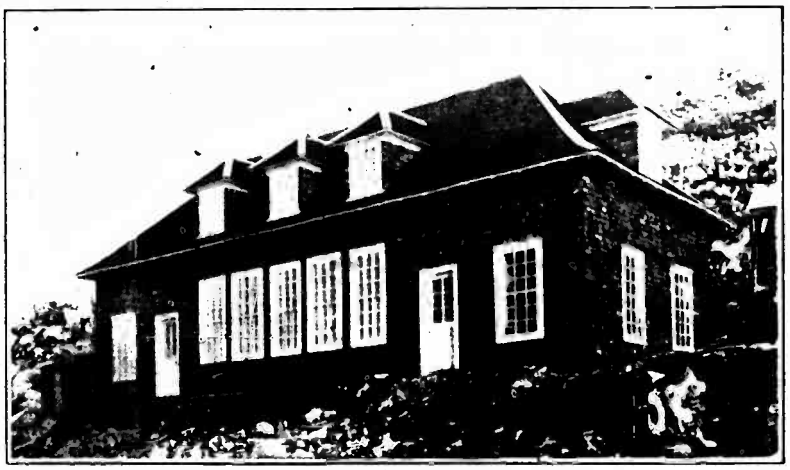
B. LIBRARY, WITH FIREPLACE, NO. 9, CANANDAIGUA, N. Y.

A. A RURAL SCHOOL PLAYGROUND.

B. WINDOWS AND LIGHTING, AUDUBON OPEN-AIR SCHOOL, LOUISVILLE, KY.



6. UNITED STATES SCHOOL, ARCTIC ALASKA.



7. UNITED STATES GOVERNMENT SCHOOL ON LITTLE DIOMEDE ISLAND, ALASKA.

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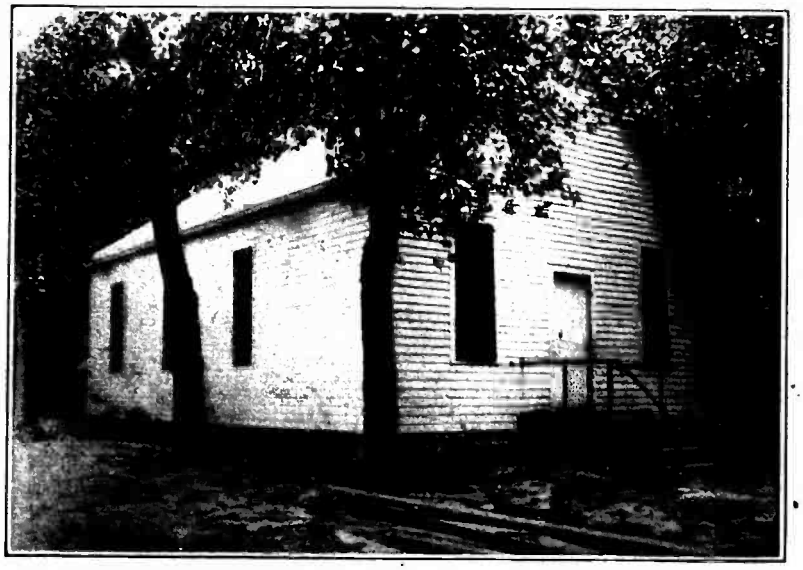
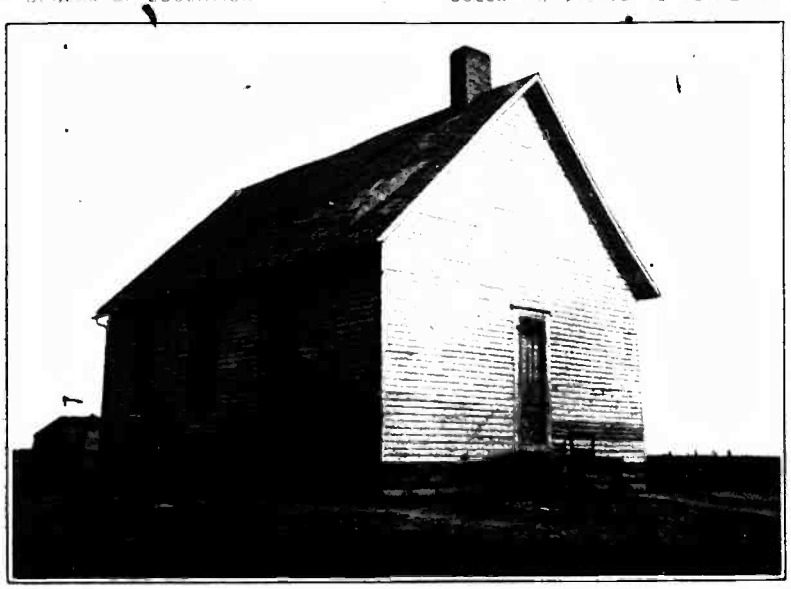
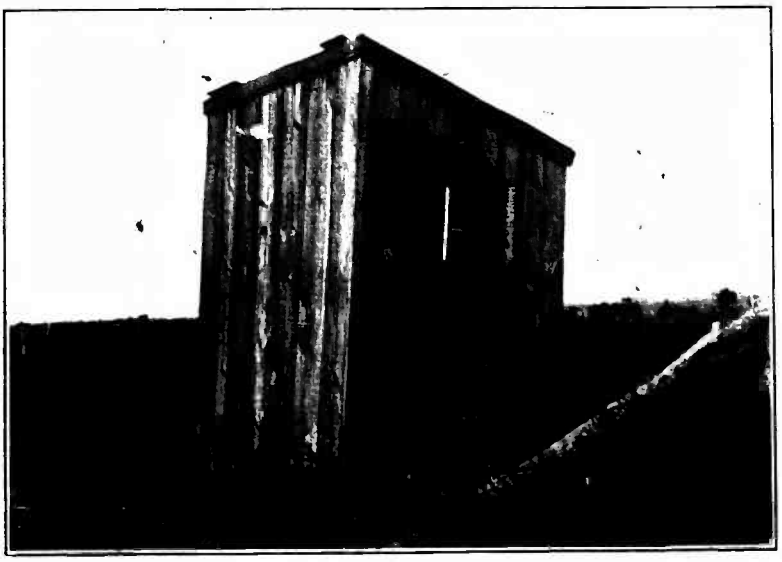


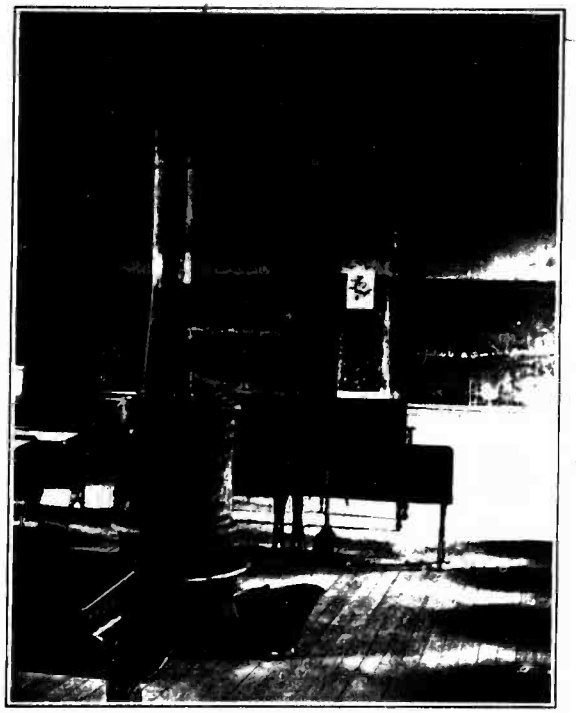
B. A FORMER ONE-ROOM SCHOOL IN MINNESOTA THAT BECAME A TEACHER'S COTTAGE



A. PORTER SCHOOL, MAY 1, 1913. AN OLD BUILDING RENOVATED

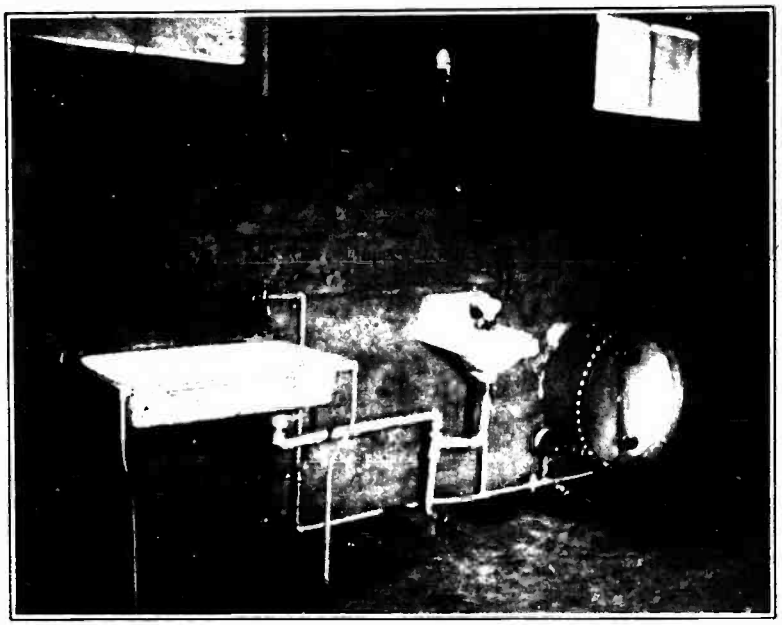


B. PRIVY AT PORTER SCHOOL IN AUGUST, 1912. LATER REPAIRED

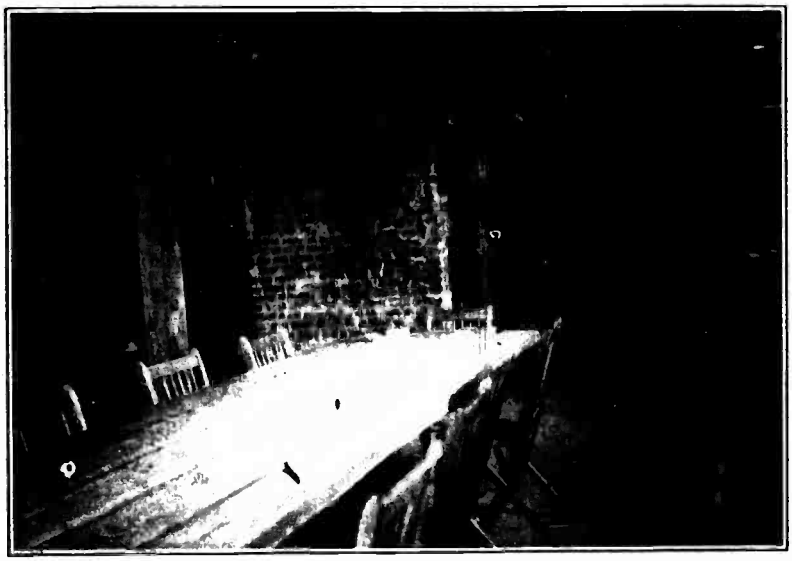


L. SOUTH WALL OF PORTER SCHOOL ON FEBRUARY 20, 1913, SHOWING HOW CROSS LIGHTS ARE AVOIDED.

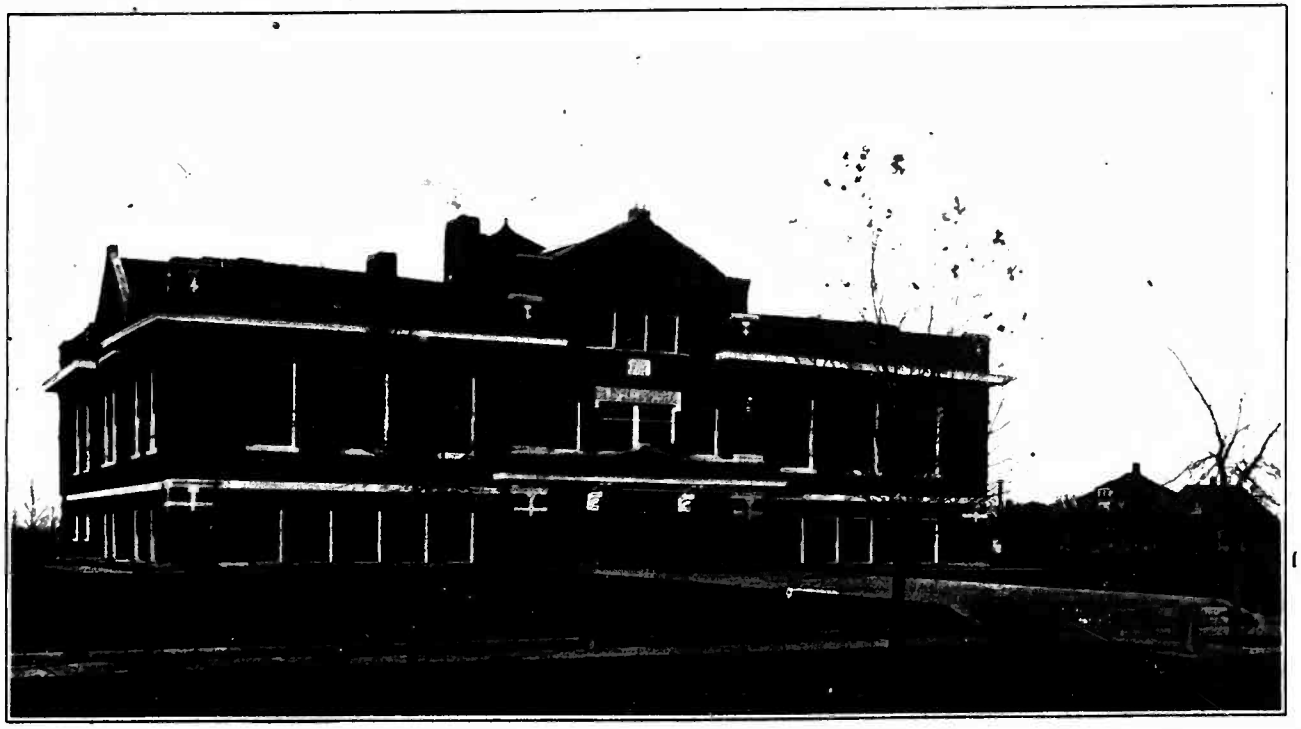
R. ANOTHER INTERIOR VIEW OF THE REMODELED SCHOOL, MAY 1, 1913.



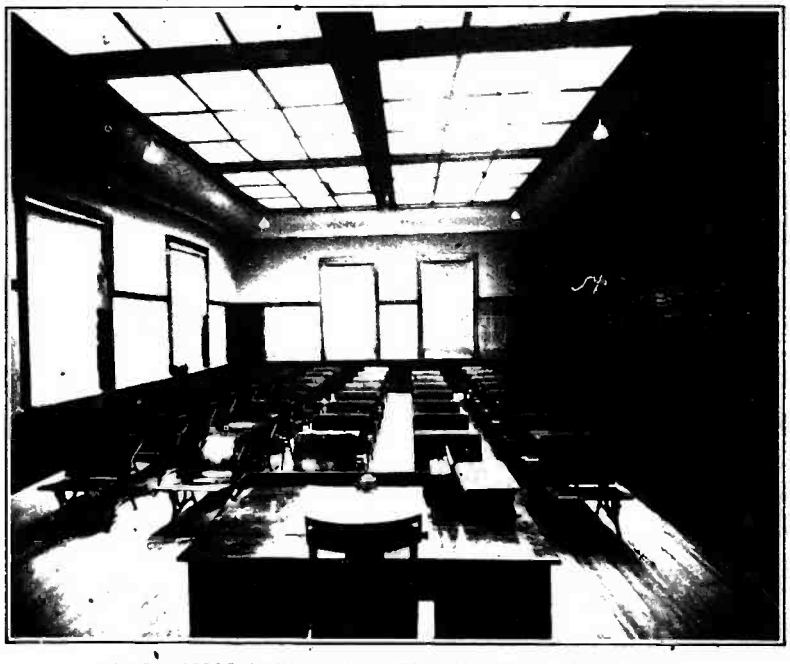
A. SOUTH SIDE OF BASEMENT, SHOWING IMPROVEMENTS. FEBRUARY 20, 1913.



B. THE MODERNIZED BASEMENT OF PORTER SCHOOL.



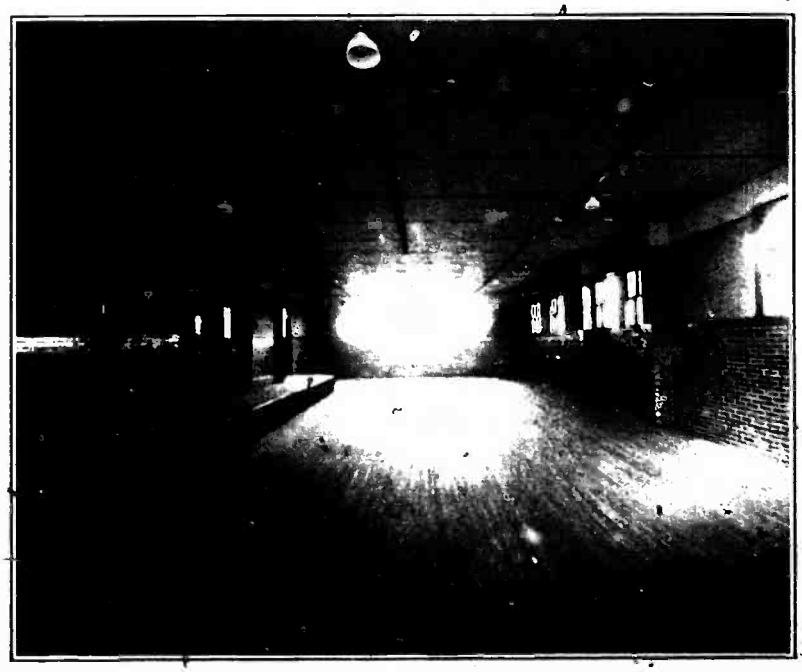
SILAS WILLARD SCHOOL, GALESBURG, ILL.



L. CLASSROOM, SILAS WILLARD SCHOOL, GALESBURG, ILL.

R. CLASSROOM, SILAS WILLARD SCHOOL, GALESBURG, ILL.

A. CORRIDOR, SILAS WILLARD SCHOOL, GALESBURG, ILL.



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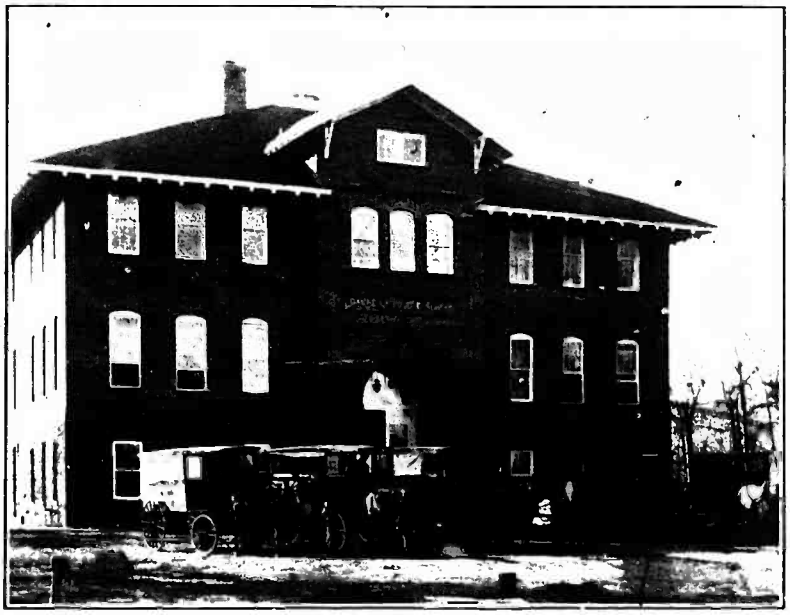
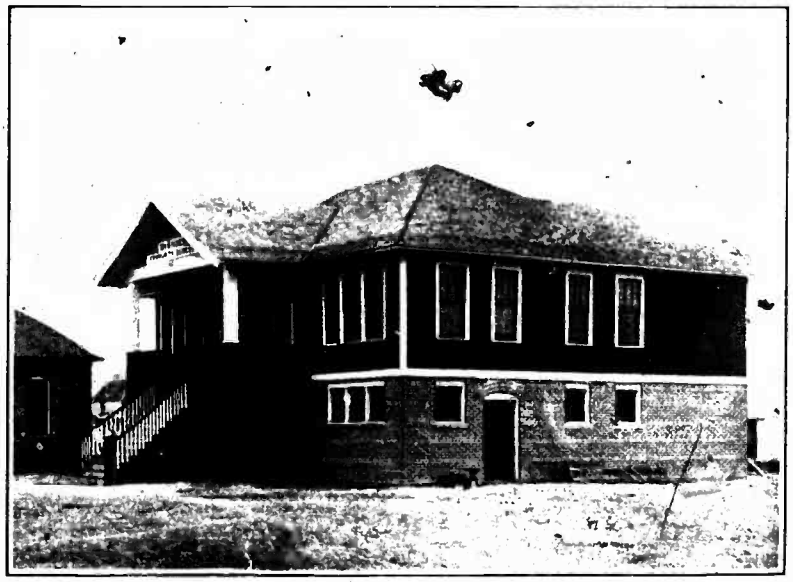
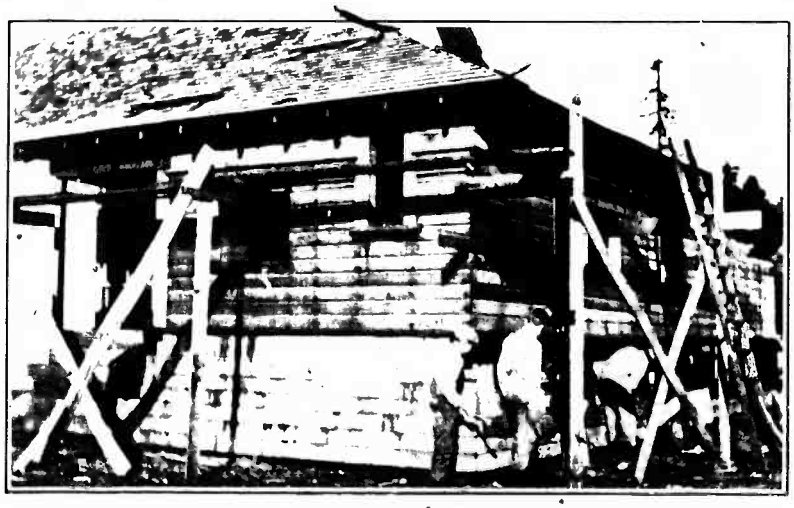


A. CACHE LA POUDRE CONSOLIDATED SCHOOL, COLORADO.



B. WASHOE COMMUNITY SCHOOL, PAYETTE, IDAHO.

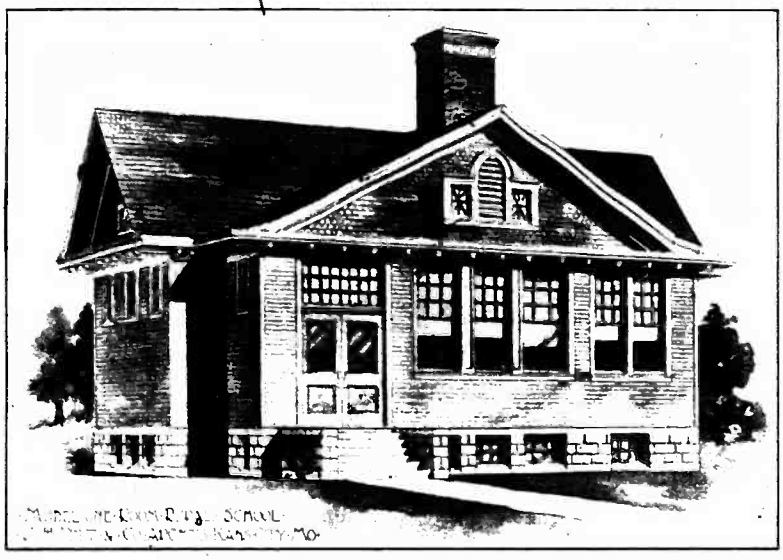
TEACHER'S COTTAGE, RICHLAND COUNTY, S. C.



SCHOOLBOYS IN WASHINGTON STATE TRANSFORMING AN OLD SCHOOLHOUSE INTO A MODERN COTTAGE FOR THE TEACHER.

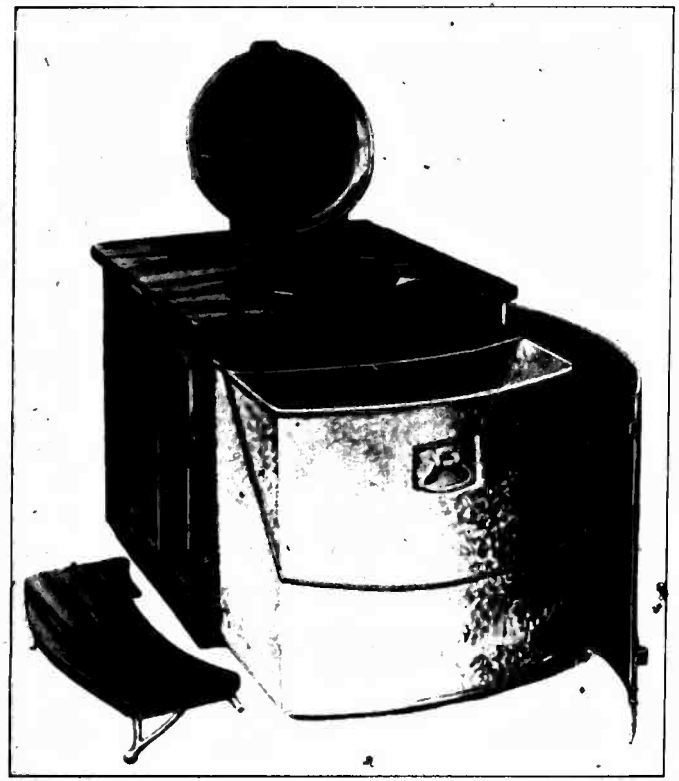
[illegible] TEACHER'S COTTAGE, PORTER SCHOOL, [illegible]

[illegible] TEACHER'S RESIDENCE, MILL CREEK SCHOOL, RICHLAND COUNTY, S. C.

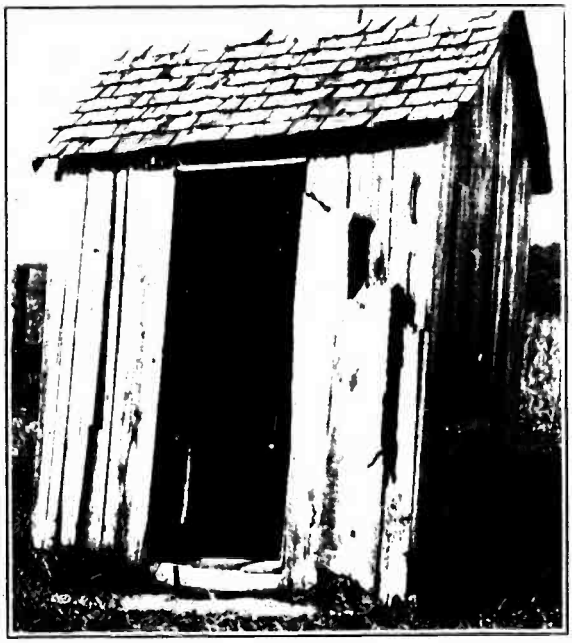


A. MODEL RURAL SCHOOL. WM. FELT & CO., ARCHITECTS, KANSAS CITY, MO.

B. CLIMAX HIGH SCHOOL, PITTSYLVANIA COUNTY, VA.



A RECENT PATENTED DEVICE FOR INDOOR TOILETS IN RURAL SCHOOLS OR RESIDENCES



A SCHOOL PRIVY IN A WESTERN STATE

The only privy for the young women teachers and pupils [illegible]

DRINKING FOUNTAIN ATTACHED TO PUMP

HOW WELL WATER MAY BE CONTAMINATED.

BULLETIN OF THE BUREAU OF EDUCATION.

[NOTE.—With the exceptions indicated, the documents issued below will be sent free of charge upon application to the Commissioner of Education, Washington, D. C. Those marked with an asterisk (*) are no longer available for free distribution, but may be had of the Superintendent of Documents, Government Printing Office, Washington, D. C., upon payment of the price stated. Remittances should be made in coin, currency, or money order. Stamps are not accepted. Documents marked with a dagger (†) are out of print.]

1906.

†No. 1. Education bill of 1906 for England and Wales as it passed the House of Commons. Anna T. Smith.
†No. 2. German views of American education, with particular reference to industrial development. William N. Hailmann.
*No. 3. State school systems: Legislation and judicial decisions relating to public education, Oct. 1, 1904, to Oct. 1, 1906. Edward C. Elliott. 15 cts.

1907.

†No. 1. The continuation school in the United States. Arthur J. Jones.
†No. 2. Agricultural education, including nature study and school gardens. James R. Jewell.
†No. 3. The auxiliary schools of Germany. Six lectures by B. Maennel.
†No. 4. The elimination of pupils from school. Edward L. Thorndike.

1908.

†No. 1. On the training of persons to teach agriculture in the public schools. Liberty H. Bailey.
*No. 2. List of publications of the United States Bureau of Education, 1867–1907. 10 cts.
*No. 3. Bibliography of education for 1907. James Ingersoll Wyer, jr., and Martha L. Phelps. 10 cts.
†No. 4. Music education in the United States; schools and departments of music. Arthur L. Manchester.
*No. 5. Education in Formosa. Julean H. Arnold. 10 cts.
*No. 6. The apprenticeship system in its relation to industrial education. Carroll D. Wright. 15 cts.
*No. 7. State school systems: II. Legislation and judicial decisions relating to public education, Oct. 1, 1906, to Oct. 1, 1908. Edward C. Elliott. 30 cts.
*No. 8. Statistics of State universities and other institutions of higher education partially supported by the State. 1907–8. 5 cts.

1909.

*No. 1. Facilities for study and research in the offices of the United States Government in Washington. Arthur T. Hadley. 10 cts.
*No. 2. Admission of Chinese students to American colleges. John Fryer. 25 cts
*No. 3. Daily meals of school children. Caroline L. Hunt. 10 cts.
†No. 4. The teaching staff of secondary schools in the United States; amount of education, length of experience, salaries. Edward L. Thorndike.
No. 5. Statistics of public, society, and school libraries in 1908.
*No. 6. Instruction in the fine and manual arts in the United States. A statistical monograph. Henry T. Bailey. 15 cts.
No. 7. Index to the Reports of the Commissioner of Education, 1867–1907.
*No. 8. A teacher's professional library. Classified list of 100 titles. 5 cts.
*No. 9. Bibliography of education for 1908–9. 10 cts.
No. 10. Education for efficiency in railroad service. J. Shirley Eaton.
*No. 11. Statistics of State universities and other institutions of higher education partially supported by the State. 1908–9. 5 cts.

1910.

*No. 1. The movement for reform in the teaching of religion in the public schools of Saxony. Arley B. Show. 5 cts.
No. 2. State school systems: III. Legislation and judicial decisions relating to public education, Oct. 1, 1908, to Oct. 1, 1909. Edward C. Elliott.
†No. 3. List of publications of the United States Bureau of Education, 1867–1910.
*No. 4. The biological stations of Europe. Charles A. Kofoid. 50 cts.
†No. 5. American schoolhouses. Fletcher B. Dressler.
†No. 6. Statistics of State universities and other institutions of higher education partially supported by the State, 1909–10.

1911.

*No. 1. Bibliography of science teaching. 5 cts.
*No. 2. Opportunities for graduate study in agriculture in the United States. A. C. Monahan. 5 cts.
*No. 3. Agencies for the improvement of teachers in service. William C. Ruediger. 15 cts
*No. 4. Report of the commission appointed to study the system of education in the public schools of Baltimore. 10 cts.
*No. 5. Age and grade census of schools and colleges. George D. Strayer. 10 cts.
*No. 6. Graduate work in mathematics in universities and in other institutions of like grade in the United States. 5 cts.
†No. 7. Undergraduate work in mathematics in colleges and universities.
†No. 8. Examinations in mathematics, other than those set by the teacher for his own classes.
No. 9. Mathematics in the technological schools of collegiate grade in the United States.
†No. 10. Bibliography of education for 1909–10.
†No. 11. Bibliography of child study for the years 1908–9.
†No. 12. Training of teachers of elementary and secondary mathematics.
*No. 13. Mathematics in the elementary schools of the United States. 15 cts.
*No. 14. Provision for exceptional children in the public schools. J. H. Van Sickle, Lightner Witmer, and Leonard P. Ayres. 10 cts.
*No. 15. Educational system of China as recently reconstructed. Harry E. King. 10 cts.
†No. 16. Mathematics in the public and private secondary schools of the United States.
†No. 17. List of publications of the United States Bureau of Education, October, 1911.
*No. 18. Teachers' certificate issued under general State laws and regulations. Harlan Updegraff. 20 cts.
No. 19. Statistics of State universities and other institutions of higher education partially supported by the State, 1910–11.

1912.

*No. 1. A course of study for the preparation of rural-school teachers. Fred Mutchler and W. J. Craig. 5 cts.
†No. 2. Mathematics at West Point and Annapolis.
*No. 3. Report of committee on uniform records and reports. 5 cts.
*No. 4. Mathematics in technical secondary schools in the United States. 5 cts.
*No. 5. A study of expenses of city school systems. Harlan Updegraff. 10 cts.
*No. 6. Agricultural education in secondary schools. 10 cts.
*No. 7. Educational status of nursing. M. Adelaide Nutting. 10 cts.
*No. 8. Peace day. Fannie Fern Andrews. [Later publication, 1913, No. 12.] 5 cts.
*No. 9. Country schools for city boys. William S. Myers. 10 cts.
†No. 10. Bibliography of education in agriculture and home economics.
†No. 11. Current educational topics, No. I.
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