DOCUMENT RESUME

ED 265 544 CS 209 506

AUTHOR Goble, Corban
TITLE Mark Twain's Nemesis: The Paige Compositor.
PUB DATE Aug 85
NOTE 36p.; Paper presented at the Annual Meeting of the Association for Education in Journalism and Mass Communication (68th, Memphis, TN, August 3-6, 1985). Appendices may not reproduce clearly.
PUB TYPE Speeches/Conference Papers (150) -- Historical Materials (060)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Inventions; Printing; *Technological Advancement; United States History
IDENTIFIERS Nineteenth Century History; *Paige Compositor; *Twain (Mark); Typography

ABSTRACT

Samuel Clemens (Mark Twain), who had set type by hand in his youth, had believed that a mechanical composer was beyond the realm of possibility. In 1880, however, he invested $2,000 in an early typesetter invented by James W. Paige. Both Clemens and Paige dreamed of immense wealth that would be generated by selling thousands of Paige Compositors. Clemens' fame as an author and humorist lent a certain aura to the proceedings. Both men were sustained by an unshakeable belief in the ultimate success of the Compositor. Newspapers, toward the end of the 19th century, were keenly interested in a revolutionary device that would lower composition costs, increase profits, and expand the amount of reading matter. The Paige Compositor, with Clemens as its principal promoter, impressed both printers and publishers. Paige, though, tinkered with its design so frequently that no practical test of the Compositor could be undertaken until 1894. The machine, with its 18,000 parts, was judged to be too complicated and too expensive for practical use. Only two prototypes were built, and Clemens lost his $190,000 investment. The Paige Compositor approached the marketplace too late for serious consideration by newspapers and printing companies. Capitalists declined to finance it. By the mid-1890s, the state of the art had passed over the Paige and its brilliant capacity to set, justify and distribute foundry type. The Linotype, which composed type lines in a hot-metal process, became the popular machine at newspapers and printing offices. (Author/HTH)

History Division

MARK TWAIN'S NEMESIS: THE PAIGE COMPOSITOR

by
Corban Goble

Assistant Professor
Department of Journalism
Western Kentucky University
Bowling Green, KY 42101

Presented to the History Division at the Association for Education in Journalism and Mass Communication Annual Convention in Memphis, Tennessee, August 1985.

ABSTRACT

History Division

MARK TWAIN'S NEMESIS: THE PAIGE COMPOSITOR

Corban Goble
Assistant Professor
Department of Journalism
Western Kentucky University
Bowling Green, KY 42101

ABSTRACT

This paper examines the intriguing alliance between Mark Twain/Samuel Clemens and James W. Paige and his grandiose typesetting machine, the Paige Compositor. It outlines the historical and technological backgrounds that brought the Paige both to its fame and to its failure. The machine's role in printing history is analyzed through the use of trade journal and newspaper articles, Mark Twain's writings, patents, and minutes and reports of a national newspaper association.

Clemens, a hand compositor in his youth, had believed that a mechanical composer was beyond the realm of possibility. In 1880, though, he invested $2,000 in Paige's early typesetter and soon fell under Paige's spell. They both dreamed of immense wealth to be generated by selling thousands of machines. Clemens' fame as an author and humorist lent a certain aura to the proceedings. Both men were sustained by an unshakable belief in the ultimate success of the Compositor that, Clemens said, would "eventually turn up trumps."

Newspapers, towards the end of the 19th century, were keenly interested in any revolutionary device that would lower composition costs, increase profits and expand the amount of "reading matter." The Paige Compositor, with Clemens as its principal promoter, impressed both printers and publishers. Paige, though, tinkered with its design so frequently that no practical test could be undertaken until 1894. The Compositor failed that test. The machine, with its 18,000 parts, was judged to be too complicated and too expensive for practical use. Only two prototypes were built, and Clemens lost his $190,000 investment.

The Paige approached the marketplace too late for serious consideration by newspapers and printing companies. Capitalists declined to finance it. By the mid-1890s, the state of the art had passed over it and its brilliant capacity to set, justify and distribute foundry type. The Linotype, which composed type lines in a hot-metal process, became the popular machine at newspapers and printing offices.

Presented to the History Division at the Association for Education in Journalism and Mass Communication Annual Convention in Memphis, Tennessee, August 1985.

Among the annals of mechnical type composition, no machine ever invented came close to the grandiosity of the Paige Compositor. Encyclopaedia Brittanica described the Paige as "one of the most remarkable pieces of mechanism ever put together."[1] Even so, only two models were constructed. Its backers, including Mark Twain, lost upwards of $2 million in this costly venture by which they had hoped to acquire a prime position in the composing rooms of newspapers and printing offices throughout the world.

This monograph examines the historical and technological backgrounds that brought the Paige both to its fame and to its failure. Its role in printing history is analyzed through use of trade journal and newspaper articles, Mark Twain's writings, patents, and minutes and reports of a national newspaper association.

The Setting

Interest in composing printer's type mechanically came to the forefront in the 19th century as new newspapers were started, existing newspapers sought to enlarge, and the book industry expanded, all stimulated by growing literacy and a widening circle of interests among the population. Faster and larger presses were placed into service, but the composition of type by hand had remained a bottleneck as long as printers continued to use a procedure virtually unchanged since Gutenberg's invention of movable type some 400 years earlier.

A hand compositor worked in front of his type case. The characters were stored in various compartments of the case. The compositor picked up each character in order and placed it in a "stick" usually held in the left hand. After the characters of a

line had been assembled, the compositor justified the line (adding spaces between words) so that the right and left sides of the column would be even. After use, the type was distributed by hand to the proper compartments in the case.

Printing historians[2] who have traced the history of composing machines concur that the first efforts to set type mechanically were made by Dr. William Church, a Vermonter trained in medicine. In 1822 he patented his typesetter not in the United States, but in England, were he worked as a mechanical engineer. British printers considered Church's invention a chimera,[3] and no record has been found to show that his typesetter was ever built or used. Early American-built machines included Mitchel's 1850 Composer, a device arranged somewhat like a pianoforte, and Timothy Alden's 1857 Typesetter. The New York Times, after it had ordered a dozen Aldens in 1862, called that machine "the invention of the Nineteenth Century" and predicted that a "new era in newspaper publishing will date from the day of introduction."[4] The Alden failed to live up to that promise.

Enthusiasm in the United States to perfect a composing machine was likely stimulated in 1869 by the New York World, then under the proprietorship of Manton Marble. In an article reprinted in Scientific American, the World stated that "it is discreditable to the inventive genius of this country that the one great mechanical want of the time is still unsupplied." Newspapers, it said, were prevented from "giving their readers the literal 'volumes' of matter they would gladly do from day to day were they not hampered by the delays and the cost of composition." The World

proposed that newspapers establish a prize fund of $500,000, with the successful inventor to receive half that amount.[5] No documentation has been located to confirm that the money was raised or that a prize was awarded.

The Church, Mitchel and Alden machines were representative of a first category of machines designed to compose type. They were the typesetters, machines that duplicated in some degree the processes earlier accomplished by hand. These machines--and the Paige Compositor and the more prevalent Thorne--all used individual characters that had usually been cast at typefoundries. In order to work in a typesetter, each different character had to be nicked on the side so that proper type assembly, controlled by a keyboard, and distribution could proceed mechanically. Early devices required a team of three persons: one to operate the keyboard, one to load the type to be distributed, and a third to justify each line. The quest among inventors, though, was to devise a machine that could speedily set, justify and distribute type and still require only one operator.

Two other processes were utilized in the 1880s and 1890s for the mechanical composition of type. One of these, incorporated into the impression-type category, generally involved the pressing of hard type dies into a soft material from which lines were cast. Impression machines, though, were not successful even though inventors such as Ottmar Mergenthaler (the Linotype) and John R. Rogers (the Typograph) used that process as a stepping stone in the development of their linecasting machines. Their linecasters, the third machine category, were operated by temporarily assembling

brass type matrices (or molds). Hot lead was forced into the line of matrices and a casting of each line was made. Justification was accomplished by adjustable mechanical devices, and the mechanical distribution of the matrices allowed them to be used over and over. The linecasting machine--principally the Linotype and the Intertype--became the main composition device even though it has been almost completely superseded now by photocomposition methods.

The Joining of Paige and Clemens

Only the sketchiest details are known of James William Paige's early life. He was born about 1841 and likely grew up in Rochester, New York. Although Paige conceived the idea of a simple mechanical typesetter while located in the oil fields, the development of his typesetter stretched over a period of more than 20 years. Paige apparently was not a practical printer, but then neither was Church, Mergenthaler, Rogers or Tolbert Lanston, the inventor of the Monotype machine. Paige's early device assembled type mechanically, but included no provision for mechanical justification or distribution.

Paige developed his first machine in Rochester and applied for a patent in 1872. This first typesetter served as a simple beginning for the massive Compositor that evolved in the two successive decades. The scenario moved to Connecticut about 1877 when the Farnham Typesetter Company of Hartford contracted with Paige to allow the combination of his typesetter with a distributor developed by a Mr. Thompson. At first it was thought that the distributor mechanism could be attached to the typesetter. That procedure proved impractical and Paige began work on a completely new

machine. As various defects turned up when this machine was tested, further revisions would be needed as well as additional capital.[6]

Samuel Clemens' involvement with the machine began about 1880. In his Autobiography, he described the visit of Dwight Buell, a Hartford jeweler, to the billiard room of Clemens' expansive showplace home at the Nook Farm, Hartford. Buell wanted Clemens to subscribe $2,000 for stock in the company then developing the Paige machine at the Colt Arms factory. Clemens admitted that he was "always taking little chances like that--and almost always losing by it, too." Clemens, of course, drew on his teenage remembrances as a roving hand compositor. "I knew all about type-setting by practical experience, and held the settled and solidified opinion that a successful type-setting machine was an impossibility."[7] Clemens was known for his penchant for backing impractical inventions, and such objects as a steam generator, a steam pulley and marine telegraphy were among projects in which he invested and lost.

Clemens in 1880 was flush with success as Mark Twain, the author. By then his books, The Adventures of Tom Sawyer, A Tramp Abroad and The Prince and The Pauper, were being widely read. He was 45 that year and was enjoying a growing reputation as a humorist. The typesetting machine, though, mesmerized him. After he saw it operating at the Colt factory, he wrote that its "performance . . . did most thoroughly amaze me," for he had thought such a machine could not be "made to think, and the thing that sets movable type must think or retire defeated." Clemens was hooked, for he had seen a machine setting type about four times faster than a

hand compositor. Clemens pledged an additional $3,000, and that, he wrote, was when "the music begins."[8]

Had efforts been undertaken at that time to manufacture and introduce Paige's machine, the course of mechanical composition might well have been different. Mergenthaler and Rogers were just then beginning their preliminary efforts leading to the development of their linecasting machines. Paige, though, wanted to add one feature, a device for mechanical justification. That delay (and others as well) added years to the project and compounded the ruin that the machine brought to its backers.

Paige was a perfectionist, never satisfied with merely adequate performance. Clemens, writing in 1890, described the inventor as a

> poet, a most great and genuine poet, whose sublime creations are written in steel. He is the Shakespeare of mechanical invention. In all the ages he has no peer. Indeed, there is none that even approaches him. Whoever is qualified to fully comprehend his marvelous machine will grant that its place is upon the loftiest summit of human invention, with no kindred between it and the far hills below.[9]

Paige, in Clemens' view, was a "little bright-eyed, alert, smartly dressed inventor" who could "persuade anybody [but] convince nobody." By that time, he had worked at his "expensive machine more than twenty years, but always at somebody else's cost."[10] Paige, another author wrote, possessed "a scientific mind and an inexhaustible patience. His tragedy lay in the fact that there seems to have been something approaching a vacuum in the economic department of his mind."[11] Clemens was just the man for the dreamer Paige, who persuaded Clemens with visions of immense profits resulting from his machine that could "do it all."[12]

The First Endeavor

Various entries in Clemens' journals and notebooks chronicle the author's rising involvement with Paige's machine. In 1881, Clemens was only one of a number of men who had invested modestly in the project. By 1885, though, he came further under the spell of Paige and the machine. He was impressed by it, for he wrote that this machine "does not get drunk . . . does not join the Printers' Union . . . [and] does not distribute a dirty case."[13] He and Hartford attorney William Hammersley sought to raise capital to fund manufacture. Clemens wanted to secure advance orders so that capitalists' money could be enlisted.

By a contract signed on 6 February 1886, Clemens agreed to undertake responsibility for the capitalization and promotion of the machine in exchange for a half interest surrendered by Paige. Clemens' new business adviser, F. G. Whitmore, warned him that the new contract could bankrupt him. Clemens passed off the advice, telling Whitmore: "Never mind that, Whitmore; I've considered that. I can get a thousand men worth a million apiece to go in with me if I can get a perfect machine."[14] Clemens was absorbed about that time with other business affairs, principally the production and sale of Personal Memoirs of U. S. Grant by his publishing company.

With Clemens footing the bill, Paige embarked on plans to perfect the typesetter by building an entirely new machine. That plan, to Clemens, constituted a "total violation of the agreement." To Clemens, good business sense would have said to "put it on the market as it was, secure the field, and add improvements later." But "Paige's business insanity said," Clemens wrote, "add the im-

provements first and risk losing the field."[15] The new machine would not be perfected until nearly four years had elapsed. The decision was a fatal mistake for the Paige Compositor.

Clemens was quite aware of other developments in the composing field. He knew about the linecasting machine, later known as the Linotype, being developed in Baltimore by Mergenthaler. In fact, he and New York Sun publisher William M. Laffan had planned to inspect it at Baltimore in January 1886. Clemens could not go, but Laffan wrote him later of his belief that "every daily in [New York] will be set up by that machine inside of twelve months." (Laffan's prediction proved to be incorrect.) Clemens, though, recorded a note saying that: "I [am] unaffrighted [and] am still at work building my [Paige] type-setter."[16] He believed the Mergenthaler machine would end up in a scrap heap.

After the first Mergenthaler arrived at the New York Tribune in July 1886, Clemens watched that newspaper carefully to check the quality of machine composition. He received inside reports about the defects of the machine and particularly about the recurring need to replace worn out matrices. He gloated over the Linotype's failures, even when the Tribune published The Tribune Book of Open-Air Sports using type set on the new machine. Clemens could not be dissuaded from the rosy visions of fortune that would be his when the Paige was marketed. He was not affected by the news from Laffan in 1887 that New York publishers were "all ready to talk machines."[17] Nor was he depressed by the installation of a Rogers Typograph at the New York World in 1890, a year before it was adjudged an infringement of Mergenthaler's patents.

Clemens recorded in his notebooks various lists of prospective Paige investors and the amounts of capital each might be able to provide. He listed prominent newspaper proprietors whom he would invite to a demonstration of the Paige when it was finished. He projected that 2,173 typesetters would be needed in the United States.[18] He determined that New York newspapers published 439 pages per week, and mechanical composition of that many pages would require 157 Mergenthalers or 150 Rogers machines, but only 63 Paige typesetters.[19] He calculated that some 6,500 Paige machines could be utilized in the international marketplace.[20] In mid-1889 he prepared a form letter to be sent to various publishers in which he stressed the Paige's long-term savings and claimed its ability to set type speedily in sustained operations.[21] The letter, apparently, was never sent.

The Paige project continued to drain Clemens' resources in those years, at one time costing $3,000 per month. He involved his friends and relatives in supporting the work, which once he described as the "eternal machine." Clemens knew he was speculating, for he once acknowledged that there were two times a man should not speculate: "when he can afford it, and when he can't."[22]

Notations in his journals record the composition speed of Hartford workmen who used the Paige when it was operating. Composition on the machine first approached a speed that was three or four times faster than what a hand compositor could set in a similar period. Clemens predicted that with a Paige, the cost for setting up an entire page on a New York daily would be the same as "it now costs to set a column by hand."[23] He believed that his

machine, when fully operational, would bring more and bigger newspapers, with a result that more printers would be required.[24] He assured himself in 1889 that for every man deprived of work by the Paige, "10 will get work, through it."[25] In reality, though, the mechanization of type composition by the installation of Linotypes in the 1890s caused extensive technological displacement at the rate of about three compositors per machine, or about 10,000 men in the United States. Employment of printers did not reach pre-machine levels until about 1900.[26]

As Paige worked on the machine, delay followed delay, and its completion date was repeatedly advanced. Finally, in early January 1889, it was ready. Clemens joyfully proclaimed "Eureka!" in his notebook, stating that at 12:20 p.m. on Saturday, 5 January, "I have seen a line of movable type spaced & justified BY MACHINERY! This is the first time in the history of the world that this amazing thing has ever been done."[27] Clemens seemed to believe his troubles had ended, for he wrote a London publisher that the "death-warrant of all other type-setting machines in this world was signed at 12:20 this afternoon."[28]

In 1889 and 1890, newspaper publishers learned and talked about the Paige and other composing machines at the annual meetings of the American Newspaper Publishers Association (ANPA). W. W. Pasko, in his 1889 composing machine report to the publishers, said that use of a Mergenthaler machine would save only one half of a man's wages, while the Paige, when fully operational, would save the wages of six men.[29] Those figures obviously had been slanted to show the Paige in a good light. By 1890, mention of

the Mark Twain machine appeared in the ANPA minutes. F. P. Chapin of the Toledo Bee, reporting on an interview with Clemens, implied that newspapers could pay off the machine cost by remitting a percentage of the savings on their composition bills until the $10,- or $12,000 was paid. Chapin added that: "It is a plausible theory if the machine is as perfect as he thinks in practical work."[30] Of the Paige, L. L. Morgan of the New Haven Register told the ANPA that there was "probably no machine made which is so attractive when working," but noted that its price and 18,000 parts weaken its prospects both "mechanically and financially."[31]

A month or so after the 1890 ANPA convention, Clemens, Paige, and his engineer, Charles E. Davis, saw an improved Mergenthaler in operation in New York. Clemens wrote to an associate that "we considered it liberal to call it a 3,500-em machine" (the Paige then producing some 5,000 ems per hour). He added that the Mergenthaler people "talk as glibly as they've always done, make as prodigious claims as they used to when the old machine was a wonder."[32] Clemens probably didn't realize that he was making the same sort of exaggerated claims about his own machine.

Clemens continued to see dollar signs in his visions of the typesetter's success. The process of raising the capital, though, consumed his energies in 1889 and 1890. He sought out a millionaire acquaintance, Senator John P. Jones of Nevada, believing him to be the right capitalist whose influence would sway others of his kind. Clemens entertained Jones and his entourage at his home, then took them to the Pratt & Whitney machine shop to see the typesetter. They found it disassembled because Paige had taken it apart to add

an air blast. The group left abruptly, and months passed before Jones could be enticed to return to Hartford to see the machine in operation. Jones came again in August 1890. At that time he bought a $5,000 share of Clemens' expected royalties and, more importantly, took up a six-month option to organize a company to manufacture and promote the machine. Jones and his conferes, however, declined to invest further, and Jones did not exercise the option. Some of the prospective stockholders already owned extensive holdings in the Mergenthaler company.[33]

The rejection by Jones devastated Clemens' spirit. He put the typesetter aside, returned his contract with Paige, and turned again to writing and lecturing as the means to restore his income and assets. He had spent some $190,000 on the typesetter during the 10-year period and was still saddled with debts from the fiasco. The first chapter of his involvement with the Paige machine had come to a close.

Clemens and his family left in mid-1891 for an extended European stay. By then he had sworn off further attempts to develop the typesetter. He was even negotiating for the sale of his royalty rights. While he was gone, Paige continued further efforts that would eventually lead Clemens to dishonor his pledge.

The Interim

Interest in Paige's typesetter continued to manifest itself during the first year Clemens lived in Europe. The machine shared the spotlight of newspaper publishers and printers anxious to discover the best process for mechanical type composition.

Newspaper and commercial printing associations continued to assess the advantages and disadvantages of machine composition. The United Typothetae of America, an organization of commercial printing managers, studied the Paige's circular at its 1891 convention. Records of tests run on it indicated that an experienced printer set over 8,000 ems per hour, a quantity some eight times faster than what the hand compositor could set. Still, the Paige, then in use in "private practical operation" at Hartford was viewed with some uncertainty because it could be used to set only one size of type.[34]

The ANPA, composed of publishers of many prominent daily newspapers, sought in 1891 to evaluate the strengths and weaknesses of various kinds of composing machines. The organization scheduled a type composition contest in late 1891. The ANPA invited the Paige owners, but the machine was not ready then to "enter the lists."[35] The contest results heavily favored the use of linecasting machines. In comparison with the machines that assembled foundry type, the linecaster (Mergenthaler and Rogers) was found to be "by far the preferable [kind of machine] for ordinary newspaper work."[36] This statement was an indication that the state of the art was going to pass over the Paige and its kin.

Paige may have cried "foul" when the ANPA ran its tests without his typesetter. By early 1892 he had managed to persuade the ANPA to monitor a private, two-day test on the Compositor, using copy that had been used by compositors at the New Haven Register, New York Evening Post and Brooklyn Times. Operators tested the machine by using various kinds of copy: manuscript copy,

two-line heads, flimsy in short takes, reprint copy and typewritten copy. One galley of type was taken to New York, where 12 stereotype matrices were formed under pressure. On its return to Hartford, the type was fed into the Paige distributor, which had the capacity to reject characters that were turned, bent or bruised. In some of the production trials, composition speed surpassed 10,000 ems per hour.[37]

The ANPA's examining committee concluded that "in so far as the limits of the test, they believe the Paige Compositor is a perfect machine, as it did in the test all that the inventor claims for it." The committee praised its advantages (positive action, one operator, the best possible product, ingenious keyboard) but reported no disadvantages. The Brooklyn Times composing foreman gave the Paige "my hearty endorsement. It is one of the marvels of the Nineteenth Century and will work such a revolution in the printing trade as to eventually benefit all mankind."[38]

Meanwhile, the Mergenthaler company was beginning to work its own revolution. Mergenthaler, who had developed the Square Base Linotype model in 1890, introduced the Model 1 machines in 1892. Both were vast improvements over the primitive Blower Linotype, first used at the Tribune in 1886. The new machine found a ready market in newspaper composing rooms. The Linotype "got in" before the Paige was ready to enter the marketplace. By the end of 1891, some 300 Linotypes were being run at 23 U.S. newspapers, the company claiming that the Linotype produced type lines at a cost "not exceeding one third" of the amount spent for hand composition.[39] The Linotype then sold for about $3,000, or could be rented for

$500 per year.[40] The Mergenthaler company also had effectively removed the Rogers Typograph from competition in the United States after winning patent infringement suits.

Mergenthaler successes did not seem to deter Paige. The Connecticut Company, apparently one of Paige's organizations, published a 57-page booklet about the machine, complete with descriptions, testimonials and the report of the ANPA test.[41] About this time, a new company came on the scene. Three New York men, identitified only as Ward, Frink and Kneval, established a new firm that contracted with the Webster Manufacturing Company in Chicago to redesign and build a new model of the typesetter.[42] Near the end of March 1892, Paige moved the Hartford-built machine to Chicago in a 10-ton safe, "every precaution being taken to prevent loss or disclosure." The New York Times article disclosed that 500 hands would soon be employed at the Chicago factory. The newspaper printed Paige's claims that the business was backed by a capital of $6 million and that he held orders for 4,000 machines, each to cost $20,000.[43] Paige, it seems, had not lost his touch for hyperbole.

The inventor's private life also was exposed in the New York Times several months later when Mrs. Jessie Hall, an ex-actress, sued Paige for breach of promise of marriage and $950,000. Mrs. Hall's attorney claimed that Paige had become infatuated with her after she had played on a Hartford stage two years earlier. She went to live with Paige under a promise of marriage. He delayed the ceremony pending completion of negotiations for capitalizing his typesetter. After the couple had arrived in Milwaukee for their marriage, Paige accused Mrs. Hall of "flirting with a

good-looking clerk, and finally declared he would not marry her. She says that by threats he induced her to sign a contract releasing him." By advice of counsel, though, she instituted the suit against Paige, claiming that he had "promised to give her $800,000 out of the royalties from the sale of his machine." The Times apparently sought to find out Paige's version of the dispute, for it said "he knows nothing about this case."[44] It is not known how the suit was settled.

The Second Endeavor

Clemens, in mid-1892, renewed his dormant but passionate interest in the typesetter. After hearing from Paige about the recent developments, he left Europe and saw for himself what was happening in Chicago. Becoming sufficiently convinced that the new prospects promised hope, he broke off negotiations for the sale of his royalty rights. The impossible dream had gripped him once again. He believed that machine sales would finally relieve him of the financial burden he was still carrying.

He returned again to the United States in 1893 to view the status of the machine. Paige came to see him at a Chicago hotel and as usual was full of promises and prospects. Clemens wrote about the visit:

> Paige shed even more tears than usual. What a talker he is! He could persuade a fish to come out and take a walk with him. When he is present I always believe him; I can't help it.[45]

The number of machines under manufacture at Chicago, first reported to be 50, dropped subsequently to 10, and then to one. Although efforts were made to complete the machine in time for the Chicago World's Fair, it was not ready.

Clemens returned to Europe in May. He came back in September, and by then the Panic of 1893 was seriously dampening the economy. The debts of his publishing company were mounting and no royalties were yet forthcoming from the typesetter. While in New York, Clemens met a financier, H. H. Rogers, who soon became Clemens' business adviser. Rogers arranged with Paige for a new contract, signed in February 1894, that, in the view of Paige and Clemens, would again assure everyone with a fortune.[46]

By April 1894, Clemens again returned to the United States, this time on account of the looming failure of his publishing company. He and Rogers were unable to save it, and it closed its doors with a debt of some $160,000. Clemens again pinned his hopes on the typesetter, which was soon operational and placed in the Chicago Herald & Post composing room for an extended trial. In early fall, Clemens received a copy of the machine-set paper, and he noted: "It affects me like Columbus sighting land."[47] Prospects for the typesetter seemed rosier than ever before.

Newspapers, in the 1892-94 period, advanced rapidly in their use of composing machines, even in spite of the economic depression of 1893. Their use, according to a Journalist article, "marks a change to which publishers must quickly adjust themselves.[48] Publishers--at least at the larger newspapers--viewed the machines as devices allowing reduced composition costs and increased profits. Members of the ANPA attending the body's 1892 sessions were advised that they could "learn more on the subject [of composing machines] than they possibly could in any other way."[49] The members at that time knew the results of the recent

type composing contests; discussions, however, were held in closed-door executive sessions.

Progress on the Paige and other machines continued to be an important topic in the trade press. In a review of composing machines in 1892, Journalist editor Allen Forman described the experimental Paige as being "as complicated as a French watch, and runs as smoothly as a chronometer." Forman liked its work, "but there is a question as to how it will stand the wear and tear of actual use."[50] By the time of the 1893 ANPA convention, the Paige seemed closer to completion. Editor Forman ventured to say that the Paige "seems to be the favorite machine with the majority of [the ANPA] members." The Paige, in spite of its great size and delicacy of operation, became the darling of the ANPA. Forman believed further that the favorable feeling towards the Paige "proved pretty conclusively that the typesetting machine [such as the Paige] and not the linecasting machine [such as the Linotype] will have the call for machine composition."[51] That prediction, though, never came to pass.

Verbatim minutes of the 1893 ANPA committee revealed that the Paige was both praised and questioned. James W. Scott, ANPA president and publisher of the Chicago Herald & Post, was a believer in the Paige (and later tested the machine in his composing room). Scott told the convention that the Paige, because it used very thin spaces between words, allowed him to "get more [reading matter] into a column than hand composition [and type set upon the Mergenthaler]." W. C. Bryant, Brooklyn Times, in reporting on the ANPA's Paige trials, related that inventor Paige claimed that his

his machine, because of its justification capabilities, would save a newspaper such as the New York Herald something like $15,000 in its annual newsprint costs. S. H. Kauffman, Washington Star publisher, viewed the Paige "as a perfect piece of work, but too delicate in its [18,000] parts and liable to get out of order, and too expensive to go into general use." Bryant revealed that "Mr. Twain, and several gentlemen in Hartford, have a claim on it in the shape of a royalty," thereby adding $1,500 or more to the cost. The minutes stated that several newspapers had placed provisional orders for the Paige.[52]

Later that year, the Paige was extensively described (but not illustrated) in Inland Printer, the trade's principal journal. The three-ton machine stood six feet high, nine feet long and four feet wide. An adept operator could assemble certain syllables and even complete words at the 109-character keyboard. The justifier utilized 11 different sizes of spaces to fill the spacing between words. The distributor, as it returned the dead matter to its proper channels, removed any damaged or bent type. A locking mechanism, called the "brains of the machine," prevented malfunctioning within the numerous sequential operations. The company prospectus asserted that "anyone can run the machine. . . . The operator need only know how to read and punctuate correctly."[53]

The Denouement

The practical test of the Paige at the Chicago Herald began with the high hopes of its inventor, its principal backer and other investors. The ANPA notified its members that the machine would be used for 60 days beginning 20 September 1894. It was to

be used for setting a story written by Paul Bourget, members being advised that the Herald serial "will show the character of the work done by [the Paige]."[54]

Clemens, after hearing by cable that the machine was in practical use, allowed himself to exult in joy. "It seems to me," he wrote, "that things couldn't well be going better at Chicago." His joy was short-lived. Machine stoppages became longer, and type began to break.[55] Paige had to be sent for because no one else comprehended its complexity. The realization dawned with finality that the machine was too delicate and too complicated for the printing trade. The Herald would use it no more.

The responsibility for telling Clemens, then living in Paris, about the machine's failure fell to Rogers, his advisor. Clemens replied in December that "I seemed to be entirely expecting your letter, and also prepared and resigned. . . . It hit me like a thunder-clap."[56] Later, after Rogers wrote him that the Paige company was going to quit, Clemens philosophied that he had always "stumbled upon lucky chances of large size" and blamed the failures on his own stupidity and carelessness. He said he felt "entirely certain that the machine would turn up trumps eventually." It didn't, and Clemens added a note of remorse: "I wish that you [Rogers] had been in at the beginning. Then we should have had the good sense to step promptly ashore."[57]

Epilogue

The machine that had consumed the inventiveness of James W. Paige and the extensive backing of Clemens and others was dead. By most accounts, the experiments with the Compositor had cost well

over $2 million. Clemens lost some $190,000,[58] an amount compounded with the earlier failure of his publishing house. He made good his debts, though, by embarking on extensive travel, lecture and writing tours. Within four years--in January 1898--Clemens paid all his creditors. By then he was 62 years old and had put the typesetter and other schemes behind him. Clemens was 75 when he died in 1910.

Paige may have spent many of his latter years in obscurity, or at least until the New York Times carried a Chicago dispatch about him in 1917. By then he was impoverished and had to live in the poor house at Oak Park. The article said he was reputed to have been worth $1.5 million when he owned the Paige plant, and that he lost his money in the 1893 panic.[59] When he died at age 76 in 1917, he was penniless,[60] a tragicomic ending for the inventor of Mark Twain's nemesis.

Although typesetters less complicated than the Paige machine were manufactured in the United States until about 1910, their usage was dimmed by the Linotype in its rise to prominence. Mergenthaler's machine permitted greater flexibility in the composition process. It could be used to set several sizes of type, something a single typesetter could not do. (Paige's machine set only nonpareil, or six-point, type.) The linecaster permitted type to be melted after use, thereby eliminating the entire distribution process inherent in hand composition and in the typesetter.[61]

Paige's machine, however, continued to be newsworthy even after its death at the Chicago Herald. Nearly a year later, on 15 October 1895, the Patent Office issued three patents some eight

years after Paige had submitted his first application. Taken together, the three patents total 417 pages, illustrate 856 figures and delineate 448 claims by the inventor. The second patent (No. 547,860) was so voluminous (218 pages) that it was known at the Patent Office as "The Whale." A patent attorney who prepared the final specifications reported that a patent examiner studied the machine in Chicago for an entire month.[62] Rumors that one patent examiner died during the process and that one of the patent attorneys and another examiner died insane cannot be documented.[63]

Contemporary reports on the Paige patents indicated that the Patent Office lost heavily on the issuance proceedings. At that time, the cost of a patent application was $15, with an additional $20 due upon issuance. Examination of the Paige patents was said to have cost about $1,000. Additionally, the regulation price of patent copies was 10 cents then, but the cost of preparing the first edition for printing reached $6. The Patent Office received many orders for the Paige patents "just for curiousity, for in volominousness they might said to be considered together as the father of inventions."[64]

The two machines themselves, together with their rights and patents, were bought for $20,000 in 1898 by the company that Paige and Clemens for so long had scorned: Mergenthaler Linotype.[65] If one believes Clemens' early biographer, Albert Paine, the Mergenthaler promoters had once offered to exchange half their interests for a half interest in Paige's patents. Clemens, though, interpreted the offer as a confirmation of his trust in Paige's machine, and "he let the golden opportunity go by."[66] In another

version reporting on the supposed offer, Charles E. Davis, the inventor's mechanical engineer, said it was Paige who would not accept the Mergenthaler offer.[67] A later Clemens biographer, however, reported that there was "not a glimmer of evidence" among Clemens' business papers that the offer had ever been extended.[68] No substantiating information about the supposed offer has been found among various Mergenthaler company reports and documents.

In 1985, only one of the two Paige Compositors is known to exist. The surviving machine is believed to be the earlier model built in Hartford. This machine, shortly after the Mergenthaler company acquired it, was presented to Cornell University. An 1898 Inland Printer editorial noted that the machine was the "costliest piece of machinery in the world," adding that Cornell students could "here study the cam in all its glory."[69] Correspondence in the Cornell archives indicated that this machine was returned to the Mergenthaler company in 1921 for placement in its museum at its Brooklyn, New York, headquarters. It was donated in 1957 to the Mark Twain Home at Hartford.[70]

The Hartford machine was placed in the museum area of the Twain basement, close to some type cases from the print shop where Clemens had set hand type in his youth. A cord restrains visitors from touching the Paige machine and its large keyboard. The plaque in front reads:

"LOCAL HISTORIC
"MECHANICAL ENGINEERING LANDMARK

"The Paige Compositor

"The first machine to successfully set, justify and distribute foundry type from a common case using only one operator. Invented by James W. Paige in 1877 this machine, the first of

two, was completed in 1887 under the direction of Charles E. Davis - Mechanical Engineer. The second machine, completed in 1894, successfully participated in a 60 day trial at the Chicago Herald - its only commercial application.

"THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
"HARTFORD SECTION
"1975"

The whereabouts of the second machine, apparently the one used in the 1894 test at the Chicago Herald, is unknown. According to Thompson's 1904 history on composing machines, the second machine had been placed at Columbia University.[71] Huss' 1973 history implied that the second machine had been junked for scrap metal in World War II.[72] A 1981 letter from a Columbia librarian indicated that a Paige Compositor had once been placed at the university, but that it had been discarded or scrapped.[73]

Summary

The idea of a machine that composed, justified and distributed individual type characters seems foreign to today's dependence on computers and photocomposers. Yet machines such as Paige's formed an important bridge between hand composition and the hot-lead products of machines such as the Linotype. The evolutionary process of mechanical composition linked together a gullible Mark Twain and the glib dreamer personified in James W. Paige. Their hopes were pinned on their elusive quest for easy financial reward. They were blind to the facts that Paige's machine was simply too complex, too expensive and too late to be of any practical use at newspapers and other printing offices. Regardless of the aura accompanying Clemens' extensive involvement, the state of the art in printing inexorably passed over the Paige Compositor.

NOTES

[1]Encyclopaedia Brittanica, 11th ed., s. v. "Typesetting," p546a.

[2]Lucien A. Legros and John C. Grant, Typographical Printing-Surfaces (London: Longmans, Green, and Co., 1916; reprint ed., New York: Garland Publishing Co., 1980); Richard E. Huss, The Development of Printers' Mechanical Typesetting Methods, 1822-1925 (Charlottesville: University Press of Virginia, 1973); James Moran, The Composition of Reading Matter (London: Wace & Co., 1965); and John S. Thompson, History of Composing Machines (Chicago: Inland Printer Co., 1904; reprint ed., New York: Garland Publishing Co., 1980).

[3]Richard E. Huss, Dr. Church's "Hoax" (Lancaster, Pa.: Graphic Crafts, 1976), pxiii.

[4]"Concerning Composition," New York Times, 11 August 1862, p5.

[5]The World article was reprinted in "Type-setting and Distribution Machine Wanted," Scientific American 20 (29 May 1869):343. In an editorial note, the magazine reported that "there is no machine for setting and distributing type that perfectly fills all the conditions required."

[6]Legros and Grant, op. cit., pp378-91. See also Bartlett Gould, "Mark Twain's Incredible Nightmare," Yankee 44 (November 1980):212-20, 223, 226-28. Paige's 1874 patent was No. 157,694.

[7]Mark Twain, Mark Twain's Autobiography (New York: Harper Bros., 1924), p70.

[8]Ibid., p71. [9]Ibid., pp72-73 [10]Ibid.

[11]Roger Burlingame, Engines of Democracy (New York: Charles Scribner's Sons, 1940), p145.

[12]Albert Bigelow Paine, Mark Twain, A Biography, 4 vols. (New York: Harper & Bros., 1912), 3:906.

[13]Frederick Anderson, gen. ed., Mark Twain's Notebooks & Journals, vol. 3, 1883-1891, by eds. Robert Pack Browning, Michael B. Frank and Lin Salamo (Berkeley: University of California Press, 1979), p147.

[14]Paine, op. cit., 3:906. [15]Twain, op. cit., p76

[16]Anderson, op. cit., p215, fn94. [17]Ibid., p333, fn96.

[18]Ibid., p485, fn8. [19]Ibid., p530. [20]Ibid., p247.

[21]Ibid., p493.

[22]Justin Kaplan, Mr. Clemens and Mark Twain (New York: Simon and Schuster, 1966), p288. In "Machine Composition," Inland Printer 37 (July 1906):563, Twain is quoted as telling a friend the reason for his involvement with the Paige: "'I'll tell you how it was. You see, in the fall and winter I go up to Elmira, where m' wife's folks live, and write books and things. In the summer I come down to Hartford and have to have something for a diversion, and this typesetting machine business . . . is a helluva diversion.'"

[23]Anderson, op. cit., p474. [24]Ibid., p192.

[25]Ibid., p437.

[26]See George E. Barnett, Chapters on Machinery and Labor (Cambridge, Mass.: Harvard University Press, 1926), pp3-29; and U.S. House of Representatives, Report of the Industrial Commission, Capital and Labor, v7, House Documents, vol. 95. No 495, 56th Congress, 2nd sess. (Washington, D.C.: Government Printing Office, 1901), p276.

[27]Anderson, op. cit., p441. [28]Paine, op. cit., 3:909.

[29]Anderson, op. cit., p528.

[30]ANPA, Minutes of Annual Meeting, 1890, p56.

[31]Ibid., p55. [32]Anderson, op. cit., p546.

[33]Paine, op. cit., 3:913.

[34]UTA, Proceedings of Fifth Annual Meeting, 1891, pp153-55.

[35]ANPA, Report of F. Driscoll on Machine Composition (New Haven, 1892); and New York Mail and Express, 18 February 1892. The ANPA report is located at the Library of Congress. The Mail and Express article is located in a scrapbook organized by W. H. Brearley and now kept among the archives at ANPA headquarters in Reston, Virginia.

[36]"Machine Composition," New York Times, 15 January 1892, p3. This report, and an illustrated description of each machine appearing in the Chicago Herald, were widely circulated.

[37]ANPA, The Paige Compositor: Report of Committee (1892), not paged. The report is located at the Library of Congress.

[38]Ibid.

[39]"The Linotype," advertisement, Journalist 14 (December 1891):55.

[40]P. D. Ross, "Type-casting Machines," Popular Science Monthly 40 (December 1891):184.

[41]The Connecticut Company, The Paige Compositor (New York: The Connecticut Company, n.d.). This booklet is shelved at the Library of Congress.

[42]Legros and Grant, op. cit., p381.

[43]"Paige Typesetting Machines," New York Times, 30 March 1892, p3. The article noted that Paige was reported to have kept an all-night guard on the works at Hartford.

[44]"Sadly Blighted Affections," New York Times, 10 June 1892, p9.

[45]Paine, op. cit., 3:965. In Twain, op. cit., p78, Clemens wrote: "Paige and I always meet on effusively affectionate terms, and yet he knows perfectly well that if I had him in a steel trap I would shut out all human succor and watch that trap until he died."

[46]Ibid., 3:979. [47]Ibid., 3:990.

[48]"The Canadian Press Association," Journalist 15 (26 March 1892):10-11. The Journalist was a forerunner of Editor & Publisher.

[49]"The Annual Meeting of the A.N.P.A.," Journalist 14 (6 February 1892):8. The article was an editorial.

[50]"The Status of Machine Composition," editorial, Journalist 15 (12 July 1892):8.

[51]"The ANPA and the Type Combine," Journalist 16 (25 February 1893):8.

[52]ANPA, Minutes of Annual Meeting, 1893, pp21-23.

[53]W. C. Roberts, "The Paige Typesetting Machine," Inland Printer 11 (June 1893):248-49.

[54]ANPA, Bulletin, No. 285, 6 October 1894.

[55]Paine, op. cit., 3:990-91. [56]Ibid., 3:991-92.

[57]Ibid., 3:991-95. [58]Twain, op. cit., p78n.

[59]"Inventor in Poorhouse," New York Times, 7 March 1917, p11. The Times called the Compositor "a mechanical marvel [that] proved impractical and needed further development, which never came."

[60]"Obituary Notes," New York Times, 6 December 1917, p13. No photograph of Paige has yet been located.

[61]The growth and usage of the Linotype are described in George A. Everett, "The Linotype and U.S. Daily Newspaper Journalism in the 1890's" (Ph.D. dissertation, University of Iowa, 1972): and G. Corban Goble, "The Obituary of a Machine: The Rise and Fall of Ottmar Mergenthaler's Linotype at U.S. Newspapers" (Ph.D. dissertation, Indiana University, 1984).

[62]Legros and Grant, op. cit., p391.

[63]"A Triumph of Ingenuity and a Patent with a History," Scientific American 84 (9 March 1901):145, 147, 150. Illustrations of the Paige were run on the front page of that issue.

[64]"The Type-composing Machine upon which Mark Twain Lost His Fortune," Inland Printer 17 (April 1896):55. A bound copy of the Paige patents is located on the shelves of the library of the Patent and Trademark Office, Washington, D.C. By 1981, the basic filing fee had advanced to $65 and the basic issue fee to $100. The three Paige patents, together with their application dates, are No. 547,859 (5 December 1882), No. 547,860 (19 August 1887) and No. 547,861 (14 February 1893). The latter patent, for the justifying mechanism, was issued to Paige and C. R. North. A mechanic in Paige's employ, North was a principal inventor of the justifier. Copies of the patents are still available from the Patent and Trademark Office at a cost of $1 each, a 10-fold increase from the 1895 price.

[65]Paine, op. cit., 3:995-96. [66]Ibid., 3:906.

[67]Legros and Grant, op. cit., p386.

[68]Kaplan, op. cit., p288

[69]"A Costly Mechanism," Inland Printer 22 (November 1898):178.

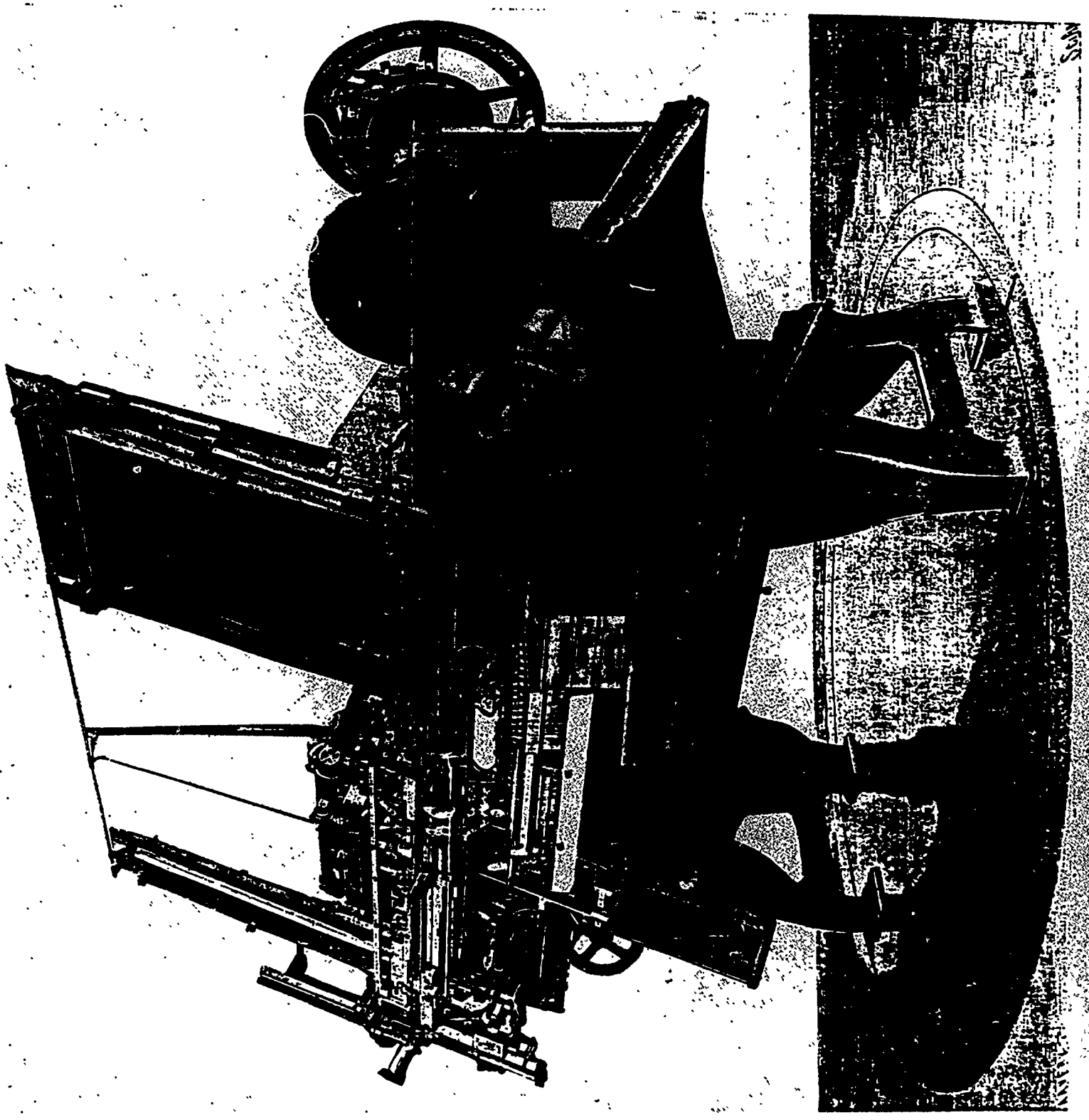
[70]Mike Parker (Mergenthaler Linotype Co.) to Felix Reichmann (Cornell), letter, 26 November 1973. In manuscript collection at Cornell University Libraries, Ithaca, New York.

[71]Thompson, op. cit., pp23-27.

[72]Huss, Development, op. cit., p80n.

[73]Alice Schreyer, personal letter, 30 October 1981. According to Hellmut Lehmann-Haupt, The Book in America, 2nd ed. (New York: R. R. Bowker Co., 1952), p160, an "unassembled Paige composing machine" was, at the time of his book, located at Columbia University.

N.B.---The first following page (29) depicts the Paige Compositor as a whole. Pages 30-32 are reproduced from patents. The complexity of the internal mechanism is shown on p30, and various spacing combinations on p31. The first of 55 specification pages for No. 547,860 is shown on p32.



A MACHINE WITH 18,000 ELEMENTS--THE PAIGE TYPESETTING MACHINE
Scientific American 84 (9 March 1901):145

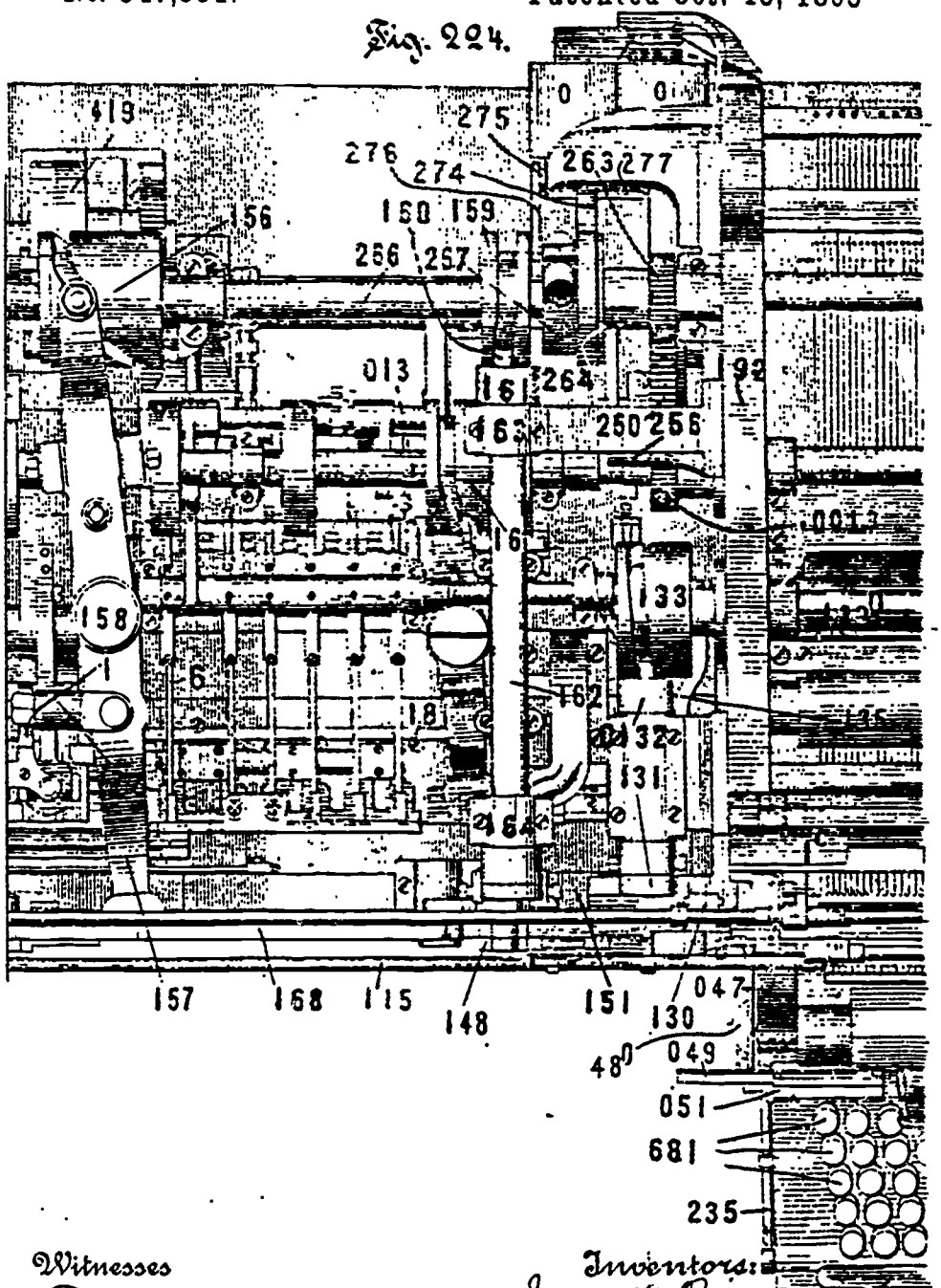
(No Model.) 81 Sheets—Sheet 71.

J. W. PAIGE & C. R. NORTH.

AUTOMATIC TYPE-JUSTIFYING MACHINE.

No. 547,861. Patented Oct. 15, 1895

Fig. 224.



Witnesses
Fredk. W. Mills.
Chas. A. Wood.

Inventors:
James W. Paige and
Charles R. North.
By their Attorney
David H. Fletcher.

(No Model.) 81 Sheets—Sheet 77.

J. W. PAIGE & C. R. NORTH.

AUTOMATIC TYPE JUSTIFYING MACHINE.

No. 547,861. Patented Oct. 15, 1895.

Fig. 230.

Method of Justifying Lines of Type.
Table No. 1.

Lines of 9 Words Column Measure 3 inches			Lines of 10 Words. Column Measure 3 inches.	
Aggregate Measure of Words without spaces.	Combination of Spaces adopted to justify to column measure		Aggregate Measure of Words without spaces.	Combination of Spaces adopted to justify to column measure.
(1) 2 200/1000 inches	Spaces measuring 4 - .040 each 4 - .035 -		(1) 2 665/1000 inches.	Spaces measuring 4 - .040 each 5 - .035 -
(2) 2 705/1000 "	3 - .040 - 5 - .035 -		(2) 2 670/1000 "	3 - .040 - 6 - .035 -
(3) 2 710/1000 "	2 - .040 - 6 - .035 -		(3) 2 675/1000 "	2 - .040 - 7 - .035 -
(4) 2 715/1000 "	1 - .040 - 7 - .035 -		(4) 2 680/1000 "	1 - .040 - 8 - .035 -
(5) 2 720/1000 "	8 - .035 -		(5) 2 685/1000 "	9 - .035 -
(6) 2 725/1000 "	7 - .035 - 1 - .030 -		(6) 2 690/1000 "	8 - .035 - 1 - .030 -
(7) 2 730/1000 "	6 - .035 - 2 - .030 -		(7) 2 695/1000 "	7 - .035 - 2 - .030 -
(8) 2 735/1000 "	5 - .035 - 3 - .030 -		(8) 2 700/1000 "	6 - .035 - 3 - .030 -
(9) 2 740/1000 "	4 - .035 - 4 - .030 -		(9) 2 705/1000 "	5 - .035 - 4 - .030 -

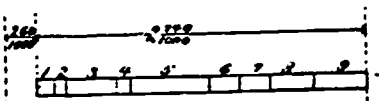


Fig. 231.

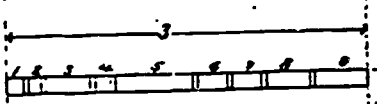


Fig. 232.

Witnesses
Fredk. H. Miller
Chas. F. Hood.

Inventors
James W. Paige and
Charles R. North.
By their Attorney
David H. Fletcher.

UNITED STATES PATENT OFFICE.

JAMES WILLIAM PAIGE, OF HARTFORD, CONNECTICUT.

MACHINE FOR DISTRIBUTING, SETTING, AND JUSTIFYING TYPE.

SPECIFICATION forming part of Letters Patent No. 547,860 dated October 15, 1895.

Application filed August 18, 1887. Serial No. 247,325. (No model.)

To all whom it may concern:

Be it known that I, JAMES WILLIAM PAIGE, of Hartford, in the county of Hartford and State of Connecticut, have invented a new and Improved Machine for Setting, Distributing, and Justifying Type; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

This invention has for its main object the distributing, setting, and justification of types in a more certain and perfect manner and with greater rapidity than has heretofore been done.

To this end my invention consists, first, in novel means for advancing the column in the distributing-galley; second, in novel means for removing the line from the "dead-matter" column; third, in novel means for advancing the removed line of type upon the raceway; fourth, in novel means for controlling the advance of the type-line for distribution; fifth, in novel means for separating or cutting off the individual types from the end of the line; sixth, in novel means for returning the line-follower and other connected mechanisms to their normal positions; seventh, in novel means for forwarding the line of separated types from the cut-off to the main forwarder; eighth, in novel means for moving each individual type longitudinally on the distributing-raceway to bring it into the proper position for presentation to the testing mechanisms; ninth, in novel means for testing each type and for removing defective type from the line; tenth, in novel means for moving each individual type longitudinally upon the distributing raceway to bring it into proper position for presentation to the selecting mechanisms; eleventh, in novel means for selecting and removing from the line of separated type any type that may be turned end for end or which may be otherwise disarranged; twelfth, in novel means for selecting and removing from the line of separated type the wide type which are not provided for in the type-case; thirteenth, in novel means for selecting and removing from the line of separated type the regular "pi" characters—such as the star, dagger, &c.—which characters are not provided for in the type-case; fourteenth, in novel means for forwarding the separated type from the position in which they are left by the first forwarder to the extreme end of the distributing-raceway; fifteenth, in novel means for selecting and lifting into the auxiliary transfer-channels outside of the type-case the spaces used in justifying; sixteenth, in novel means for selecting and lifting into the main channels of the type-case the regular characters which are provided for in the type-case; seventeenth, in novel means for stopping the feeding of the type-line when any one of the character-channels is full; eighteenth, in novel means in connection with the time-lock for overcoming the resistance of the returning-bar upon the partial depression of a key; nineteenth, in novel means for selecting the ordinary characters of the type-case for composition; twentieth, in novel means for ejecting the selected characters from the type-case into the raceway; twenty-first, in novel means for selecting the three-em space; twenty-second, in novel means for setting the three-em space from the auxiliary space-channels of the type-case; twenty-third, in novel means for closing the setter-raceway on the rear side while the type are being swept into the line of composition; twenty-fourth, in novel means for giving the type ejected from the type-case into the raceway their principal movement; twenty-fifth, in novel means for continuing the movement of the type upon the raceway; twenty-sixth, in novel means for facilitating the justification of the type.

It consists, further, in the legitimate combinations of the features referred to with each other and with other features not yet alluded to, and in numerous other subordinate but important combinations, and also in certain specific features of construction, all of which will be fully described hereinafter.

In the drawings, Figure 1 represents a plan view of the main base-plate with the main supporting parts located thereon, and also certain parts which are located in the main uprights 11 and 12. This view is taken from the front side of the machine. Fig. 2 is a perspective view of the bearing-bracket 26; Fig. 3, a perspective view taken from the rear side of the machine of the supporting-arm 23, having the relieving-spring of the time-lock