The Inland Printer

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DISCURSIONS OF A RETIRED PRINTER.

NO. VII.— BY QUADRAT.

THE THREE GREAT REFORMS IN TYPEMAKING.— THE ORIGINATORS OF THE AMERICAN POINT, UNIT-SET, AND LINING SYSTEMS FOR TYPE.— A TYPEFOUNDER'S INVENTION WHICH OVERCAME A SERIOUS OBSTACLE TO THE SUCCESS OF THE LINOTYPE.— SIDELIGHTS ON THE INVENTION OF THE LINOTYPE.— A PRINTER WHO INVENTED THE PIANOLA.

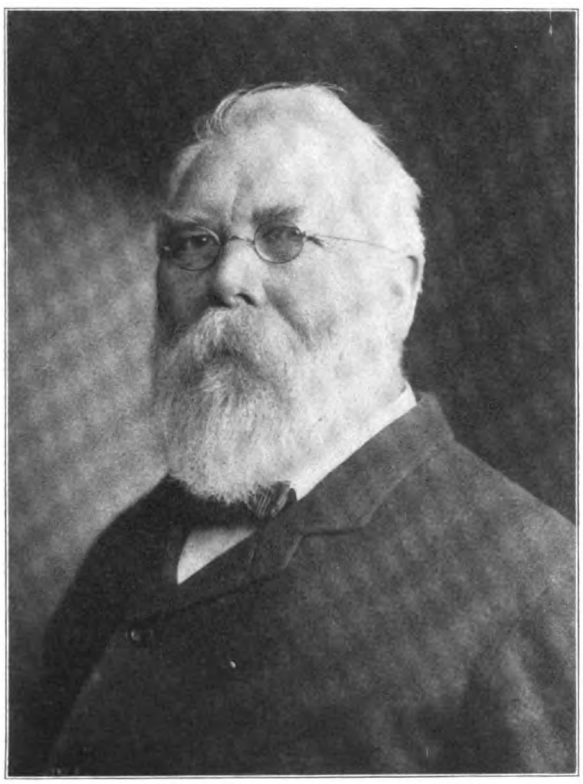
IN almost every instance the evils of human society are traceable to that unintelligent self-interest which ever overreaches itself by antagonizing possible emulators or competitors. Union and coöperation constitute the secure basis of society. These encourage harmony; and while, perhaps, it would not be safe to assert that whatever is harmonious is right, it is always true that whatever creates inharmonious and antagonistic conditions is wrong; and in the business world, as in the moral world, the retribution must be paid by either the innocent or the guilty, and that usuriously. A spirit of short-sighted antagonism among the letterfounders of Germany and Great Britain induced each of them to adopt a standard of type-bodies varying from that used by his competitors. These variations were expected to give each letterfounder a sort of monopoly of the trade of the printers who may have been its original customers, for a printer would be likely to submit to many inconveniences or exactions before facing the greater inconvenience of introducing confusion into his establishment in the shape of differing type standards. So long as there were no great differences between the type-faces of the competing letterfounders this policy of isolated action was effective, but as competition developed in type-designs the printer (then as now) would not be restrained by any mechanical disadvantages from purchasing those type-faces which his taste or fancy approved; and thus the object of the typefounders was frustrated, while, nevertheless, the printing community was subjected to constant losses, through time wasted, which very materially added to their costs of production. It is undoubtedly true that in a period equal to the average life of a job font the loss of a printer through extra justifications involved by the use of varying standards in one office would exceed many times the original cost of the fonts. American letterfounders imported this foolish, chaotic policy from Great Britain.

In England it was the theory that six picas should equal one standard inch, but beyond that there was no agreement even in theory; while in practice no two British typefounders have agreed in any size of type down to about five years ago, when several of them adopted the present American system of type-bodies. In America, as late as 1886, the same chaos plagued the innocent printer. In that year a careful comparison of the type-bodies of the six leading typefoundries with our present standard disclosed these variations: Pica (12 points), 12 to 12½ points; small pica (11 points), 10¼ to 11 points; long primer (10 points), 9⅝ to 9¾ points; bourgeois (9 points), 8 1-3 to 8½ points; brevier (8 points), 7⅜ to 8⅛ points; minion (7 points), 6¾ to 7¼ points. These discrepancies increased, of course, in the larger sizes. The printer who purchased an outfit from one typefoundry found that its spaces and quads would not justify with type from another foundry. If he purchased spaces and quads to match the type from the various founders, it was not long before his troubles were increased by the unavoidable mixing of these articles. If he contented himself with spaces and quads from one foundry his compositors were compelled to justify the type with them by means of paper and cardboard. The same disadvantages were experienced in using labor-saving materials, while

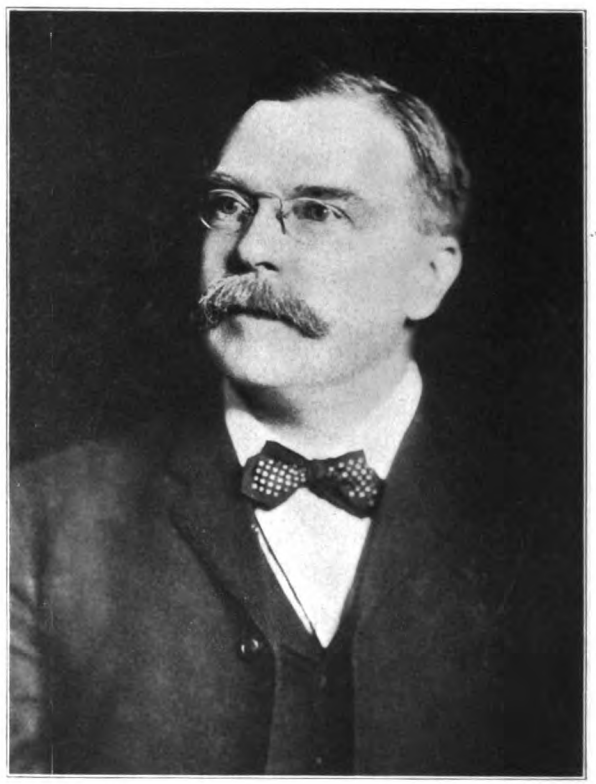
wood type, reglets, and wood furniture were all cut arbitrarily to a size equivalent to 12½ points, the largest pica then in use.

This state of affairs affords an excellent example of the power of national prejudice; for in France for more than one hundred and fifty years before America adopted a uniform system of type-bodies, French printers were profiting by that system. We owe to France our system of decimal currency, and have injured ourselves by not adopting its metric system of weights and measures. France is the home of scientific system. In modern times France led the way in the codification of national laws. It has given the world the system used in measuring electric force; and in 1737 a French typefounder, Pierre S. Fournier, devised the present system of type-bodies, dividing cicero (equivalent to the English pica) into twelve points, with other sizes proportionate. In 1789 another French typefounder, Francois Ambroise Didot, observing that Fournier's sizes at that time failed to agree, owing to carelessness in manufacture, with the French standard of lineal measurement, corrected the sizes; and again, in 1795, when France adopted the metric system of measurements, he changed the sizes to correspond. In 1878 the leading letter-founders of Germany adopted the French Didot system of bodies with a standard of their own, in which 133 nonpareils (6 points) equal thirty centimeters. In 1888 a few German typefounders adopted the American system and standard of type-bodies, in addition to their own national standard, using the former for type to be sold in the British and foreign markets. About five years ago the leading British typefounders also adopted the American system with reluctance and in self-defense; they are now casting type on both the new and their old bodies, and have also adopted the American lining system.

There exists a record which shows that Elihu White had prepared a plan for adopting the French system of type-bodies as early as 1814, but it was not put into effect. George Bruce devised a scientific geometrical system which was used in his typefoundry, but not otherwise accepted. The Chicago Type Foundry, owned by Marder, Luse & Co., was totally destroyed in the great Chicago fire of 1871. In rebuilding the plant, the adoption of the Didot system of type-bodies was discussed, but the exigencies of the situation decided the owners to resume with their old type-bodies. The foundry having been established originally by the New York Type Foundry (now Farmer's), its standards were the same, and its pica also was identical with that used by MacKellar, Smiths & Jordan, who at that time had a practical monopoly of the production of ornamental type-faces. John Marder, the managing partner, decided to adopt a system of



JOHN MARDER.
Who established the American system of point bodies.



LINN BOYD BENTON.
Who originated unit-width type.

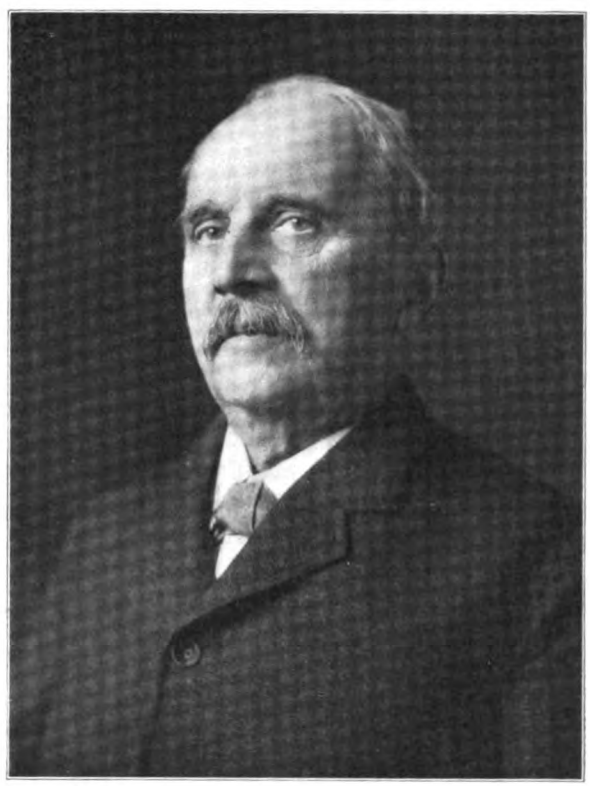
point bodies conforming in principle with the French Didot system, and commenced work on it in 1877. In 1879 type cast on the new system was placed on sale. Marder, Luse & Co. in this reform acted entirely alone. Having decided to use a system of twelve points to one pica, they retained their original pica as a standard. It is unfortunate that they did not adopt the more correct and scientific standard of a pica, six of which equal one lineal inch; but apart from the economy of retaining their old pica as a standard, they took into consideration the fact that almost every American printing-office was depending largely upon MacKellar, Smiths & Jordan for ornamental faces, and consequently these faces, cast on nonpareil, pica and brevier bodies and multiples of them, exactly the same as in the Marder system, would give the users of the new system a larger range of selection than the Chicago Type Foundry could offer.

The pica or 12-point standard (*) of the American point system is .166044 inch, six 12-point bodies measuring .996264 inch, or less than four one-thousandths (.003736) under the theoretically correct standard of six 12-point bodies to one United States standard lineal inch. Didot's French point is .0376 centimeters, and the American point .0351 centimeters. The American standard height-to-paper is .918 inch. When the point system was formally adopted in America there existed variations in the height of type of over five one-thousandths of an inch from minimum to maximum. The agreement among the typefounders corrected this evil, not the least which had vexed the printers.

The British typefounders who adopted the American point system were furnished correct standards as above, made by the American Type Founders Company.

In the beginning of this reform the courage and public spirit of John Marder caused his firm a serious monetary loss. The printers required to be educated to the advantages of the new system; those who had outfits of the old bodies hesitated to introduce another body into their already

WILLIAM SCHRAUBSTADTER.
Who originated the lining system.



HENRY BARTH.
The inventor of the most successful automatic typecasting machine.

*NOTE.—This is the first time the actual American standard measurements of type have been publicly printed. Heretofore, all published authorities have stated the 12-point body to be .166 inch, and .996 inch to be the equivalent of the six 12-point bodies. In 1886, when the American Typefounders' Association formally adopted the point system, a steel standard furnished by MacKellar, Smiths & Jordan was accepted as official, in which eighty-three 12-point bodies equaled 35 centimeters, and fifteen heights-to-paper (type-heights) also equaled 35 centimeters. Careful measurements made necessary by the exigencies of the best typefoundries have demonstrated the inaccuracy of this standard. It is only approximately correct, and the term "approximate" as applied to type standards of body, width or line does not exist in the dictionary of Mr. L. B. Benton, whose investigations, tested by several other experts, have established the absolute standards. The non-technical reader will comprehend the meaning of .003736, the difference between six 12-point bodies and a United States lineal inch, when he learns that it is equivalent to the thickness of an ordinary thin sheet of writing paper. It would have saved the typefounders of America a great deal of trouble and expense if the United States inch had been made the standard, instead of our irregular standard.

too extensive collection; immediate inconvenience outweighed acknowledged future benefits; spaces and quads had to be put up with nearly all job fonts; and all competing typefounders ridiculed or opposed a principle the general adoption of which would involve them in great expense. The typefounders' leading opposing argument was the alleged impossibility of a number of typefounders to maintain uniform standards. Year by year, however, the status and business of Marder, Luse & Co. improved, and first their western competitors and then their eastern competitors were compelled to adopt the Marder system. In 1882, MacKellar, Smiths & Jordan partially adopted the system by adding to their old bodies new sizes — 3-line excelsior (9 points), 3-line nonpariel (18 points), and 5 and 7 line nonpariel (30 and 42 points); and after that year all their new job faces were cast on multiples of three or six points. This concession was a great aid to Marder, Luse & Co., although its object was to head off any radical change. In 1885 MacKellar, Smiths & Jordan reluctantly announced their adoption of the Marder system, without discarding their old system of bodies. Their *Typographic Advertiser* in that year, giving a half-hearted support to the great reform, urges that it is incomplete without a lining system. This is the earliest mention I find of a lining system, the second great reform in typemaking, introduced in 1894 by the Inland Type Foundry of St. Louis. Thus the *Typographic Advertiser*, 1885:

Printers generally are apt to be deceived regarding the value of what is designated as the interchangeable (more correctly proportional) system of type-bodies. . . . The printer is led to a certain extent to believe that this interchangeable system will cause the faces of different sizes of type, when used in combination, to line without justification. This is not so. It is the great fallacy that hovers around the [Marder] system. . . . To make such a system perfect, every face should be so located on the various bodies as to leave the same amount of shoulder on each body, either at the top or at the bottom; then, by interchangeable system, the justification will not only be by a mathematical system, but the great desideratum will exist that the faces of any bodies that may be used together will line without additional justification.

In 1886, under the heading "An Imaginary Agitation," William B. MacKellar writes:

The matter of the adoption of the uniform standard of type-bodies by the printers of this country appears to possess little of an interesting nature to them. Now that most of the typefounders have placed themselves in the position to furnish the new system of bodies to the printers, we may say very few, if any, avail themselves of the supposed privilege. The agitation evinced by the printers, as announced by some journals, proves to have been entirely imaginary, and seems to have been advanced largely as an advertising scheme. The sensible printer, especially where a large office may be concerned, is slow to inveigle himself into endless perplexity. Suffering present inconveniences it may be, from having the bodies of type of several foundries in his office, what amount of confusion will exist can be imagined upon the introduction of a new series of bodies which virtually double his troubles. . . . The entire expense [of the adoption of the new bodies,] without any apparent benefit therefrom, will be saddled upon the foundries where an entire or partial change is necessary. . . . In work requiring care and nice calculation it will be found inadvisable to unite the product of the different foundries. Granted that all the foundries adopt the new system of standards, will they strictly adhere to it? Under their old standards they do not. The most extreme vigilance is required by the experienced typefounder to prevent a deviation from an established standard of size; when this care is not exercised ruinous results follow.

Later on in the same year, these reluctant reformers, these conservative young heirs of the progressive MacKellar and elder Smiths, return to the subject. Conservatism when found in the young is ever the more blind and obstinate:

. . . Steps were taken by this foundry to perfect a point system of bodies. This was accomplished, and it is the system that has been generally adopted throughout the country. From the tone of several trade journals that viewed the proposed radical changes from visionary or theoretical points only, the uninitiated may have been led to suppose that a crying demand would exist . . . for material to supply the long-felt want, based upon a standard of point measurements. Such has not proved to be the case. A calm so peaceful and conservative in character exists that nothing but the most casual notice of it is deigned by the printing craft regarding the merits or demerits of the new system now placed in practical shape and within easy grasp. . . . The entire series of faces shown in this number conform to both the old and the new system of bodies. . . . *We shall confine ourselves to furnishing customers with materials based upon our established system, unless otherwise ordered.*

These quotations accurately reveal the attitude of all the eastern typefounders ten years after Mr. Marder had started the reform. In the Johnson Type Foundry the adoption of the point system was the last act of Thomas MacKellar before he retired in 1885. The young heirs, MacKellar and Jordan, were opposed to the changes; but in 1887 light dawned upon them. In their *Typographic Advertiser* of that year we read: "The value of the point system is gradually dawning upon the minds of the intelligent printers, and it is meeting with general recognition and approval. *We unhesitatingly recommend its adoption.*" The vacillating policy of MacKellar, Smiths & Jordan from 1882 to 1887 in regard to this reform was the first of the causes which ultimately undermined their supremacy. In 1886 at a meeting of the Typefounders' Association at Saratoga, it was finally decided to adopt the Marder system. All the typefounders hastened to announce their adoption of the system, many individually claiming credit for enterprise; but, with that lack of generosity and candor which too often degrades the business world, not one of them acknowledged indebtedness to the efforts of the originator and sustainer of the reform which of all others in the

type business has been most valuable to printers. Printers, however, should remember that the point system was introduced entirely at the expense of the typefounders, who, in addition, sustained a tremendous loss in the gradual depreciation of value of large stocks of old body-types, much of which went direct from the shelves to the metal-pot. No increase in demand nor in price compensated the typefounders for this great expenditure and greater loss.

No history of the introduction of the point system can be complete without an acknowledgment of the active and effective work of THE INLAND PRINTER in educating the printers and supporting the efforts of John Marder.

John Marder, whose enterprise conferred on the printers of North America incalculable savings, was born March 5, 1835, in Greentown, Stark county, Ohio, of German parents, who arrived in this country in 1820. Until the age of sixteen he worked on his father's farm, attending the district school in the winter months. At sixteen he entered a printing-office in Akron, learning the business and adding to his education; at twenty-one he went to Davenport, Iowa, where he was employed for three years in the book store which was owned by his future partner, A. P. Luse, and afterward was a department of the business of which the printing firm of Egbert, Fidlar & Chambers is the successor. In 1860 John Marder went to Chicago, and became bookkeeper for the Chicago Type Foundry, which was then a branch of Charles T. White & Co.'s New York Type Foundry, now A. D. Farmer & Son Typefounding Company. Two years later this business was acquired by D. Scofield & Co., Mr. Marder being one of the partners. From that time to the present John Marder has been one of the most notable of American typefounders. At the present time he is the manager of the Chicago branch of the American Type Founders Company, to whom he sold his business in 1892, retaining a large interest. At the age of seventy-one he displays a vigor which might put much younger men on their mettle, the evidence of a well-spent life. He has three sons: John W. Marder, principal owner of the Peerless Printing Press Company of Palmyra, New York; Walter S. Marder, manager of the Jersey City manufacturing department of the American Type Founders Company, and Clarence C. Marder, manager of the manufacturing department of the Chicago branch of the same company. The Chicago Type Foundry was the first in Chicago. The first type cast in Chicago was a dress for the *Journal* of Springfield, Illinois, in 1855. Notwithstanding the serious loss resulting from the total loss of the foundry in the great fire of 1871, Mr. Marder extended credits to the burned-out printers to an amount exceeding $300,000 to replenish their offices, on the strength of former satisfactory connections, not one in ten having any basis for credit so far as money went after the fire; and it is to the credit of the printing fraternity that the loss on this credit was less than two per cent.

The point system of Didot and Marder related only to type-bodies. In 1883 Linn Boyd Benton, senior partner in the Northwestern Type Foundry, of Milwaukee, was granted a patent for type that was "point system both ways." This is the so-called "self-spacing" type, the first type made systematically to units of width (or set, as the typefounder calls it), accurate both widthwise and bodywise. Figures, points, and a few other characters and spaces and quads excepted, the widths of type were, up to that time, determined by the eye of the fitter solely with a view to securing proper distance between the characters. Mr. Benton is the originator of unit-width type, and the history of his invention and what grew out of it is one of the most interesting in the annals of typography. Mr. Benton started to invent an automatic justifying typesetting machine. For this machine he devised a system of casting body-types on eight different widths, instead of the more than one hundred widths found in an ordinary body-type font. When testing the first font of body-type made on this system the compositor discovered that there was a marked gain in the speed of hand composition. It is an authenticated fact that this gain was in many cases as much as twenty-five per cent on straight matter and much greater on tabular work. This discovery induced the inventor to suspend work on his typesetting machine, for the purpose of putting "self-spacing" type on the market. The term "self-spacing" is, of course, a misnomer; it originated in a very suggestive remark made by the compositor who was testing the first font that "the d — d thing spaced itself." To put this unit-width type on the market involved cutting thousands of steel punches, and a dearth of steel punch-cutters threatened to make this the task of years. In this dilemma Mr. Benton invented the wonderful or rather wonder-working engraving or punch-cutting machine which bears his name.

Metal-engraving machines had been made and used before 1885 in Germany, and William Schraubstadter made and used one in this country in 1881, but these all lacked precision and required to be supplanted by hand work. So far as perfectness is possible in a machine the Benton punch-cutter is perfect, completing the whole operation unaided and with greater delicacy, exactness and finish than is possible with human hands; and it has no rival. It has engraved the autograph

"Benton" lengthwise in a width of two points, the detail sharply visible under a microscope. Its range is limited only by the requirements of the typemaker. Quite unexpectedly the success of one of the most revolutionary and beneficial inventions in typography — the Mergenthaler Linotype machine — depended upon this punch-cutting machine. The principle of the Linotype machine had been perfected after tremendous effort by Otto Mergenthaler; the machine was in use; the capitalists behind the invention were promised big dividends; but a final and exasperating obstacle presented itself. With each machine hundreds of matrices are required. Every one of my readers has seen a Linotype matrix; on one edge of a thin piece of brass the matrix is made by driving into the brass a steel punch on which the character is engraved. For every character used on a Linotype machine a steel punch was required to be made with greater exactness as to the position of the character on the punch than a typefounder demanded. Men who could cut steel punches were scarce, their work slow. Punches soon wore out; they might last one hour or a year, as breakages were frequent. The Linotype company was paying as high as $8 per letter-punch. If, under the conditions then existing, it would have taken Benton five or six years to produce the punches for a few series of self-spacing type, what time would be required to make punches for Linotype matrices? A typefounder, after using a steel punch to make a matrix may not use it for years, while in the interval he is casting hundreds of pounds of letters from the matrix, but each Linotype machine is provided with sets of matrices, each driven by a steel punch which may be used five thousand times where a typefounder would use it once. The Linotype company was blocked. It would take years to train efficient cutters; their work would be slow and expensive; and, worse than all else, it is practically impossible to duplicate a steel punch accurately by hand, so that, as the matrices break, grave variations would occur, and the symmetry of the design be eventually lost. While Benton and his machine were still unknown to the managers of the Linotype company, his partner, R. V. Waldo, went to New York for the purpose of selling self-spacing type to the larger newspapers. Among others he visited the *Tribune*, the only office in which the Linotype was then in use, and that because Whitelaw Reid, its owner, was financially interested in the new machine. In those days there was little faith in the Linotype, especially among typefounders, and doubtless Mr. Waldo was astounded to find that the *Tribune* had no use for his type; nevertheless he persisted in unloading his story, and part of it related to the advantages it possesses for stereotyping from because it is made from punches cut on a machine! Splendid news, which straightway found its way to Messrs. Reid and Dodge, who more than its owners knew the value of such a machine. Philip Dodge was very soon in Milwaukee. Ultimately a very good bargain for the Linotype company was made, and they became the purchasers of a machine which vanquished their last great obstacle. Had Benton known of their dilemma he could have secured a comfortable fortune on the spot — instead of which he sold one machine at a fair profit. Many more machines were afterward required, not only by the Linotype company, but also by the Lanston Monotype and the Monoline manufacturers, in both America and Europe.

Thus an invention designed to aid the typefounder became the greatest ally of a machine which at that time was expected to destroy the typefounding industry. Gloomy, indeed, at one period, not so long ago, was the outlook of the typefounder; the Linotype appeared to be a monster of evil omen to the compositor and the typemaker. How mistaken we all were. The Linotype has expanded the printing trades in every direction. It has increased the work and the wages of compositors. By enabling publishers to print enlarged newspapers and journals, it has increased the demand for presses, paper, ink, men, and of type made by the typefounder. To the whole printing fraternity the invention of Otto Mergenthaler has proved a beneficence, and Linn Boyd Benton made that invention practicable. The most effective detail on the Linotype is the spacing device. Quite independently of Mergenthaler, and before him, Merritt Gally,* better known as the inventor of the Universal printing-press, invented a machine for assembling matrices and automatically spacing them by wedges, and casting lines from the matrices. His patents for this invention are dated July 16 and 23, 1872, and

* NOTE.— While Merritt Gally's name is before us it is interesting to note that he is the original inventor of the self-playing instruments, now so popular, known as the Pianola and Æolian organ. The first automatic musical instruments in America, other than the ordinary street organs, was a crude reed instrument operated by a wide belt of paper having slots therein corresponding to the wind openings to the reeds, through which the air of the bellows passed, producing the tones. Mr. Gally's inventions, dating from 1876, consist of a rolling and re-rolling apparatus and a set of pneumatic appliances acted upon by a succession of small, graded perforations in a long narrow sheet of paper, which passes over a tubed "tracker-range." The perforations in the paper control the pressure of air in a peculiarly sensitive pneumatic apparatus, embodying an entirely new philosophical principle, which enables the instrument not only to produce the music notes but to automatically render every gradation of tone as perfectly as an artist. His experiments resulted in the production of the Orchestrion and the Gally Automatic Piano, and his patents were later purchased by the Æolian Company. His devices are now used in the Pianola, the Æriol, the Angelus, the Apollo, the Chase & Baker, the Harmonist, the Simplex and Peerless piano players. The orchestrions of Welte & Sons, Freiburg, Germany, and of New York, the most celebrated constructors in the world, are now built on the Gally pneumatic system, under licenses issued by Mr. Gally. Among the notable printers who have benefited the world by their inventions Merritt Gally stands in the front rank.

were sold to the parties interested in the Linotype in 1884. I have been told on excellent authority that Mergenthaler's early idea was to make a line-casting machine to be sold for about $200, to be used by reporters, and in law offices, etc., much as we use typewriting machines to-day, delivering the lines to the printer instead of copy.

But to return to unit-width type. Benton established an arbitrary unit for each character in a font: thus lower-case "a" was always four units, and capital "A" five units. His unit is variable, but always a subdivision of a twelve-point em, for a condensed face the units in a twelve-point em are increased, and for a round face decreased; thus he made eight-point faces of nine, ten and eleven units to the twelve-point em, giving three widths of face without departing from the system of units. There are eight widths in each modern roman series and nine widths in the old-style roman series in every body-type font, which, including the italics and the spaces and quads, contain 232 characters or separate casts. The italic characters are put on the same widths as the corresponding roman characters. In order to get this equality of widths Mr. Benton abandoned the conventional italic in favor of a sloped roman face, which gives greater emphasis (the object of an italic), while losing nothing in beauty. I believe that in the other unit-width systems to be described below, it has been found practically impossible to put the roman and italic characters on equal widths. Benton's purpose was to aid the publishers of papers to reduce the cost of body-type composition by making justification simple and easy. He accomplished his purpose completely, but in use in general printing-offices where more than one series of body-type of a size are used certain drawbacks developed. Had the Linotype not entered the field of newspaper composition, we would have seen self-spacing type in general use, because of its undoubted time-saving quality. It is the fewness of widths in a font which makes it possible to justify and correct self-spacing type more rapidly than any other. It is excelled in this respect only by typewriter type which has one width for all characters and spaces. As you increase the number of widths you increase the number of manipulations in justifying, and therefore increase the time required to justify. It is easy for the compositor to memorize eight or nine invariable unit widths, and this aided the speed. The chief drawback to the general adoption of self-spacing type, outside of newspaper offices, is the differences in widths of the spaces and quads, when two or more series of one size of body-type are used in one plant. In practice it is impossible to keep the spaces separate, and when they are mixed the justifying economies are lost. In most of the existing series of modern roman self-spacing a distortion of certain characters is observable, due to making the design conform to the width of the body. This is most noticeable in the round character "e" which is three-unit, and the "o" which is four unit, thus giving the "o" an unfortunate prominence. In the italic and old style series these distortions disappear, and they are indeed beautiful. In the later modern roman series the cutting shows marked improvement, and had body-type not been practically banished from newspaper offices I believe that designs would have been produced and the arrangement of widths modified to overcome these defects. Self-spacing type was the commencement and a long step forward in a reform which is of great advantage to the printers.

The next development of the unit-width idea was Barnhart's point set, which was applied to two series of body-type. For some sizes the unit was one point; for others it was one-half a point. This effort, however, was not carried any further. In 1894 the Inland Type Foundry commenced business with all its type — body and job — cast to a system of units which is so satisfactory that it has since been adopted by all progressive American typefoundries and also by the leading British typefoundries. The unit is one-eighth of one point, which is used on very small and condensed faces, while as the bodies and expansion increase they are put on widths that are multiples of quarter-point, half-point, or one point. The number of widths used on body fonts varies from thirteen to twenty. This system, by its compromise between the speed advantage of a lesser number of widths and the requirements of the designer, and its use of justifiers interchangeable and applicable to all fonts, overcomes all the drawbacks of Benton's system. William Schraubstadter is entitled to the credit of perfecting this extension of the unit-width system.

Linn Boyd Benton, born May 13, 1844, in Little Falls, New York, was taken to La Crosse, Wisconsin, at an early age. His father, a lawyer by profession, was register of lands at La Crosse, previous to which he was one of the editors and founders of the *News* of Milwaukee, the leading Democratic organ. Young Benton learned the printing trade in La Crosse. He then entered the typefoundry of J. A. Noonan, in Milwaukee, as bookkeeper, advancing to the position of buyer for Noonan's wholesale paper warehouse. In 1873 Benton & Cramer purchased Noonan's typefoundry. Here Benton's great mechanical talent found a fertile field, and he advanced in all branches of typemaking until his inventions made him one of the most conspicuous personalities in that

art. In 1892, his foundry having been sold to the American Type Founders Company, he became a director of the latter concern, and its manager in New York. In 1895 he was made manager of its general manufacturing department, and commenced a long series of improvements in punch-cutting and matrix-making and fitting which have reduced these difficult processes to an exact science. His punch-cutter, originally designed for relief engraving, has been perfected to engrave in intaglio, cutting the matrix in the copper without any intervening processes, and capable of infinitesimal gradations in all directions. Mr. Benton is reserved and modest in disposition, and much loved by those he admits to an intimacy. His character is as high as his achievements have been great and helpful to the printing world. In his thought and the expression of his thought he is as accurate and precise as his own machines. He has one son, Morris, who is engaged in the same work as his father, and has already distinguished himself in it.

When in 1894 the Inland Type Foundry commenced business its product represented the highest degree of mechanical perfection attained to that time. Its type was on point bodies, unit-widths, and on a standard line. I have already given credit to William Schraubstadter for extending and perfecting the unit-width system, in which he divides honors with L. B. Benton, but to him alone belongs the credit of devising and introducing the lining system. Its merits are sufficiently proved by its adoption by all the American and leading British typefoundries. The printer who uses type conforming to these three reforms is to be envied — he works with type which is mechanically perfect.

William A. Schraubstadter, son of Carl Schraubstadter of the Central Type Foundry of St. Louis, was born in Brookline, Massachusetts, October 21, 1864. In 1875 he was taken to St. Louis. In 1881, after leaving school and traveling in Europe, he entered his father's foundry as an apprentice. In 1885 he was foreman of the machine, mold and casting departments, and became superintendent a few years later. Soon after the Central Type Foundry was sold to the American Type Founders Company in 1892, he resigned as Superintendent, and in January, 1894, started the Inland Type Foundry with his brothers, Carl and Oswald. It immediately took first-class rank, due to the mechanical perfection of its product.

In my December Discursion I said that "mechanically the world owes more to Western typefounders than to Eastern." The three great reforms were made in the West, which claims a further distinction on account of the success of Henry Barth in perfecting an automatic type-casting machine which delivers the type in lines ready for examination and paging. Four sizes are made, having a range from 5-point to 144-point bodies. This machine, first introduced in 1888, still remains foremost. It is used by the American Type Founders Company, but its leading features are to be found in the machines made by other concerns.

Henry Barth was born in Leipsic, Germany, November 27, 1823, and is now eighty-three years of age. His father was a wholesale grocer. Barth worked for a short time for the well-known firm of Schelter & Giesecke, typefounders of Leipsic, as a machinist. After that he was for a few years in the German navy. He arrived in Cincinnati in 1849, and after a few trips as engineer of an Ohio river steamboat he was employed by the Cincinnati Type Foundry, then the leading foundry west of Philadelphia. It manufactured hand presses and job presses, and in 1855 Mr. Barth constructed the first cylinder press made in the West. In 1861 he became president of the Cincinnati Type Foundry. In 1870 he introduced the double casting machine, famous in its day, having two molds, etc., on one base, and casting two types at one operation. He was the first to make a lead-shaving machine and to sell shaved leads. His machine was used by many typefounders until superseded by a later invention. Many of us remember the old cast leads, untrimmed and inaccurate. Barth abolished them. Nowadays leads and slugs are made in a machine which ejects the

NOTE.— Since the seventh discursion was written, the author has come across a table showing the actual variations in the old type-bodies, the measurements for which were taken by the author in 1885, just before the general adoption of the point system, from types furnished by the various typefoundries for the purpose. This table most effectively shows the younger printers under what evil conditions the former generation of printers did their work. Special attention is directed to the variations in height-to-paper, the consequences of which to the pressroom may better be imagined than described. Let us not forget that we owe the abolition of these evils to the initiative of the venerable John Marder, now in active business in Chicago.

FOUNDRY.	Height.	Diamond.	Pearl.	Agate.	Nonpareil.	Minion.	Brevier.	Bourgeois.	Long Primer.	Small Pica.	Pica.
Boston Type Foundry	.9200	.....	.0700	.0760	.0833⅓	.0955	.1100	.1166	.1345	.1520	.1670
Cincinnati Type Foundry	.9170	.0625	.0694⅓	.0764	.0833⅓	.0972	.1911	.1250	.1389	.1528	.1666⅔
Marder, Luse & Co	.9180	.0622¼	.0691⅓	.0760⅔	.0830	.0968¼	.1106⅔	.1245	.1383¼	.1521⅓	.1660
Johnson Type Foundry	.9180	.....	.....	.....	.0830	.....	.....	.....	.....	.....	.1660
Farmer, Little & Co	.9180	.....	.0667	.....	.0830	.....	.....	.....	.1335	.....	.1660
James Connor's Sons	.9180	.....	.0665	.....	.0840	.....	.1062	.....	.1330	.....	.1680
Geo. Bruce's Son & Co	.9190	.0595	.0668	.0750	.0841	.0944	.1060	.1190	.1336	.1500	.1683
Benton, Waldo & Co	.9200	.....	.0665	.0725	.0835	.1010	.1070	.1170	.1330	.1450	.1670
Barnhart Bros. & Spindler	.9200	.....	.0664	.0706	.0838	.0949	.1065	.1170	.1330	.1412	.1679
Phelps, Dalton & Co	.9200	.....	.0667	.....	.0824	.....	.1060	.....	.1332	.....	.1670

leads in endless ribbons, which, as they cool, pass through shaving knives to give them accurate body, after which they are chopped off into the lengths desired. Mr. Barth's good work is to be seen in many special machines for printing and finishing playing cards, and perhaps this is one of the reasons why Cincinnati is the chief world-center of the playing-card industry. During the civil war he devised apparatus for casting bullets, and he made that famous little army press which accompanied the headquarter staffs of many generals, and on which the first issues of many a prosperous Western paper of this day were printed. The last time I was in Cincinnati he had just completed a machine to print the United States flag by the million on paper and calico. Mr. Barth is a great machinist. He is a director of the American Type Founders Company and manager of its important Cincinnati manufacturing department. His son, Henry O. Barth, is his able assistant.

I said something about the decadence of the sons of our earlier typefounders. This does not apply to the Western typefounders. The sons of Marder, Benton, Barth, St. John and Carl Schraubstadter are worthy of their illustrious sires.

(To be continued.)

Written for THE INLAND PRINTER.

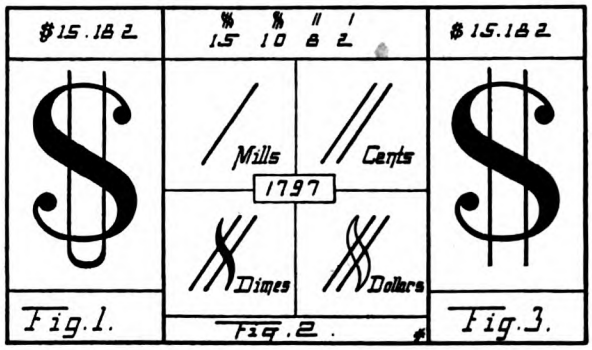
OUR DECIMAL SYSTEM AND THE ORIGIN OF THE DOLLAR MARK.

BY S. N. A.

WHAT seems to be a most plausible explanation of the origin of our conventional symbol for the dollar has recently been advanced by E. L. Wilson in the *Business Man's Magazine.*

Mr. Wilson points out several erroneous conceptions of the *raison d'etre* of the symbol, as we know it with a letter S across one or two vertical bars. Among them is the error of supposing it to be an outgrowth of the superposition of the two initial letters of the United States, U. and S. It must be admitted that the harmony of such a combination to the existing form of the symbol is most striking indeed, as Fig. 1 of the diagrams will show. Another fallacious explanation, according to Mr. Wilson, is the supposition that it was the marking of the figure 8 over the vertical line to indicate that the unit or *one* piece was composed of 8 reals; such a unit was known as the "Spanish dollar" or *peso.* According to the Century Dictionary, it was also called the "pillar dollar" from the figure of the Pillars of Hercules that were stamped on its face.

Mr. Wilson presents his conclusions in a very clever manner and, as will be seen from Fig. 2, the evolution is most interesting. The signs used in a Federal Arithmetic of 1797 to represent mills, cents, dimes and dollars are shown in the diagram beside the conventional symbol of the present (Fig. 3). The mills were represented by a single diagonal vertical stroke leaning to the right, similar to the English usage in recording shillings and pence, as 3/2, meaning three shillings and two pence. For cents, two such strokes were prefixed to the number, or headed the column to which they belonged; for dimes, two similar strokes, with a curved stroke resembling a heavy-faced old-style letter "s" placed across them, but



inclining toward the left, were used; and the dollars were represented by two similar oblique lines and two lighter faced curved lines placed parallel and across the obliques, as shown in Fig. 2. Mr. Wilson states that the author of the arithmetic, after pointing out the advantages of the decimal system of money notation, prophesied that the time would come when the very obvious advantages of a decimal system would be adapted to weights and measures.

We read that "a prophet is not without honor save in his own country," and verify the scriptural saying by referring to the establishing of the *monetary* system on a decimal basis on July 7, 1787, ten years before the publication of the "Federal Arithmetic." Now, as to the author's prophesy and the honor question. The Metric System was adopted in France, applicable to all weights and measures, in 1799, two years after the prophesy, and as referred to by the Century Dictionary, "It is in use in most other civilized countries, except the English-speaking countries, and is now almost universally adopted for scientific measurements. Its use is permitted in Great Britain, and was legalized in the United States in 1866." So then, sixty-nine years after the prophesy and sixty-seven years after its adoption in France, its use was passively permitted; and it is only within the last year that definite steps have been taken looking toward its final adoption into the commercial life of the country.