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## A MACHINE TO SUPERSEDE TYPESETTING.

Prior to January 1, there had been issued from the U. S. Patent Office upward of 160 patents relating to typesetting and type-distributing machines. All such devices, with many others known only in foreign countries, have thus far, however, met with but little favor among printers, and they have not been employed in practical work to a sufficient extent to have any appreciable effect in this most important branch of the printing business. Printing presses have been improved almost beyond comparison with those of the earlier days of the craft—when only about 200 impressions were obtainable per hour from small forms, as against more than 20,000 copies now made per hour of our largest newspapers; but the typesetting part of the making of books and newspapers has remained sub-

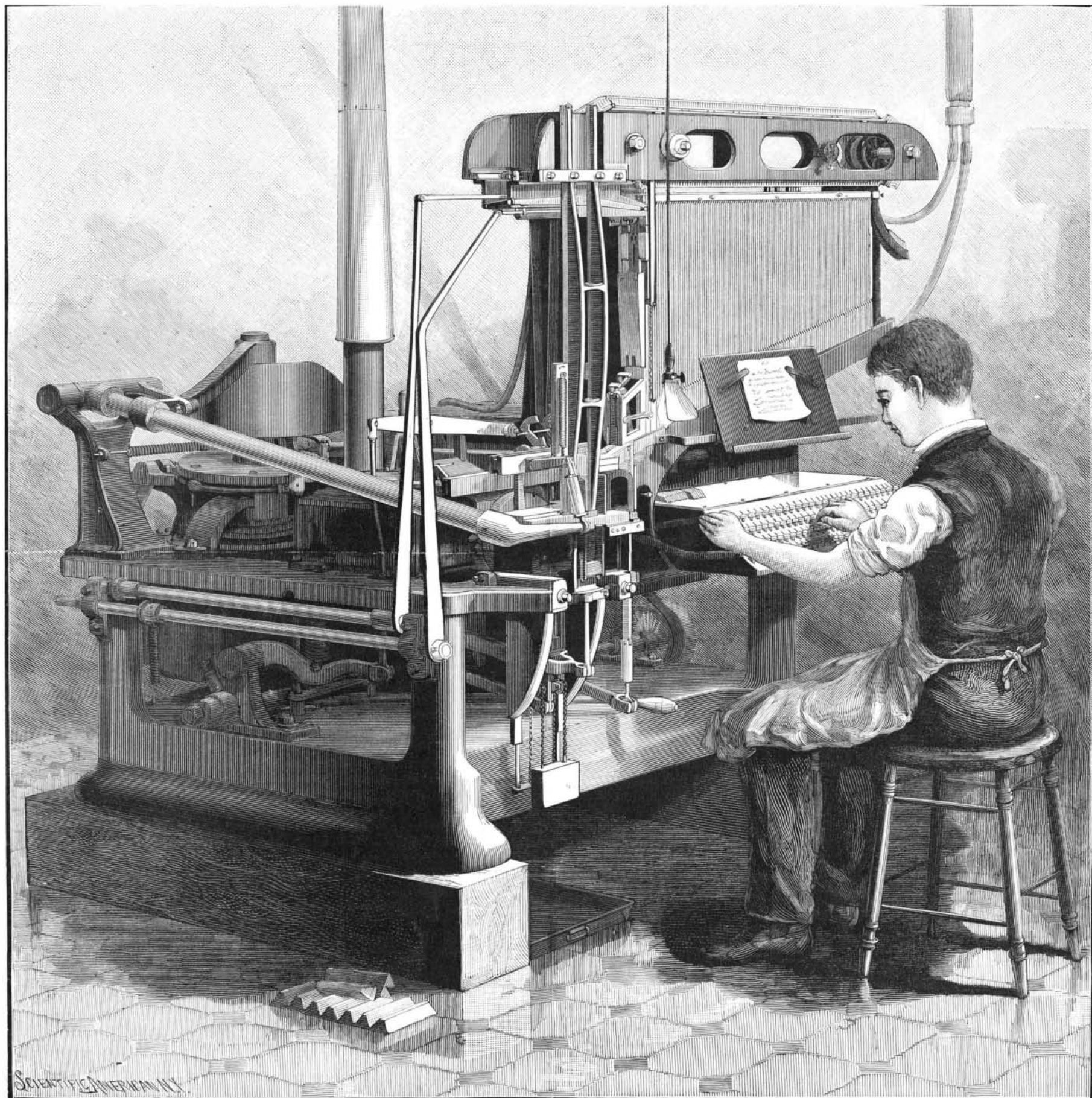
stantially where it was left by the earliest users of movable types.

The accompanying illustration represents the latest, and in many respects the most remarkable, of the numerous machines which inventors and mechanics have from time to time devised in their long-continued efforts to find some practical means by which to supersede or cut short the tedious work of typesetting. It is known as the Linotype machine, from the nature of its product, but would probably be more generally designated as the "Tribune" machine, from the fact that it has been in practical use in the New York *Tribune* office for more than two years, where it now does substantially all the work formerly done by the compositors of that paper.

It is not, strictly speaking, a typesetting machine, but

forms type bars, each of the length, width, and height of a line of type, and the exact counterpart of that which a compositor would set up, except that each line is formed of one entire piece of metal, instead of as many different pieces as there are characters, spaces, etc. A representation of such type bar or slug is given in one of the small views. The key-board in front of which the operator sits has 107 keys, each marked for a capital or lower case character of a fount of type, or the figures, points, or compound letters used in connection therewith, many of the letters most frequently used having several keys. The operative parts are carried by a rigid metal frame, all portions of which are stationary. The "copy" is placed upon a convenient holder just above the keyboard, and above and behind

(Continued on page 150.)



SETTING TYPE BY MACHINERY, AS CONDUCTED AT THE NEW YORK "TRIBUNE" OFFICE.

A MACHINE TO SUPERSEDE TYPESETTING.

(Continued from first page.)

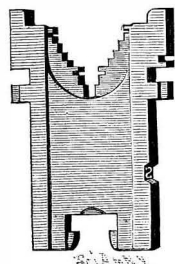
the copyholder is a series of vertical tubes, one to correspond with each key, forming the magazine in which the matrices representing type are held. The keys are pivoted in a supporting frame carried by a bar attached to the magazine tubes, and each has a vertical slot or opening for the passage of a matrix, which drops by gravity as the key is depressed, another type at the same time descending from the magazine tube to take the place of the one discharged, and bearing upon the



TYPE BAR.

upper edge of the key. This slotted oscillating key thus serves as an escapement, receiving the matrices one at a time from the tube, and delivering them through the corresponding openings beneath, the delivery being instantaneous as the operator touches each key.

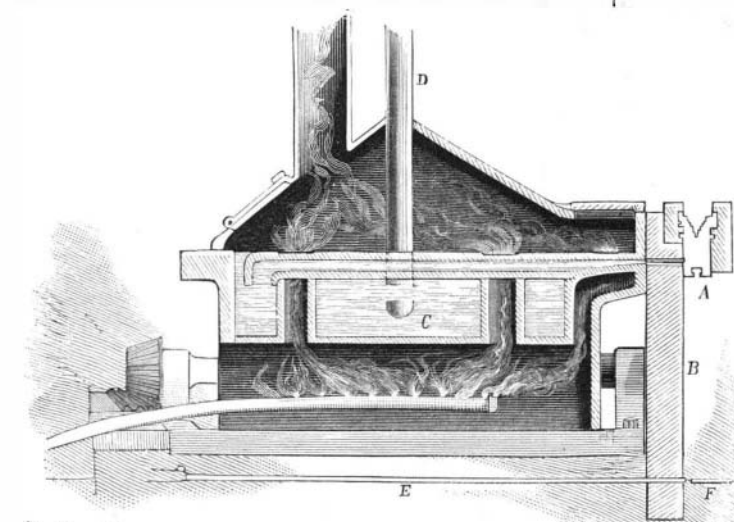
The matrices, of which one is shown herewith, each consist of a thin plate of brass, an inch and a quarter long, about three-fourths of an inch wide, and of a thickness minutely defined by that of the letter produced on each, all matrices bearing the same letter being exact duplicates of each other. Each matrix has suspending shoulders differing on the matrices representing the respective characters, and secondary shoulders or notches differing in width on the different matrices, these special distinctions being necessary to insure the correct automatic distribution of the matrices to the magazine tubes after they have been used. A side view of one of the matrices is also shown at A, in the sectional figure, where it forms part of a line as held up for casting.



MATRIX.

The magazine in which these matrices are held is composed of a series of independent vertical tubes, each internally of suitable size to receive its particular matrix, and drawn from sheet metal, to make a smooth, seamless, and perfectly true conductor, through which the matrix will pass without danger of stoppage. The upper end of each tube is slightly enlarged or flared, to permit the free entry of the matrices, and any tube can be removed independently of the others.

To receive the matrices, as they are delivered one at a time below the magazine, and conduct them to the point at which they are assembled or composed to form lines, a horizontal guide or channel is provided, with rails on which the shoulders of the matrices are supported, the matrices fitting loosely in such channel, and being maintained therein in substantially upright position. The matrices are advanced through this guide or channel to the point of assemblage by means of a blast of air directed longitudinally through the channel, from the lowermost of the two tubes seen to be connected with the machine at the right of



FURNACE FOR MELTING METAL.

the operator, the other tube being connected with the casting mechanism, to assist in cooling the mould. By this means the delivery of each matrix is effected so promptly that its motion can hardly be seen, the click of the matrix coming to its place in the line being formed seeming to be almost simultaneous with the touching of each key, little fingers or followers at the same time continually pushing forward the characters until the line is completed, or approximately so.

This brings us to one of the most interesting features of the machine, that of the justification of the

lines, the difficulty of mechanically effecting which has heretofore been one of the principal obstacles in all such machines. In this machine the operation is simple, the justification is perfect, and takes no time. The matrices, as they are pneumatically delivered and loosely held in horizontal position on their guides, have their sides in which the letters are cut plainly in view of the operator, who can then replace any letter which may have been erroneously used, and also see when his line is so nearly full that it will not hold another word, or whether some word possibly had better be divided, or how much more space will be needed to make the line full, according to the predetermined measurement. The usual spaces between the words, etc., as ordinarily inserted by the compositor, are already in place, having been inserted in the same way as the matrices, by the use of a "space key," but the spaces here used differ from the matrices, and consist of longitudinally tapered or wedge-shaped bars, three or four inches long, with their larger ends hanging down below the bottoms of the line of matrices. These space bars now do all the further work of spacing, being caused to rise automatically by means of a vertically reciprocating plate acting against their lower ends, until the line has been expanded to the full limits allowed by the clamps which determine its length. In this way the increased space between the words is evenly divided, and "uneven spacing" is simply impossible, no attention to the matter being required on the part of the operator, who is already touching the keys for the formation of the next line.

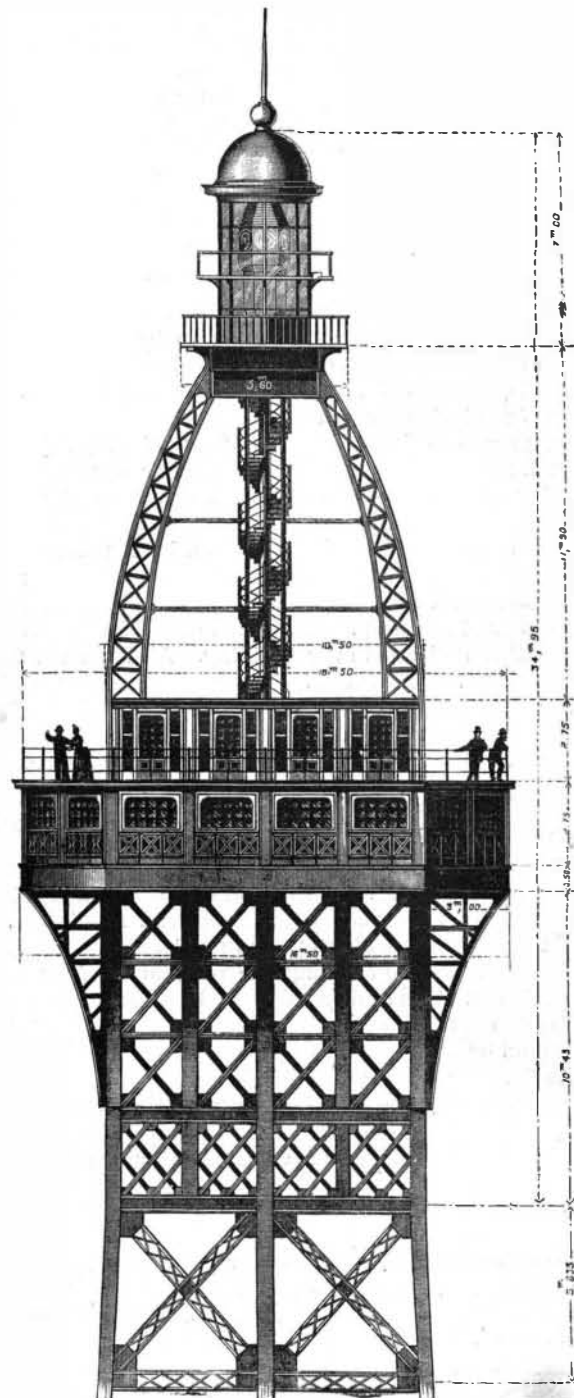
The line of matrices thus completed is received by a head opposite the end of the stationary type guide, there being immediately below and behind the head a mould, in the form of a vertical disk, having a mould chamber or slot extended horizontally through it of a form and size identical with that of the required type bar. This portion of the machine will be better understood by reference to the sectional view, where B represents the disk mould, A the line of matrices as held up thereto, C the reservoir of melted metal in its gas-heated chamber, D a plunger acting as a force pump to force the metal into the mould, and E an ejector bar which has forced out the type bar, F. For the purpose of forcing the line of matrices tightly against the mould, their characters registering with the mould proper, an outside clamping head is employed to bear against the outer edge of the line, while supplemental clamps or jaws assist to hold the line firmly and in exact adjustment. To avoid overheating of the mould when rapidly operated, it is made with transverse openings adapted for communication with the blast nozzle, although no difficulty is ordinarily experienced on this account.

There are, as is well known, a great variety of type metals, according to the sizes of type and its uses, ordinary type for newspaper work being mainly composed of 6 parts lead and 2 of antimony. The addition of a little bismuth, however, carries down the melting point, and also produces a softer metal, as more commonly used for stereotypes. Such an alloy, composed of 9 parts lead, 2 of antimony, and 2 of bismuth, readily melts at about or a little over 300° F. The thin type bar made by the machine, therefore, readily cools sufficiently for ejection during the revolution of the mould disk, the type bars being thence carried to a galley attached to the machine just to the left of the operator, where the bars are assembled in the order of their production in the form of a column ready for immediate use.

Not only is all this work done automatically, but the matrices, after the type bar has been formed, are automatically withdrawn from their position against the mould disk and lifted by a carrier to the distributing mechanism, at the top of the magazine, whence they are distributed to their several tubes. This distributing mechanism consists essentially of an endless chain or belt, arranged to travel horizontally above distributing rails, the belt carrying a series of blocks armed with adjustable forks or fingers to act between the matrices and push them forward. The rails are parallel and sufficiently separated to admit of the matrices being carried in an upright position between them, and the inner edge of each rail has a lip designed to engage the shoulders of the matrices and hold them in suspension, the lip being

divided transversely into a number of sections to engage matrices having different shoulders, whereby each matrix will be sustained upon the rails until it is carried to the point at which it is to be released to drop into its proper tube in the magazine. Connected with the distributing rails are wires from a battery, by means of which a matrix forced or dropping out of place will cause the closing of a circuit and the stoppage of the carrier belt; the particular matrix causing the stoppage is always immediately in front of the operator, with whom it is only the work of a moment to replace the matrix, or remove it entirely if it happens to be defective.

How far this machine may be considered a practical success for general uses, in the way of superseding typesetting by hand in the old way, it is perhaps too early to give a definite answer. It is obvious that it is not adapted for work requiring different varieties of type, as small capitals, italics, accented letters, etc., although we understand the machine is now being made to use small capitals as well as the other characters usually employed in Roman text. But there is a large class of work, especially that required for newspapers in general, in regard to which this objection would not be very material. The actual performance of the machine at present, and for many months past, on such plain work, is about equal to that of three ordinary compositors, and it requires but a short time for an operator to attain an efficiency which will enable him steadily to maintain this speed, as compared with hand work. This, at least, has been the experience on the New York Tribune, where only thirty machines are ordinarily kept running for a day's work of eight hours each to get out a ten-page edition of the daily, which would require the services of about ninety men



THE TOP OF THE EIFFEL TOWER.

[FOR DESCRIPTION SEE PAGE 152.]

in the old way of working. The absolute saving of all distribution, which is equivalent to about one-quarter of the work of composition, is of itself a most important factor in the economy of the machine, while "standing matter," in the form of these type bars, can be kept for an unlimited time, and in any amount, without inconveniencing the office. To correct an error a new line has to be made, but this is done so quickly that the entire work of correcting is said not to be increased. When a considerable number of the machines are employed, the more or less constant services of a machinist or repairer would undoubtedly be necessary, but the machine, as it is, appears to be a wonderfully perfect piece of mechanism, almost endowed with intelligence, and we are informed that one machinist easily does all the repairing needed on the forty machines now in use in the Tribune office. The machines are not for sale, as we understand, so that the question of their cost cannot be answered, but they are to be leased, those using them to pay a fixed sum on the execution of the lease and a quarterly rent besides.