

# J. E. MUNSON. PROCESS OF SETTING TYPE.

No. 320,271.

Patented June 16, 1885.

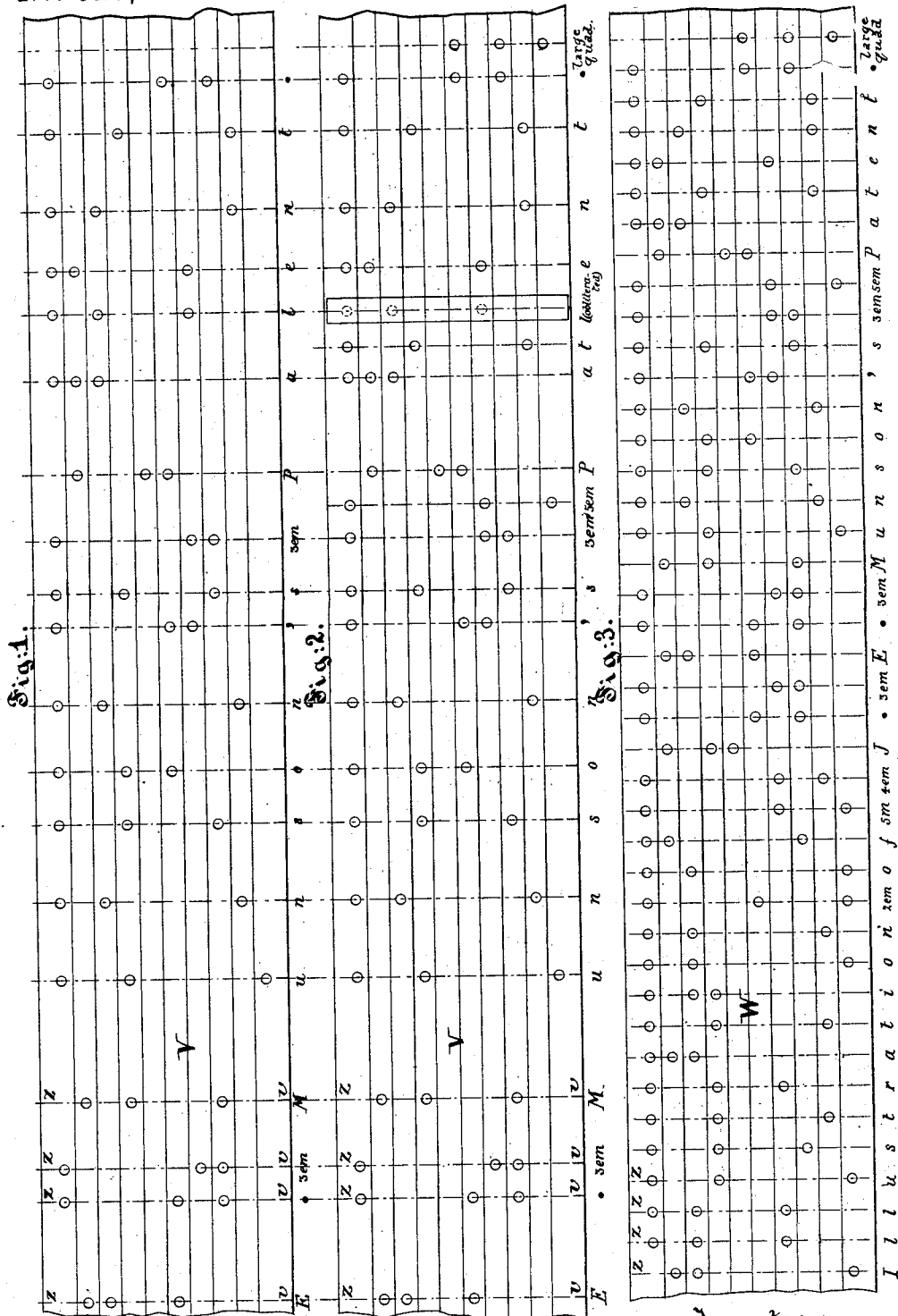


Fig. 1.

Fig. 2.

Fig. 3.

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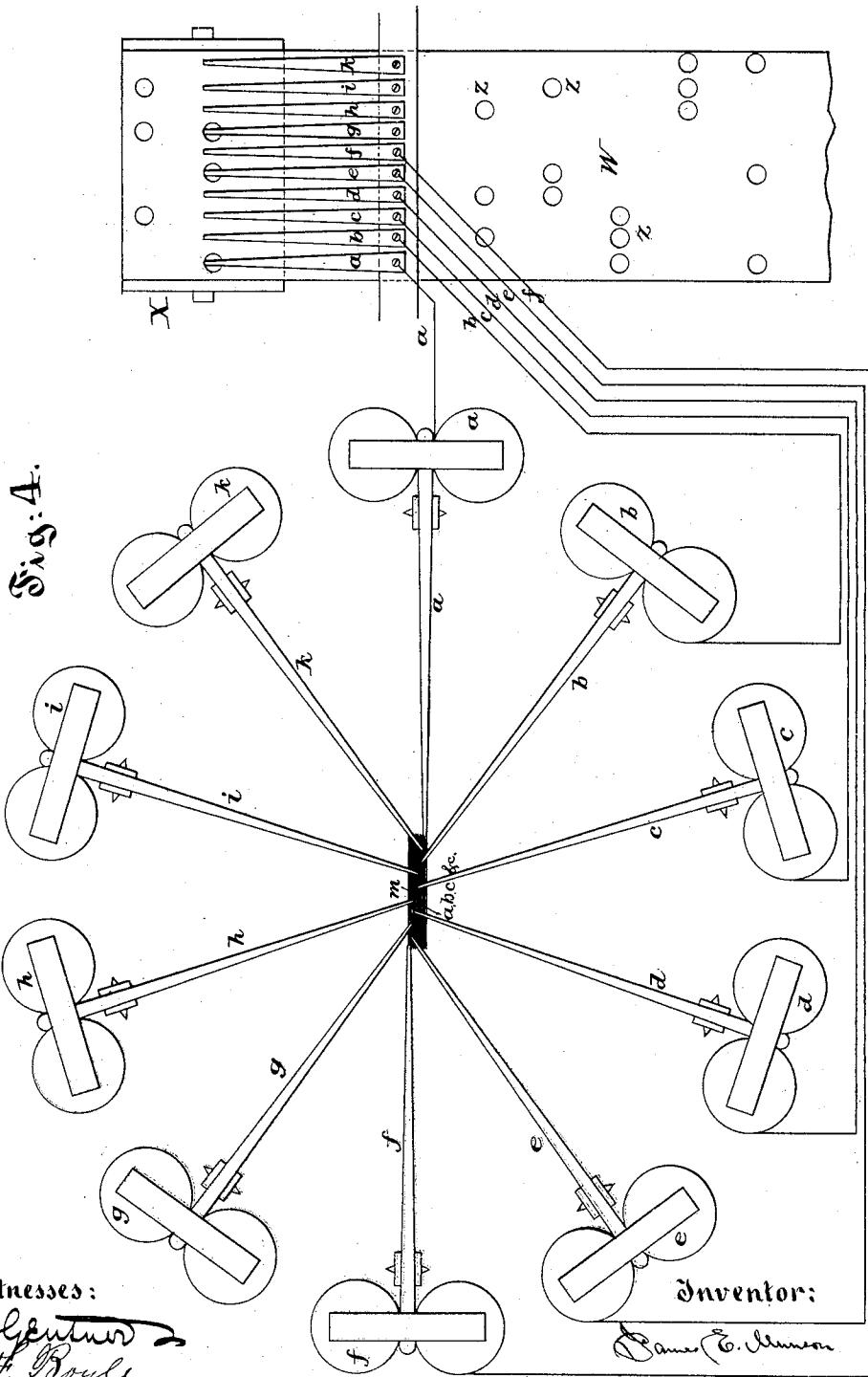


Fig. 4.

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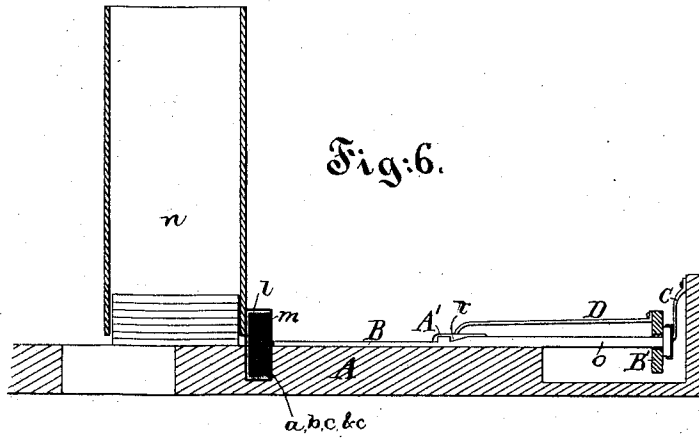


Fig:6.

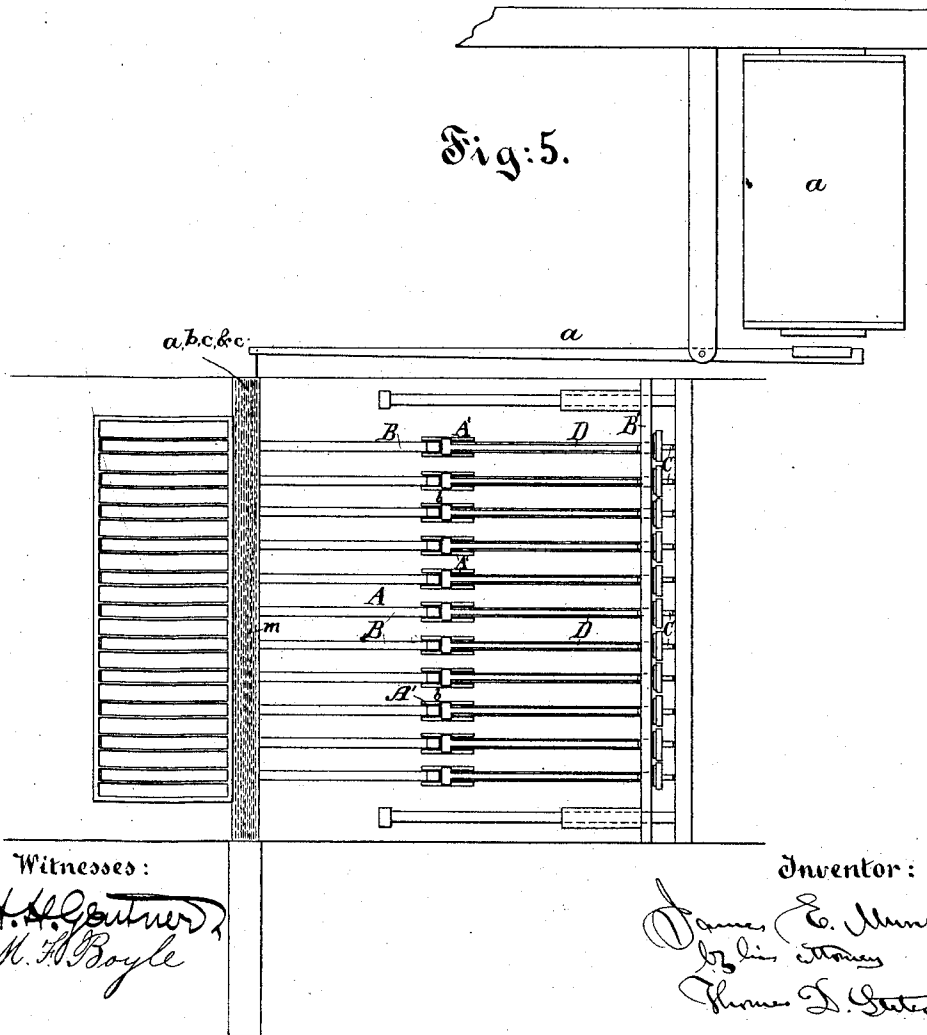


Fig:5.

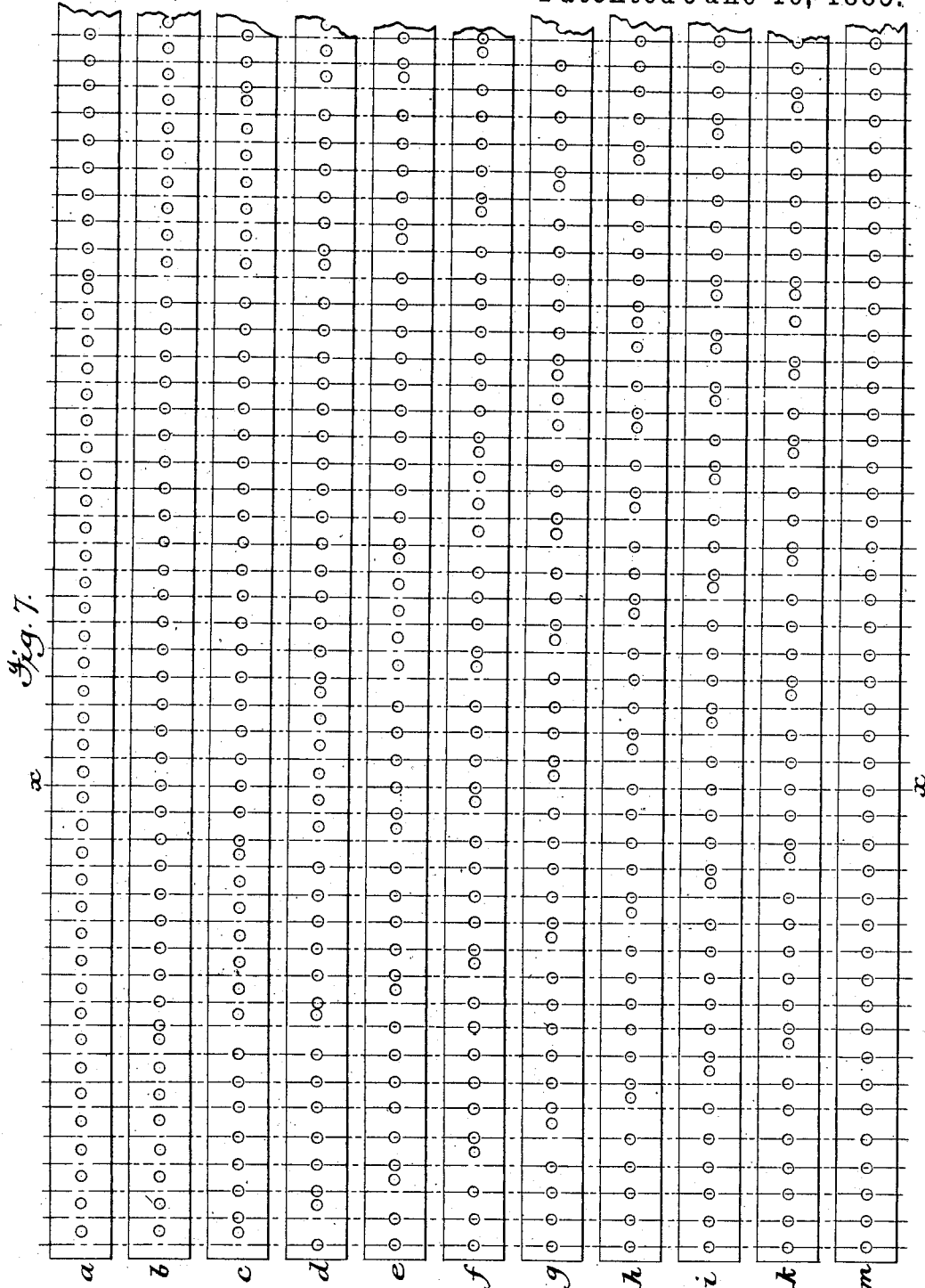
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# UNITED STATES PATENT OFFICE.

JAMES E. MUNSON, OF NEW YORK, N. Y.

## PROCESS OF SETTING TYPE.

SPECIFICATION forming part of Letters Patent No. 320,271, dated June 16, 1885.

Application filed May 23, 1882. Renewed March 18, 1885. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES E. MUNSON, a citizen of the United States, residing in the city of New York, county of New York, State of New York, have invented certain new and useful Improvements in the Art of Setting Type by Machinery, which are fully described and illustrated in the following specification and accompanying drawings, forming a part of the same.

This invention relates to a method of setting type by machinery, in which the matter to be composed is first indicated in or upon a ribbon or strip of paper or similar material by signs representing the different types, "spaces," &c., the ribbon thus prepared being afterward used to control the type-selecting devices, thereby making the operation of the type-setting mechanism entirely automatic.

The invention also embraces a method of correcting and justifying the composition upon the ribbon before the same is used to operate the type-selecting mechanism.

To aid in a ready understanding of the invention, the principal steps or operations involved in putting the same into practice will be first briefly described, after which they will be more fully explained in connection with the accompanying drawings.

In setting type according to the present invention, the matter to be put in type is first indicated in or upon the ribbon or strip of paper or similar material of suitable width to be conveniently manipulated by transverse rows of signs, preferably perforations, each of which rows represents one of the types, spaces, or quads to be set, the particular type, &c., being determined by the positions of the perforations. The number of signs in each row may be the same, or it may vary—that is to say, some of the types, &c., may be represented by a single sign, and others by combinations of two, three, or more signs; but, as will be hereinafter explained, it is preferable that the same number of signs should be used for each of the types, &c., and that this number should be three, and also that the number of possible signs in each row upon the ribbon should be ten.

For the purpose of enabling the composition to be justified upon the ribbon, the rows

of signs are separated from each other by spaces proportioned to the running thickness of the types, &c., which they represent. By reason of this proportionate spacing, the proper points for dividing the composition into lines can be readily ascertained by the use of a suitable scale or measure, so that it becomes practicable to make the proper justification of the composition before it is put in type. For this purpose, therefore, the ribbon, after the necessary corrections have been noted by the proof-reader, is taken by the justifier, who makes such corrections, either by making additional rows of signs to represent types, &c., to be added, or by eliminating (by erasing, covering, or otherwise) rows of signs representing improper types, &c., or both. The justifier then, by the use of a suitable scale or measure, divides the composition into lines of the proper length, making due allowance, of course, for the changes just made, and makes at the proper points rows of signs representing the spaces, &c., which must be inserted to fill out short lines, or eliminates rows of signs representing spaces, &c., which must be removed to shorten long lines, or both. When the end of a line comes between two words, the row of signs representing a space placed there by the compositor in the preparation of the ribbon must be eliminated. When a word is divided at the end of a line, a row of signs representing the hyphen will of course be inserted and properly allowed for in the justification. At the end of each line, a row of signs representing a special quad is inserted, which quad serves, as will hereinafter appear, to indicate the line-divisions when the matter is put in type. The ribbon thus prepared may be used to control the operation of the type-selecting mechanism; but in order to permit the setting mechanism to operate uniformly and at its maximum speed it is necessary, as will be hereinafter explained, that the rows of signs upon the operating-ribbon be uniformly spaced. The ribbon, therefore, after having its matter corrected and justified, is reproduced with its rows of signs uniformly spaced, and this reproduction is used to control the type-selecting mechanism. It is of course apparent that the rows of signs may be evenly spaced upon the ribbon in the first instance, and this

ribbon used for controlling the type-selecting mechanism, the composition being corrected and justified after it is in type in the usual manner; but it is preferable that the correcting and justifying should be done upon the ribbon.

In operating the type-selecting mechanism, the ribbon, prepared as described, is advanced beneath the ends of a series of feelers located in an electric circuit, and so arranged that the signs in or upon the ribbon produce electric impulses or combinations of impulses corresponding in number and variety to said signs, which impulses are transmitted through suitable connections to a selecting mechanism which acts upon the principle described in United States Letters Patent No. 246,411, and permits or causes the types, spaces, &c., to be ejected from their respective reservoirs in the order in which they are represented upon the operating-ribbon, thus making the operation of the type-setting mechanism entirely automatic.

The construction and organization of the various mechanisms by which this improvement in the art is carried into practical operation will be fully described and illustrated in other applications for Letters Patent to be shortly filed by me, and are not therefore described and illustrated in the present case, except so far as is necessary to a clear understanding of the present invention.

In the accompanying drawings, Figure 1 shows a portion of the ribbon or strip of paper after the composition has been indicated in it by transverse rows of signs separated from each other by spaces proportioned to the running thicknesses of the types, &c., which they represent. Fig. 2 shows the same after the composition has been corrected and justified. Fig. 3 shows the same after it has been reproduced with uniform spacing and is ready for use in operating the selecting mechanism. Fig. 4 is a diagram illustrating the electrical connections through which the signs upon the operating-ribbon control the selecting mechanism. Fig. 5 is a plan view of the principal parts of one form of selecting mechanism which may be employed. Fig. 6 is a vertical section of the same, and Fig. 7 is a view showing one of the orders in which the perforations in the selecting-plates may be arranged.

Referring to Fig. 1, it is to be understood that V represents a ribbon or strip of paper or similar material, of suitable width to be conveniently manipulated, in which the matter to be put in type is indicated by transverse rows of signs  $z$ , each of which rows represents one of the types, spaces, &c., to be set. These signs may be made in various ways, but preferably consist of perforations, as shown in the present case, and they will therefore be termed "perforations" in the following description: These perforations may be made in the ribbon with a punch operated by hand; but in order to make the system practicable for business

purposes it is of course necessary that this operation should be performed mechanically. One form of mechanism suitable for this purpose, and which I call the "compositor's machine," will be shown in one of my said future applications. It will be observed that the ribbon V is divided into ten longitudinal fields or spaces, as indicated by the longitudinal lines, and that each of these spaces is adapted to receive one perforation upon each transverse line, so that the possible number of perforations in each of the rows  $z$  is only ten, which is of course very much less than the number of types, including spaces, &c., which it is necessary to indicate in the ribbon. This deficiency in the number of perforations is compensated for by providing that each of the types, &c., instead of being represented by a single perforation, the particular type being determined by the position of said perforation with relation to the edges of the ribbon, shall be represented by a combination of three perforations, the particular type being determined by the positions of said perforations with relation to each other and to the edges of the ribbon. By this system the ten possible perforations afford, by proper permutation, a sufficient number of different combinations to represent all of the types, &c., required. It is of course apparent that it is not absolutely necessary that combinations of three perforations should be used, as by using a ribbon of sufficient width each of the types, &c., might be represented by a single perforation. This, however, would make the number of parts, both in the perforating and the type-setting mechanisms, so great as to make these mechanisms unduly expensive, complicated, and cumbersome. Combinations of two perforations might also be used; but even this would increase the number of parts beyond what is desirable. It is also apparent that even when only ten possible perforations are used, as in the present case, some of the types, &c., might be represented by single perforations, others by combinations of two perforations, and the remainder by combinations of three perforations. This, however, would be undesirable, as it would make the action of the mechanisms irregular. I have found it best, therefore, in practice to have all of the types, &c., represented by three perforations, as by using this number in combination a sufficient number of different combinations can be formed to represent all of the different types, &c., required by the use of as few as ten punches, feelers, selecting-plates, &c., while by having the same number of perforations in all of the combinations uniformity of action in the mechanisms is secured. By using combinations of four or five perforations the number of punches, &c., could be still further reduced; but this would lead to other complications which would be undesirable.

In order that the composition may be justified upon the ribbon V, it is of course neces-

sary that the length of ribbon occupied by the perforations representing a line of matter should be just equal to or bear some determined relation to the actual length of said line. If it were otherwise, it would, as will readily be seen, be impossible for the justifier to ascertain by an inspection of the ribbon the exact amount of matter which is required for each line. To accomplish this end the rows of perforations  $\approx$  are so distributed along the ribbon as to be separated from each other by spaces proportioned to the running thicknesses of the types, spaces, &c., which they represent—that is to say, the perforations representing a type of a given thickness are allowed twice the space which is allowed to those representing a type of one-half such thickness, and so on through all the variations in the thickness of the different types, spaces, &c., used. The spaces allowed to the rows of perforations may be exactly or substantially equal to the thicknesses of the types, &c., represented; or, if the type is large, the spacing, while being proportioned to the types, &c., may be less than their actual running thickness. When ordinary type is used, it will, however, be found best to make the spacing upon the ribbon considerably greater than the actual running thicknesses of the types, &c., represented, as by so doing sufficient room will be left for making corrections, &c. This proportionate spacing is readily accomplished by providing means in the compositor's machine for giving an irregular feed to the ribbon as the perforation progresses. The ribbon V is also provided with a series of small marks, indentations, or perforations,  $v$ , located along its edge, and corresponding in number and position to the rows of perforations  $\approx$ , which are made upon or in the ribbon at the same time with the said perforations by a small supplemental marker or punch provided for that purpose in the compositor's machine. The purpose of these marks or perforations will presently appear.

After the composition has been indicated upon the ribbon V, as just described, and as shown in Fig. 1, it is taken by the proof-reader, who indicates upon it the necessary corrections in the usual manner. After this has been done the ribbon is taken by the justifier, who makes the corrections noted by the proof reader, either by inserting rows of perforations to represent types, &c., which have been omitted, or by eliminating (by covering or otherwise) rows which represent improper types, &c., or both, as indicated in Fig. 2, in which the row of perforations representing the letter l has been covered and a row representing the letter t inserted. After the necessary corrections have been thus made, the justifier, by applying a suitable scale or measure, which is graduated with reference to the proportionate spacing on the ribbon to the line of marginal marks  $v$ , is enabled, after making due allowance for said correction, to determine

the exact points at which the composition must be divided to form the lines for the column or page. At the end of each line thus ascertained a row of perforations representing a large low quad, which will serve to indicate the line-divisions after the matter is in type, will be inserted, as indicated at the right of Fig. 2, and lines of perforations representing spaces which must be inserted to fill out short lines will be added at the proper points, as indicated by the insertion of the five-em space after the word "Munson's," or lines of perforations representing spaces which must be removed to shorten long lines will be eliminated, or both. When it is determined by the justifier that the end of a line shall come between two words, the row of perforations placed there by the compositor in the preparation of the ribbon to represent the ordinary space must be eliminated. Whenever it is necessary to divide a word at the end of a line, a row of perforations representing the hyphen will of course be added and properly allowed for in the justification. At the end of a paragraph the compositor will leave a considerable blank space upon the ribbon, and in this space the justifier will insert the necessary rows of perforations to indicate the spaces or quads which must be inserted to fill out the last line of the completed paragraph and to make the indent of the first line of the following paragraph. When the matter to be composed is printed "copy" which it is desired to reproduce, line for line, exactly like the original, the compositor in preparing the ribbon will at the end of each line of the copy simply insert the row of perforations representing the low quad, and then the justifier will only have to put in the proof-reader's corrections and justify the lines already marked off for him by the compositor. The rows of perforations which it is necessary to make in the process of correcting and justifying the composition may be made by hand, or by a perforating mechanism similar to the compositor's machine. The ribbon-feeding mechanism in the justifier's machine will of course be different from that of the compositor's machine, or will be entirely dispensed with, and the former will be provided with means for making the rows of perforations required to represent those spaces, &c., not used by the compositor. This machine may also be provided with mechanism similar to that shown in Re-issued Letters Patent No. 6,832, by which the strips of paper for covering the superfluous rows of perforations can be applied. After the composition has been corrected and justified, as shown in Fig. 2, the ribbon V may be used for controlling the type-setting mechanism; but if it is so used the unequal distances between its rows of perforations will cause the setting mechanism to operate irregularly, and thus prevent said mechanism from performing the maximum amount of work. To obviate this difficulty the ribbon V is used

as a pattern from which a second ribbon, W, is produced having exactly the same perforations, arranged in the same order, except that the rows instead of being irregularly are uniformly spaced, as shown in Fig. 3, and this second or reproduced ribbon is used as the operating-ribbon. This reproduction, like the preparation of the pattern-ribbon, may be accomplished by hand-punching; but an automatic reproducing mechanism suitable for this purpose will be shown in a future application.

Referring now to Figs. 4 to 7, inclusive, the manner in which the operating-ribbon W is used to control the type-selecting mechanism will be described. The particular construction and organization of the devices by which this is accomplished are fully shown and described in a future application for Letters Patent for type-setting machine now pending, so that a very brief explanation of their construction and mode of operation is all that is required in the present case. The operating-ribbon W, after being prepared as already described, is led from a reel or other suitable support to a feeding-roll, as X, and is passed between said roll and a series of spring-feelers, *a b c*, &c., equal in number to the possible perforations in each transverse row upon the ribbon, which bear gently upon its upper side, with their ends in such position as to pass through the perforations and come into contact with the roll when permitted. The roll X is constantly driven so as to gradually advance the ribbon and bring the rows of perforation successively beneath the ends of the feelers. The feelers *a b c*, &c., are connected, by a series of wires, *a b c*, &c., with one pole of a series of electro-magnets, *a b c*, &c., corresponding in number with the feelers, while the roll X is connected by a like series of wires with the opposite poles of said magnets. The armatures of the magnets *a b c*, &c., are connected with suitable mechanism, as the levers *a b c*, &c., which controls the type-selecting mechanism. This mechanism may be of any approved form; but as here shown it consists of a series of selecting-plates, *a b c*, &c., corresponding in number with the magnets and levers *a b c*, &c., which are connected to the ends of said levers and arranged to act upon the principle described in my former Letters Patent before referred to. These plates may be made in various forms and arranged in many different ways; but as here shown they consist of thin strips of metal or other suitable material, and are arranged side by side in a casing, *l*, located just in front of the type-pushers and in the rear of the composing-case. The front and rear sides, *m*, of the casing *l* are provided with perforations corresponding to the type-pushers; but the perforations in the selecting-plates are so arranged that when said plates are in their normal positions, as indicated in Fig. 7, no opening will be formed for the passage of any one of the type-pushers, but that by moving certain of

said plates an opening may be formed for the passage of the desired pusher, different plates being moved to permit the passage of the different pushers.

The composing-case *n* and the guiding apparatus for conducting the types from said case to the composing-stick will be fully described in my application for Letters Patent referred to, and consequently no description of these parts is required here. The type-pushers B are supported and slide freely upon a bed, A, and are provided at their rear ends with extensions *o*, which move freely in openings in a cross-bar, B', which receives a forward-and-back movement by means of rods which are connected with eccentrics upon a continuously-driven shaft. The rear ends of the extensions *o* are provided with heads, so that at each backward movement of the bar B' all of the pushers are withdrawn and forced against springs C, which are secured to a fixed portion of the frame-work. The bar B' is provided with a series of forwardly-extending spring-pawls, D, corresponding to the pushers, which, when the bar is in its backward position, rest upon raised portions A' of the bed A, but as said bar moves forward pass off said raised portions and rest upon the tops of the pushers. The eccentrics by which the bar B' is reciprocated are mounted upon a sleeve, which turns loosely upon its shaft, but is connected thereto by a clutch, which automatically disconnects the shaft and sleeve at the end of each revolution, so that whenever the shaft and sleeve are connected the bar B' will make one forward-and-back movement, and then be automatically arrested. The clutch is automatically operated to reconnect the shaft and sleeve at the proper time by means of an electro-magnet located in an electric circuit, which is closed by the movement of any one or more of the selecting-plates, all as will be fully explained in my application for Letters Patent before referred to.

The operation of the mechanism thus far described is as follows: The roll X having been set in motion, the operating-ribbon W will be advanced until the row of perforations representing the first type which is to be set arrives beneath the ends of the feelers *a b c*, &c., when the feelers corresponding to the perforations in said row will pass through said perforations and come into contact with the roll.

It has already been stated that the number of perforations in each row is not material, but that it is preferable that each row should consist of three. For convenience, therefore, it will be assumed that each row contains this number, and that those forming the first row correspond to the feelers *a d g*, so that said feelers will come into contact with the roll, as indicated in Fig. 4. As soon as this happens, circuits will be completed through the magnets *a d g*, thereby energizing said magnets, and causing them to attract their armatures and rock the levers *a d g*, which will



move the corresponding selecting-plates to the left, so that at one point an opening will be formed through the entire series of plates, and the front and rear sides of the casing *l*, as indicated upon the line *xx* of Fig. 7. As soon as the selecting-plates *a d g* are thus moved, they will close the circuit through the clutch-magnet before mentioned, thereby causing the bar *B'* to commence its forward movement.

As the bar *B'* advances, the springs *C* will advance all of the type-pushers through the openings in the plate *m*, when all, save the one upon the line *xx* will be arrested by coming in contact with the solid portions of the selecting-plates. The single pusher upon the line *xx* will continue to be advanced by its spring *C* until its notch *r* has passed beyond the raised portions *A'*, when the corresponding pawl *D* will enter the notch *r* and drive the pusher forward into the channel of the composing-case, thereby ejecting the selected type, and so the operation will continue to be repeated as each new row of perforations passes beneath the ends of the feelers, the positions of the perforations determining in each case the plates which shall be moved, and through them the particular type-pusher which shall be permitted to operate, all as will be more fully explained and illustrated in my application for Letters Patent before referred to. As the successive types, &c., are ejected from the channels of the composing-case, they pass into the control of the apparatus which conveys them to the composing-stick. The mechanisms by which the types, &c., are formed into line in the composing-stick and afterward taken from the stick and formed into column or page will not be here described, as they have no relation to the present invention.

The type-setting mechanism just described may, if desired, be provided with two composing-cases—one for Roman lower-case letters and capitals, and the other for Italics and small capitals—arranged opposite each other, so as to discharge their types into the same guiding apparatus. In such case the type-pushers and their operating mechanism and the series of selecting-plates and the magnets *a b c*, &c., will be duplicated; but the remaining parts of the apparatus will not be materially changed. When the apparatus is thus organized, the bar *B'* of both sets of type-pushers will be provided with an extra pusher, which operates in the same manner as the type-pushers, except that when it is permitted to pass through the selecting-plates, instead of ejecting a type from the composing-case, it operates a switch, which changes the circuit from the magnets *a b c*, &c., of one set of selecting-plates to the magnets *a b c*, &c., of the other set of plates, thereby bringing the other set of type-pushers into operation, and causing the apparatus to set Italic instead of Roman type, or vice versa. Each set of selecting-plates will in such case be provided with connections for operating its type-pushers. When the setting

mechanism is thus organized, the compositor in preparing the ribbon will, when he finds anything in his copy which is to be put in Italics or small capitals, punch in said ribbon, both before and after such matter, the proper combination of perforations to permit the switch-pushers to act, so that when the proper point is reached the switch will be automatically shifted to bring the Italic or small-capital pushers into operation and be again automatically shifted at the proper point to bring the Roman pushers into operation.

It will readily be seen that when the type-setting mechanism is operated in the manner herein described it is not essential that the operating-ribbon and its feeding mechanism should be located at the same point with the setting mechanism, but that these mechanisms may be located at points very distant from each other, so that the matter prepared at one point may be simultaneously transmitted to and put in type at a distant point. It will also be seen that by placing two or more sets of the magnets *a b c*, &c., in the same circuit the same matter may be simultaneously put in type at as many different points as may be desired. When, however, the matter is to be put in type at a point distant from that at which it is prepared, it will usually be found preferable, after the ribbon has been prepared, as shown in Fig. 3, to reproduce said corrected and justified ribbon at the point or points where the type are to be set, and use this reproduction for operating the setting mechanism, instead of operating said mechanism from a distant point, as just described. If preferred, the transmission to and reproduction at a distant point may take place before the matter is corrected and justified, the matter being afterward corrected and justified upon this reproduced ribbon, which will then be used as a pattern-ribbon from which to prepare a third or operating ribbon.

The transmission of the matter and reproduction of the operating-ribbon, as just described, may be effected automatically by the use of instruments similar to those used in automatic telegraphy, but will preferably be accomplished by an automatic transmitting and reproducing mechanism which will form the subject of a future application for Letters Patent. When the reproduction of the ribbon is to be effected at a long distance from the sending-station, it will usually be found desirable to establish intermediate stations, which will successively receive and transmit the ribbon until the end is reached. At each of these stations a fac-simile of the ribbon will be produced, which will then be used in the transmitting-instrument to reproduce the ribbon at the next station, and so on. By this system all of the operations required to put the matter in type, corrected and justified, at any number of different points, are automatically performed after a single ribbon has been prepared. By this means the same newspaper

can, without extra expense for type-setting, be issued simultaneously at different places, so as to be delivered to its readers without the delay now occasioned by transportation, or the same matter can be supplied simultaneously to many different papers. By this system, also, an author can transmit his composition, corrected and justified, to a distant publisher, and so avoid the usual delay occasioned by returning the proof for correction.

Various modifications may be made in many of the details of the system herein described without departing from or losing the advantages of the invention.

The signs in or upon the ribbon, instead of being made by perforations, may be made by saturating the ribbon at points corresponding to the perforations with some conducting substance; or the operation may be reversed, so that the various movements may be effected by breaking instead of making the electric circuits.

The selecting-plates, instead of being arranged to move horizontally, may be made of sufficient width so that the required movement can be given in a vertical direction, and this arrangement will, under certain circumstances, be found advantageous. Instead of being straight these plates may, if desired, be curved, the type-pushers being arranged in a corresponding manner, and this arrangement will also be advantageous under certain circumstances; or the plates and pushers may be arranged in the form of the letter **V**, or even of the letter **W**.

In applying the invention to those type-setting machines in which the type channels and pushers are arranged in a circle, the selecting-plates will be made of annular form, and may be moved either horizontally or vertically.

What I claim is—

1. The improvement in the art of setting type by machinery, which consists in, first, indicating the composition in or upon a ribbon of paper or similar material by signs representing the different types, spaces, &c., said signs being separated distances proportioned to the running thicknesses of the bodies of the types, &c., represented; second, making the necessary corrections in said ribbon by making additional signs, or eliminating improper ones, or both; third, justifying the composition by making additional signs representing spaces, &c., or eliminating those representing spaces, &c., or both; fourth, reproducing the corrected and justified ribbon, but with its signs uniformly spaced, and, fifth, operating the type-selecting mechanism by means of the ribbon thus produced, substantially as described.

2. The improvement in the art of setting type by machinery, which consists in indicating the composition in or upon a ribbon of paper or similar material by signs representing the types, spaces, &c., said signs being

separated distances proportioned to the running thicknesses of the bodies of the types, spaces, &c., represented, substantially as described.

3. The improvement in the art of setting type by machinery, which consists in indicating the composition in or upon a ribbon of paper or similar material by signs representing the types, spaces, &c., said signs being separated distances proportioned to the running thicknesses of the bodies of the types, spaces, &c., represented, and afterward justifying said composition by making signs representing spaces, &c., or eliminating those representing superfluous spaces, &c., or both, substantially as described.

4. The improvement in the art of setting type by machinery, which consists in indicating the composition in or upon a ribbon of paper or similar material by signs representing the different types, spaces, &c., said signs being separated distances proportioned to the running thicknesses of the bodies of the types, spaces, &c., represented, then making the necessary corrections in said ribbon by making additional signs or eliminating improper ones, or both, and then justifying said composition by making additional signs representing spaces, &c., or eliminating signs representing superfluous spaces, &c., or both, substantially as described.

5. The improvement in the art of setting type by machinery, which consists in indicating the composition in or upon a ribbon of paper or similar material by signs representing the different types, spaces, &c., said signs being separated distances proportioned to the running thicknesses of the bodies of the types, spaces, &c., represented, then correcting and justifying the composition upon said ribbon by making additional signs or eliminating improper or superfluous ones, or both, then reproducing said corrected and justified ribbon, but with its signs evenly spaced, substantially as described.

6. The improvement in the art of setting type by machinery, which consists in, first, indicating the composition in or upon a ribbon of paper or similar material by signs representing the types, spaces, &c., said signs being separated distances proportioned to the running thicknesses of the bodies of the types, spaces, &c., represented; second, correcting and justifying and reproducing said ribbon at a distant point or station by means of automatic telegraphy, and, third, operating the type-selecting mechanism by means of said reproduced ribbon, substantially as described.

7. The method of setting type and justifying the same, which consists in first preparing a pattern-ribbon having varying spaces between its signs, then preparing therefrom an operating-ribbon having uniform spaces, but containing the same number of signs, in the same order and combinations, as the first ribbon, and then operating the electro-mag-

nets of the selecting-plates of the type-setting machine by means of this second ribbon, and suitable intermediate devices, substantially as described.

5 8. The improvement in the art of setting type by machinery, which consists in indicating the end of each line by the insertion of a quad or block especially designed for that purpose, substantially as described.

In testimony whereof I have hereunto set to my hand, at New York city, New York, in the presence of two subscribing witnesses.

JAMES E. MUNSON.

Witnesses:

EDW. WM. FRANCIS,  
A. H. GENTNER.