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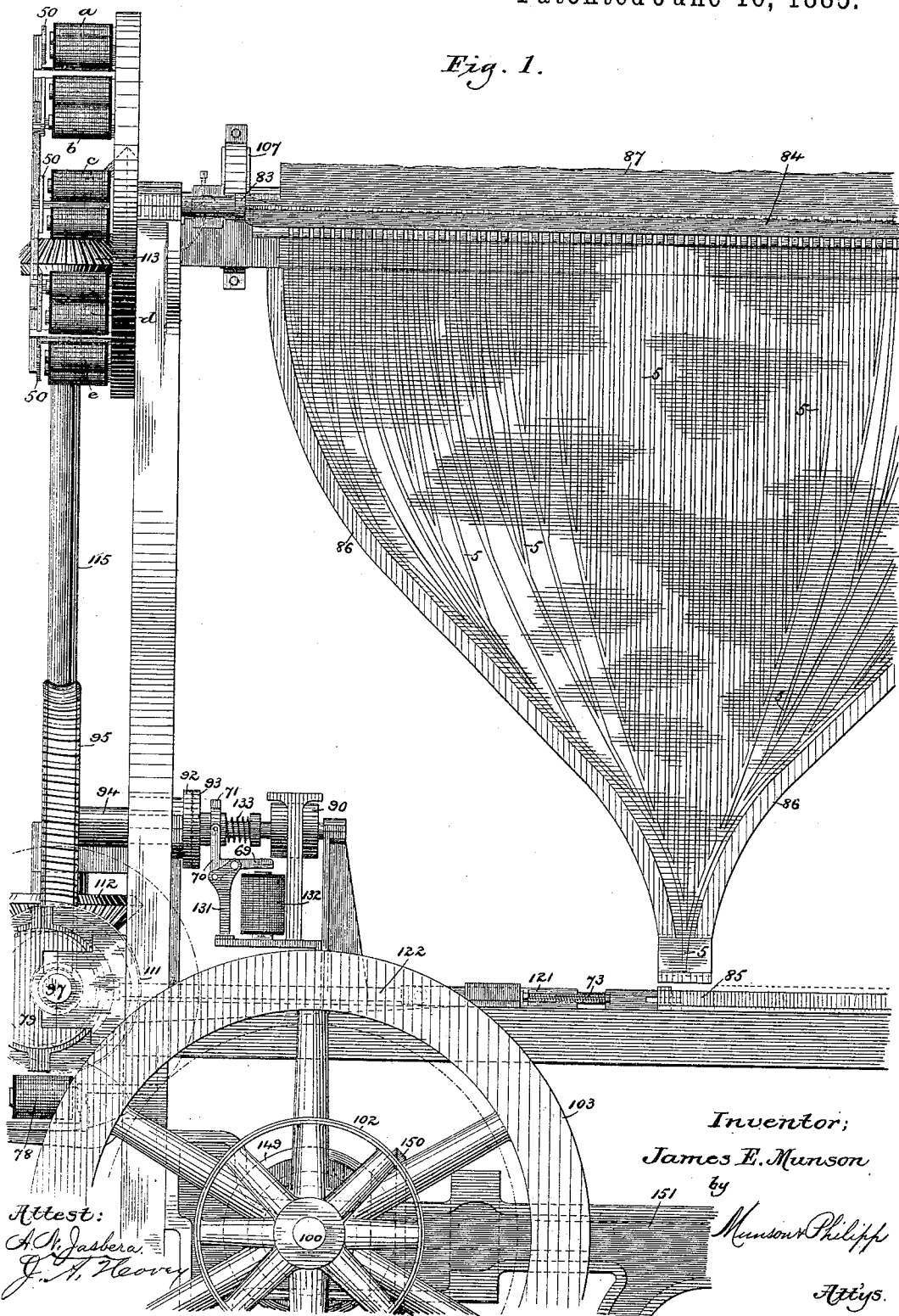
16 Sheets—Sheet 1.

J. E. MUNSON.  
TYPE SETTING MACHINE.

No. 320,272.

Patented June 16, 1885.

Fig. 1.



Attest:  
A. Ch. Jassera  
J. N. Heaver

Inventor;  
James E. Munson  
by  
Munson & Philipp  
Attys.

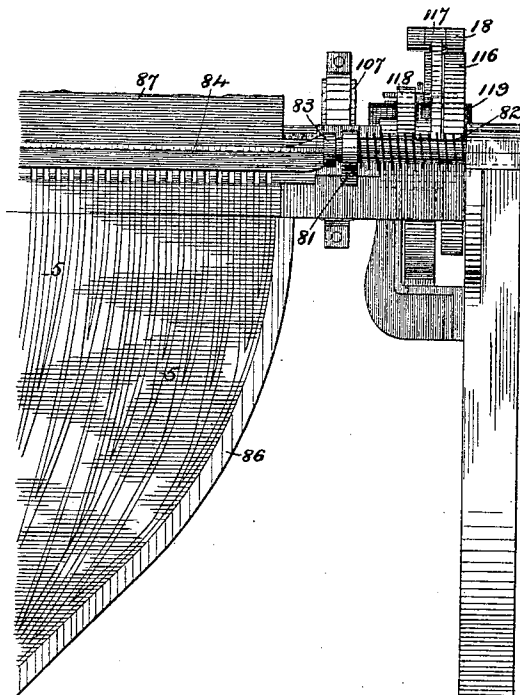
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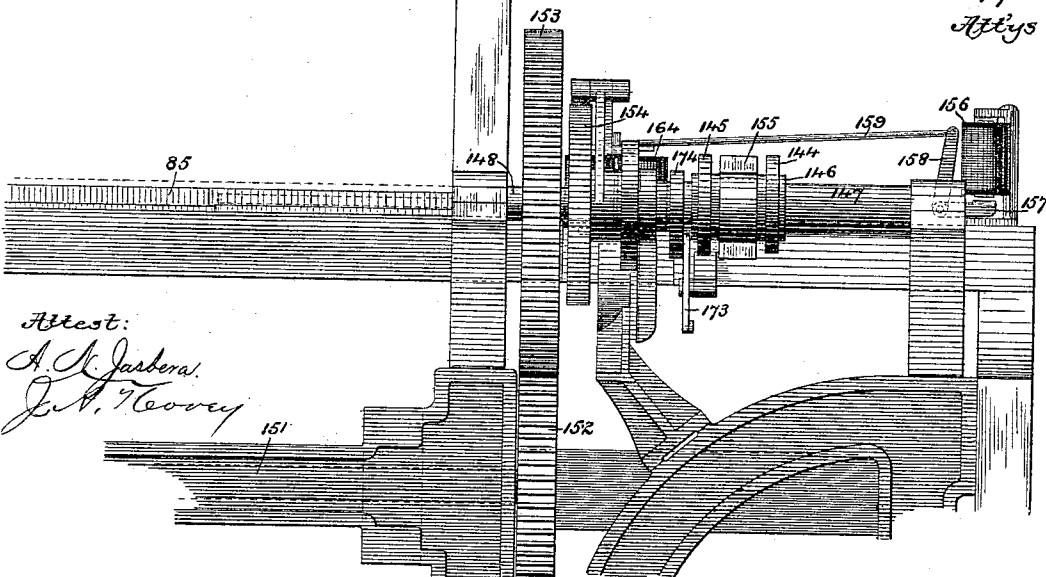
J. E. MUNSON.  
TYPE SETTING MACHINE.

No. 320,272.

Patented June 16, 1885.



*Fig. 1a*



*Inventor;*

*James E. Munson*

*by Munson & Philipp*

*Attys*

*Attest:*

*A. N. Gardner.*

*J. A. Keovey*

151

152

(No Model.)

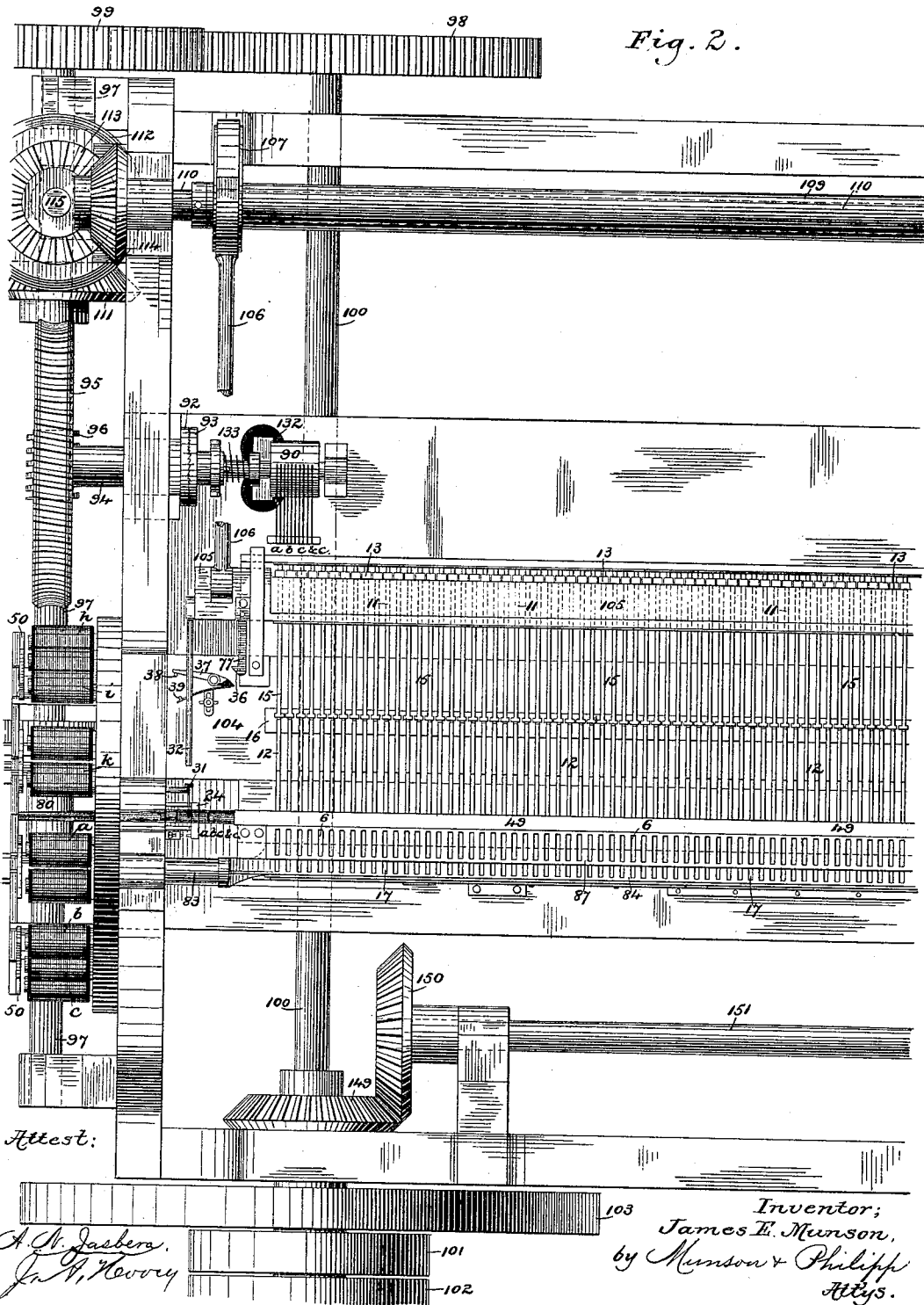
16 Sheets—Sheet 3.

# J. E. MUNSON. TYPE SETTING MACHINE.

No. 320,272.

Patented June 16, 1885.

Fig. 2.



Attest:

*A. H. Jacobs,*  
*J. H. Newby*

Inventor;  
*James E. Munson,*  
by *Munson & Philipp*  
*Atty's.*

(No Model.)

16 Sheets—Sheet 4.

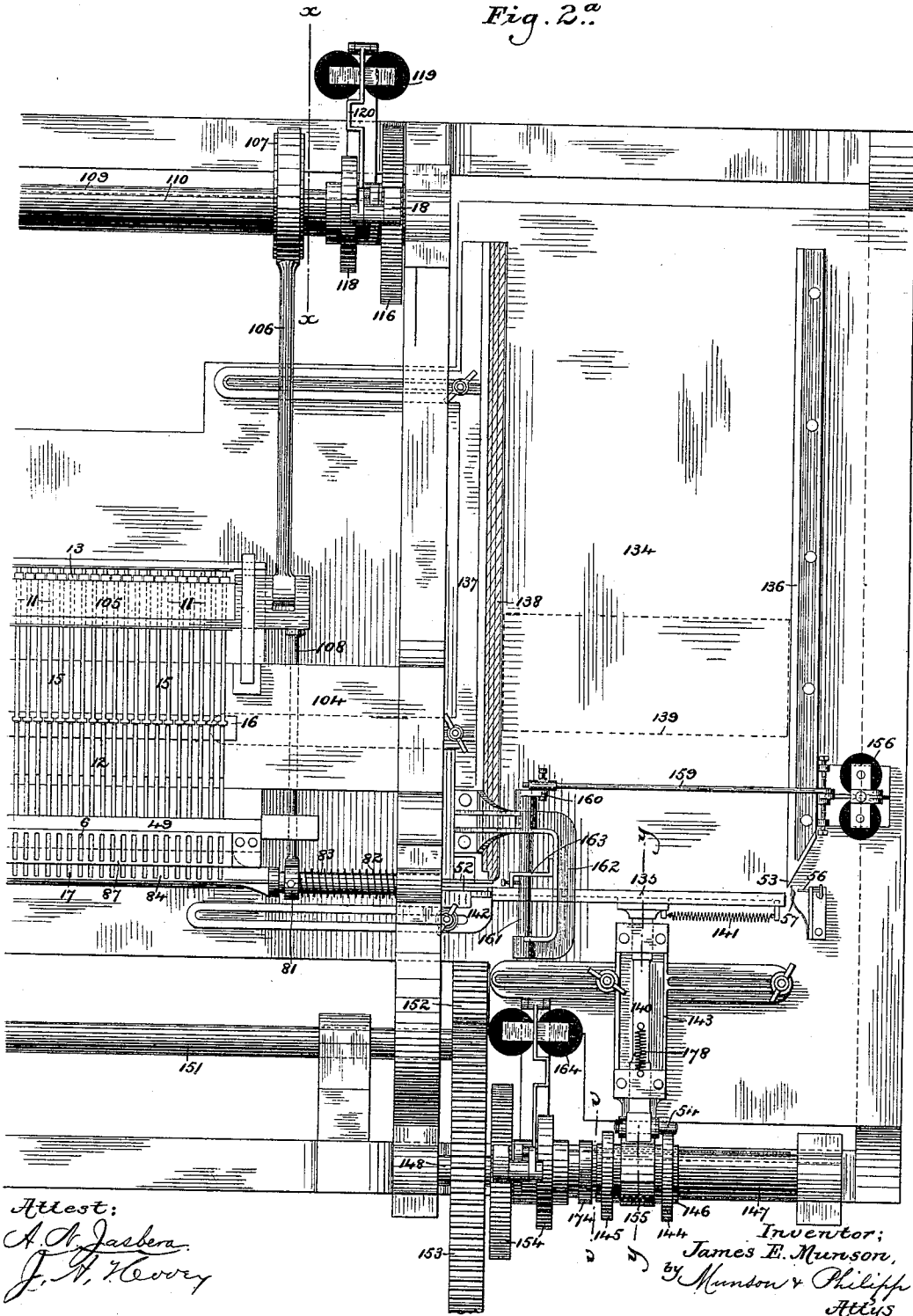
J. E. MUNSON.

TYPE SETTING MACHINE.

No. 320,272.

Patented June 16, 1885.

Fig. 2<sup>a</sup>



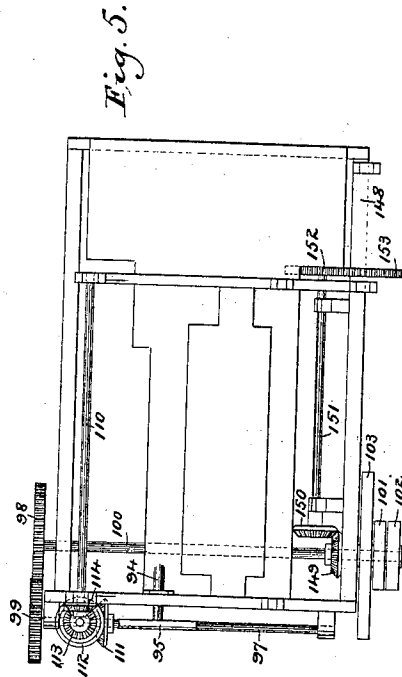
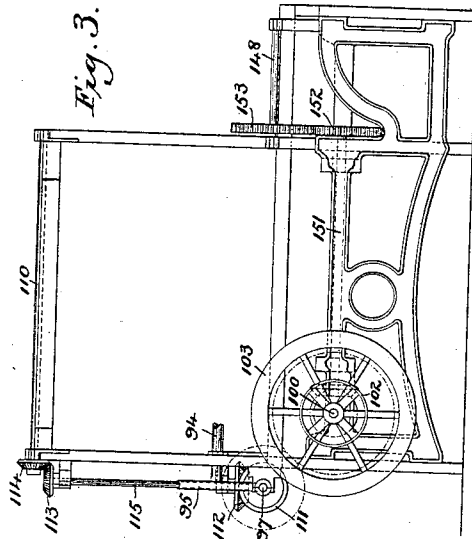
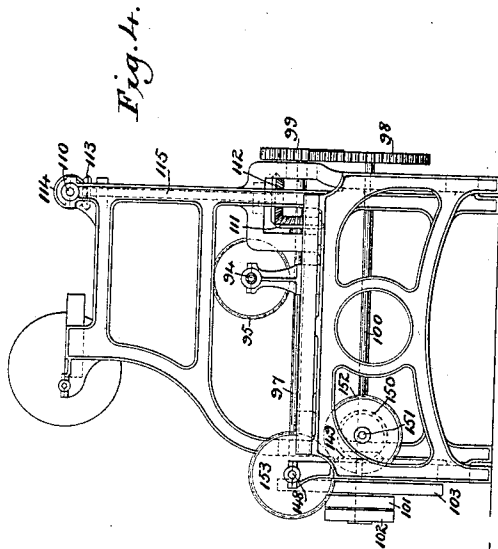
Attest:  
*A. H. Jasbera*  
*J. H. Hovery*

Inventor;  
 James E. Munson,  
 by *Munson & Philipp*  
 Attys

# J. E. MUNSON. TYPE SETTING MACHINE.

No. 320,272.

Patented June 16, 1885.



*Attest:*  
*A. N. Jaspers,*  
*J. A. Hoovey*

*Inventor:*  
*James E. Munson,*  
*by Munson & Phillips*  
*Attys.*

(No Model.)

16 Sheets—Sheet 6.

# J. E. MUNSON. TYPE SETTING MACHINE.

No. 320,272.

Patented June 16, 1885.

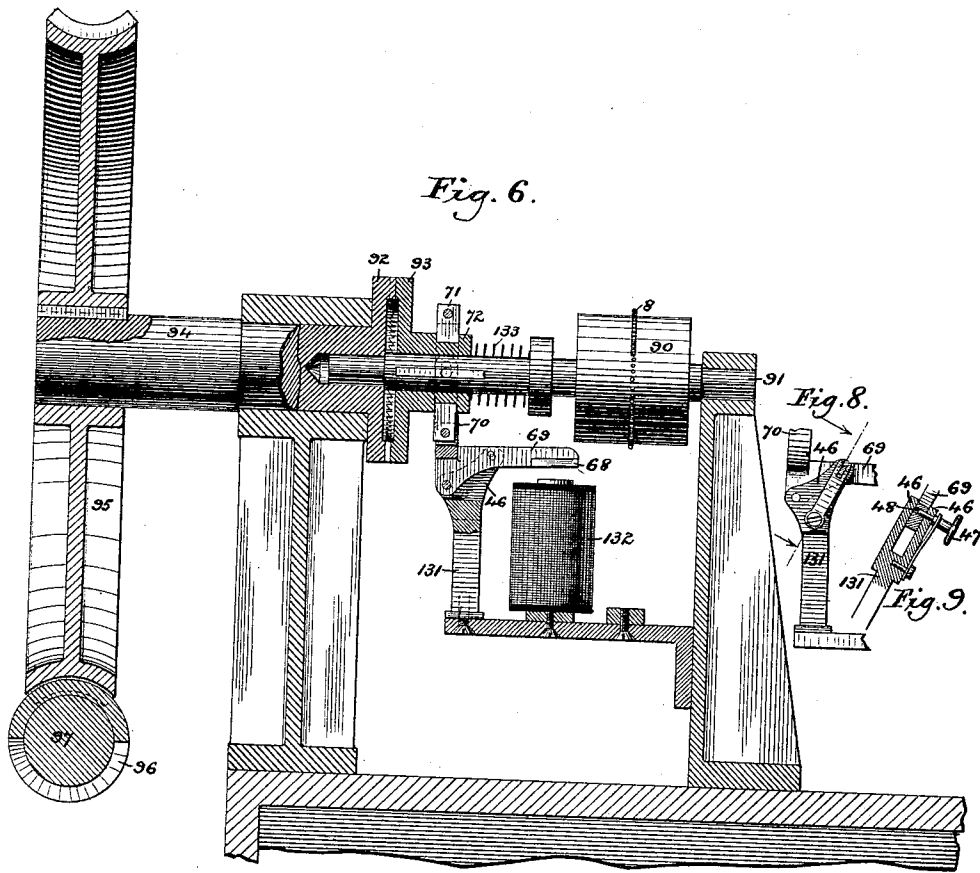


Fig. 6.

Fig. 8.

Fig. 9.

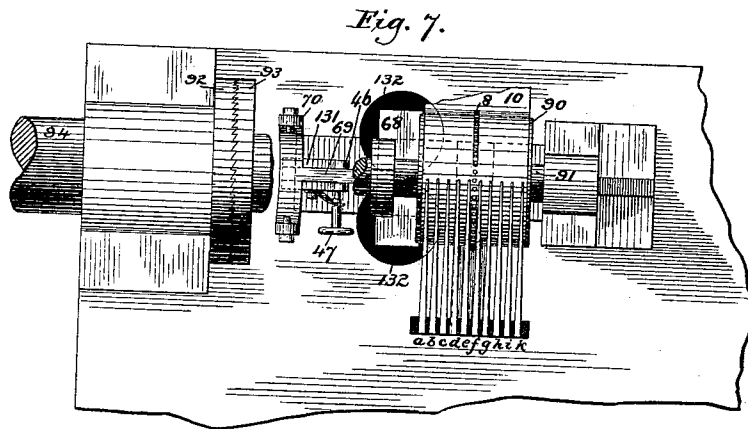


Fig. 7.

Attest:  
*A. M. Jasbera.*  
*J. A. Hevay*

Inventor;  
*James E. Munson,*  
 by *Munson & Philipp*  
*Attys*

J. E. MUNSON.  
TYPE SETTING MACHINE.

No. 320,272.

Patented June 16, 1885.

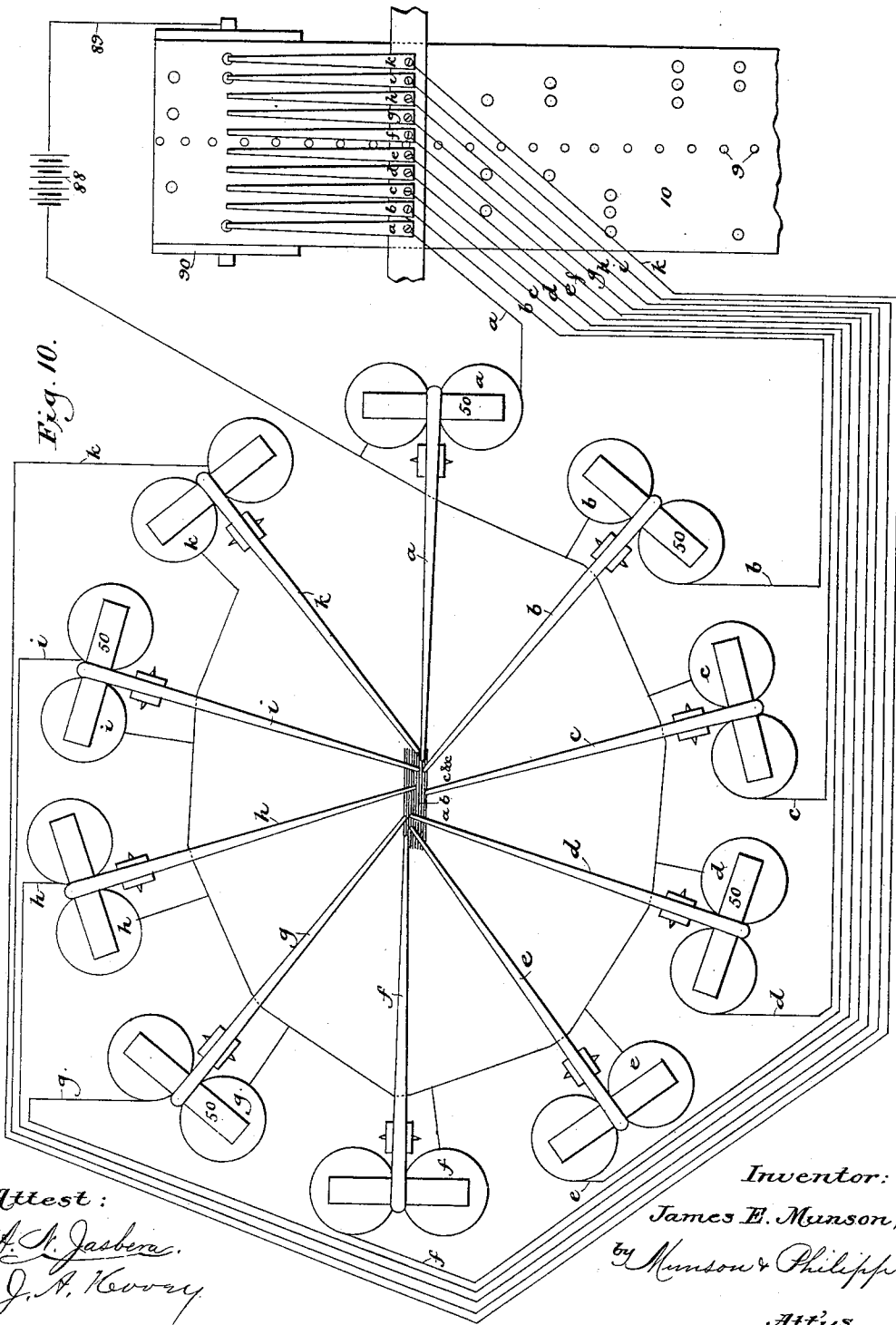


Fig. 10.

Attest:  
*A. S. Jasbera.*  
*J. A. Kevery*

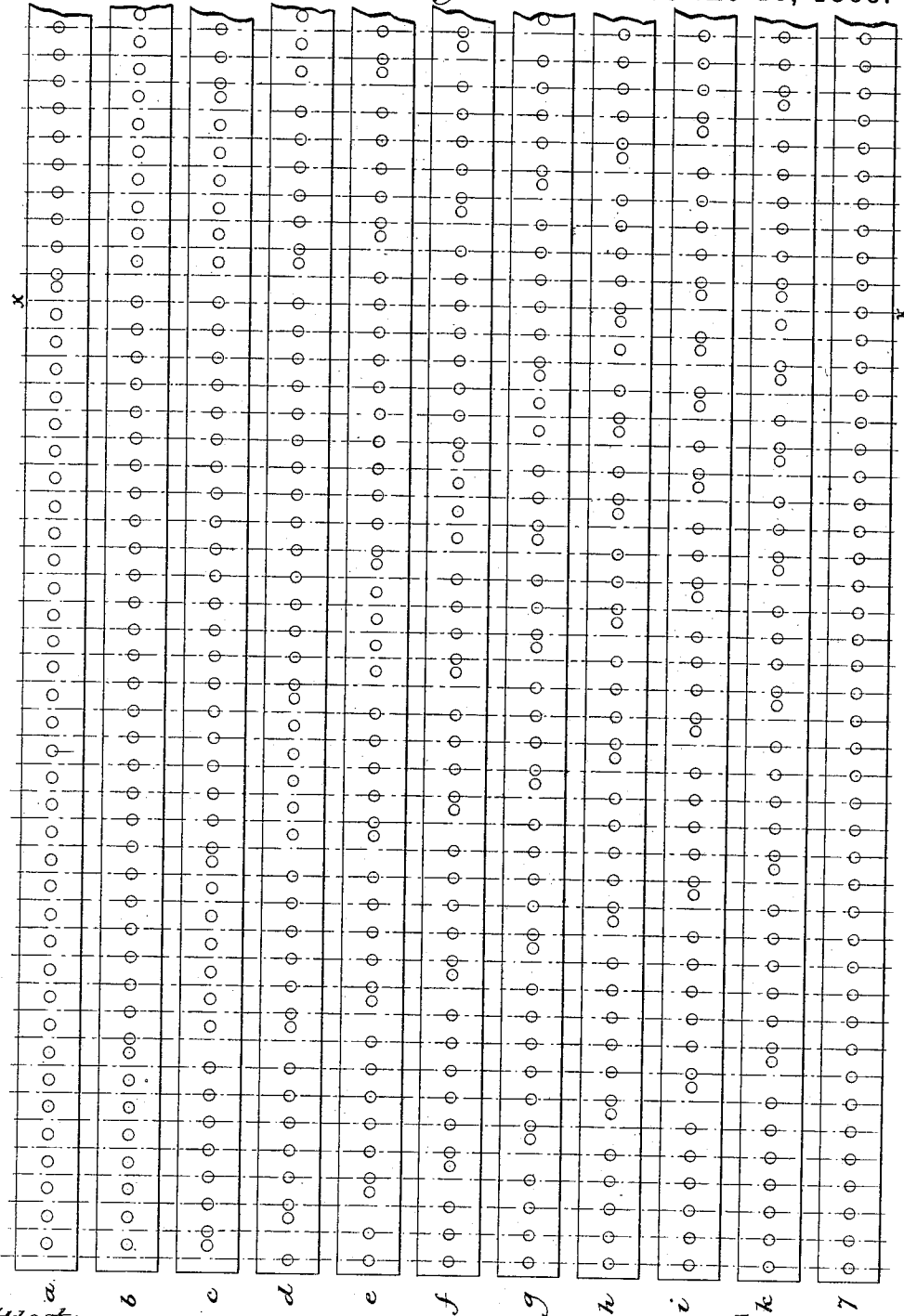
Inventor:  
*James E. Munson,*  
*by Munson & Philipp*  
*Attys.*

J. E. MUNSON.

TYPE SETTING MACHINE.

No. 320,272.

Fig. 11. Patented June 16, 1885.



Attest:

*A. N. Jasbera.*  
*J. A. Hoovey*

Inventor;

*James E. Munson*  
 by *Munson & Philipp*  
 Attys.



(No Model.)

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J. E. MUNSON.  
TYPE SETTING MACHINE.

No. 320,272.

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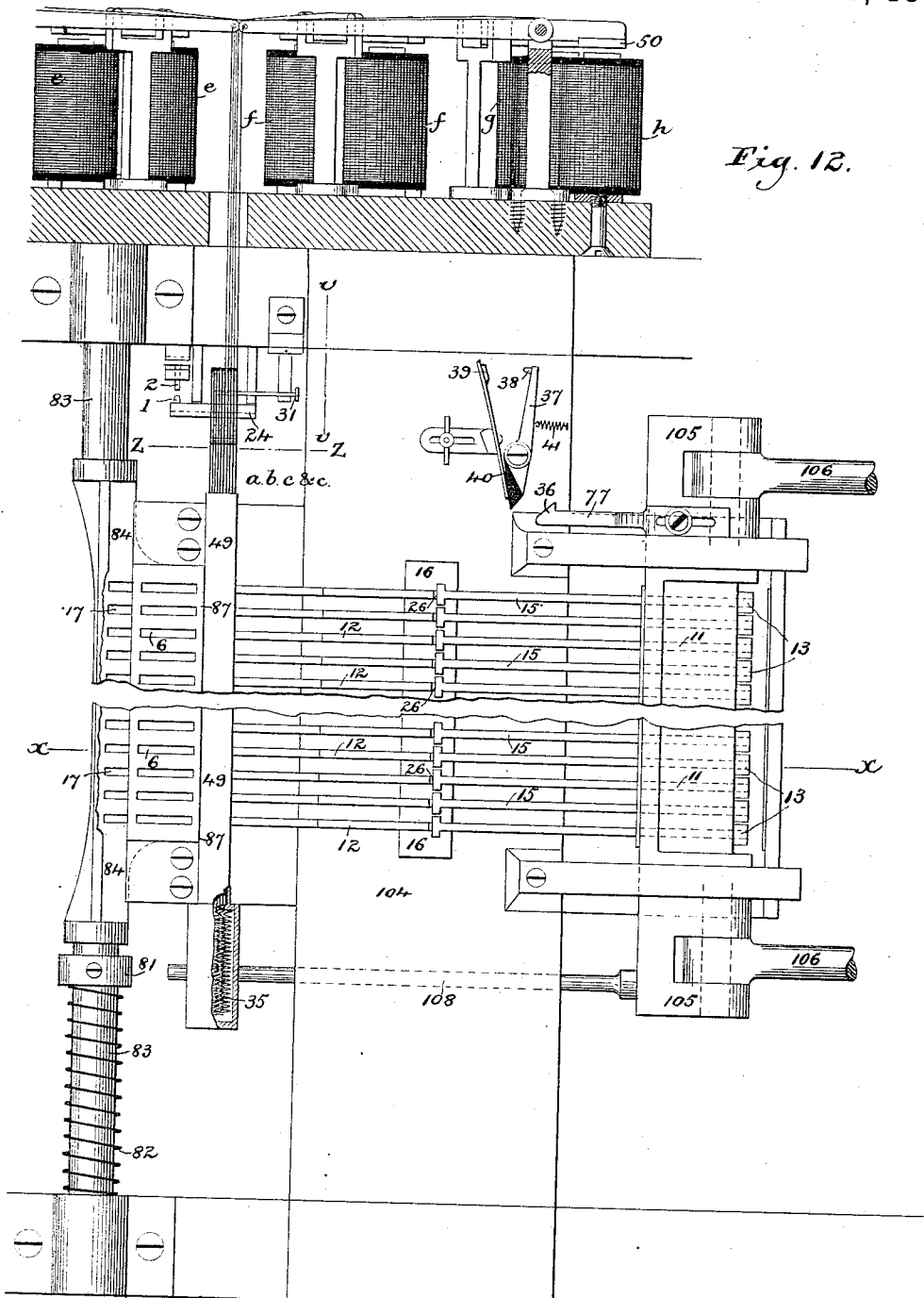


Fig. 12.

Attest:  
John A. Ellis.  
A. St. Jasbera.

Inventor:  
James E. Munson,  
by Munson & Philipp  
Attys.

J. E. MUNSON.  
TYPE SETTING MACHINE.

No. 320,272.

Patented June 16, 1885.

Fig. 14.

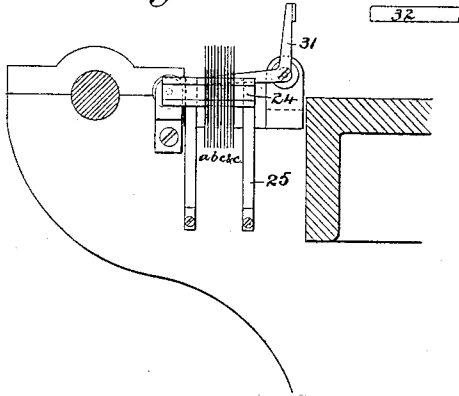


Fig. 15.

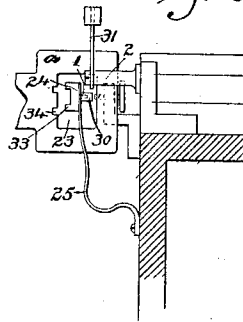


Fig. 13.

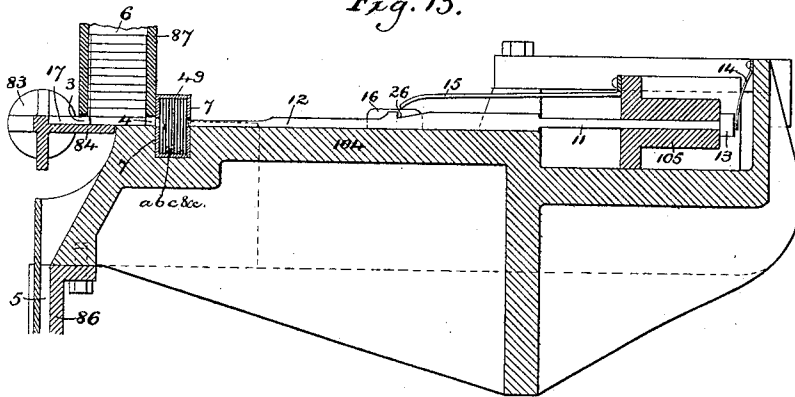


Fig. 16.

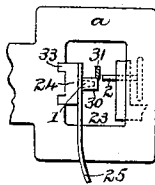
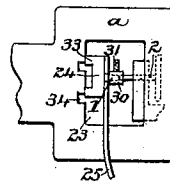


Fig. 17.



Attest:

*A. St. Jagger*  
*J. A. Keovay*

Inventor;

*James E. Munson*  
by *Munson & Philipp*  
Attys

(No Model.)

16 Sheets—Sheet 11.

J. E. MUNSON.  
TYPE SETTING MACHINE.

No. 320,272.

Patented June 16, 1885.

Fig. 18.

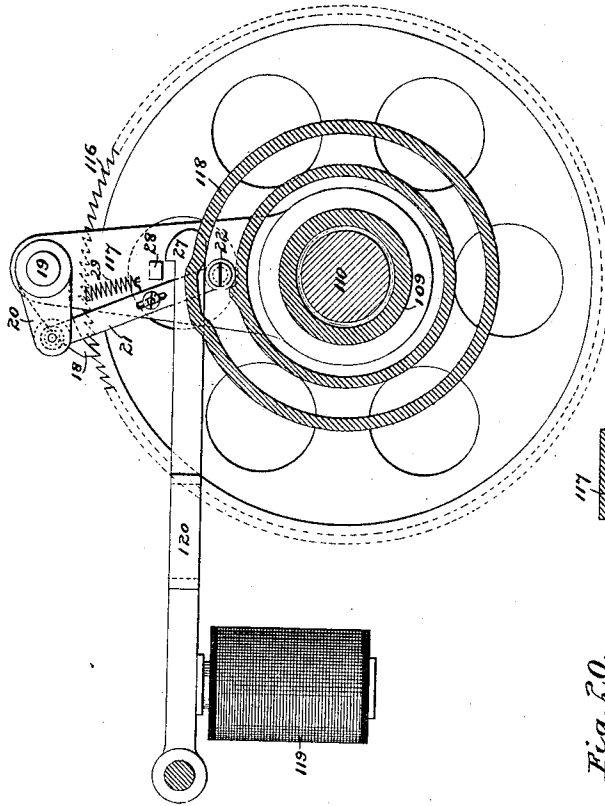


Fig. 20.

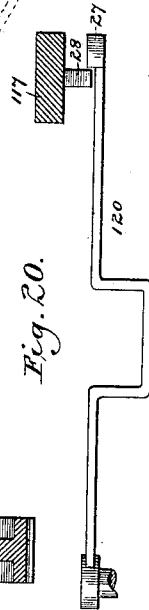
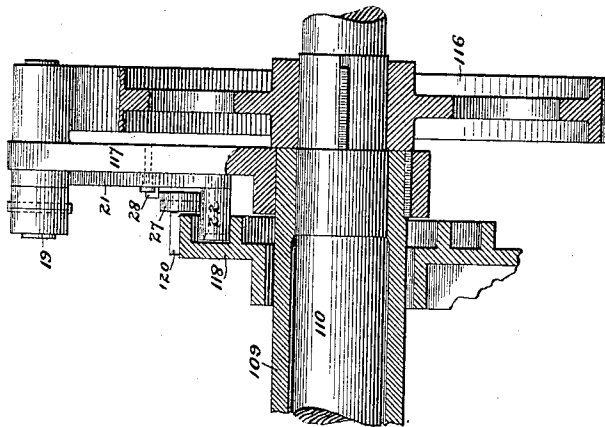


Fig. 19.



Attest:  
*John A. Ellis,*  
*A. S. Jasbera.*

Inventor:  
*James E. Munson,*  
*by Munson & Philipp*  
*Attys.*

J. E. MUNSON.  
TYPE SETTING MACHINE.

No. 320,272.

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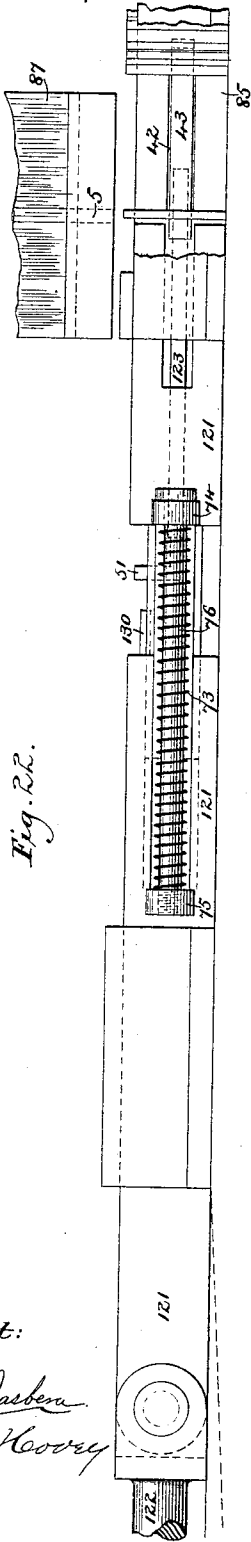


Fig. 22.

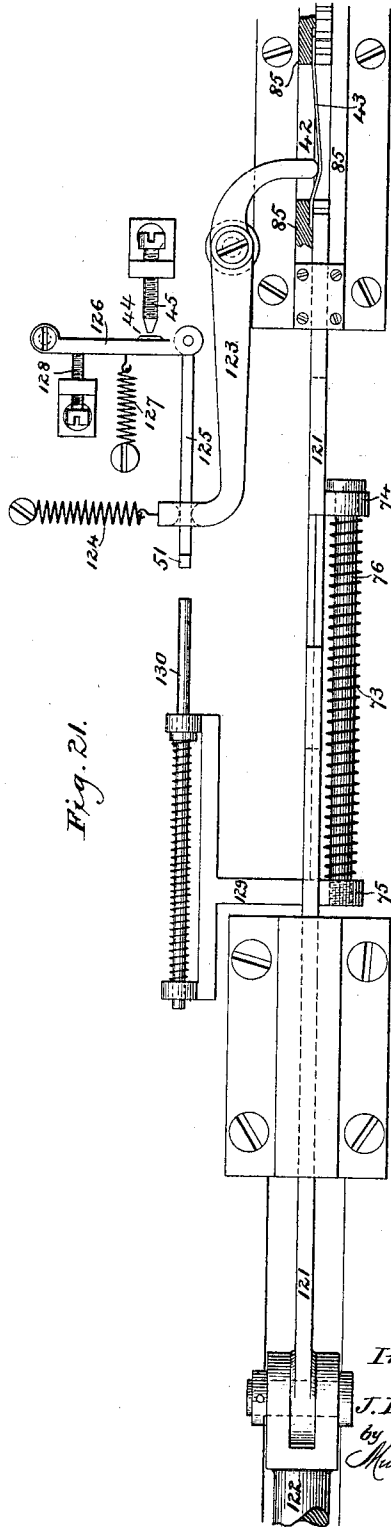


Fig. 21.

Attest:

*A. St. Jaeger*  
*J. A. Hoover*

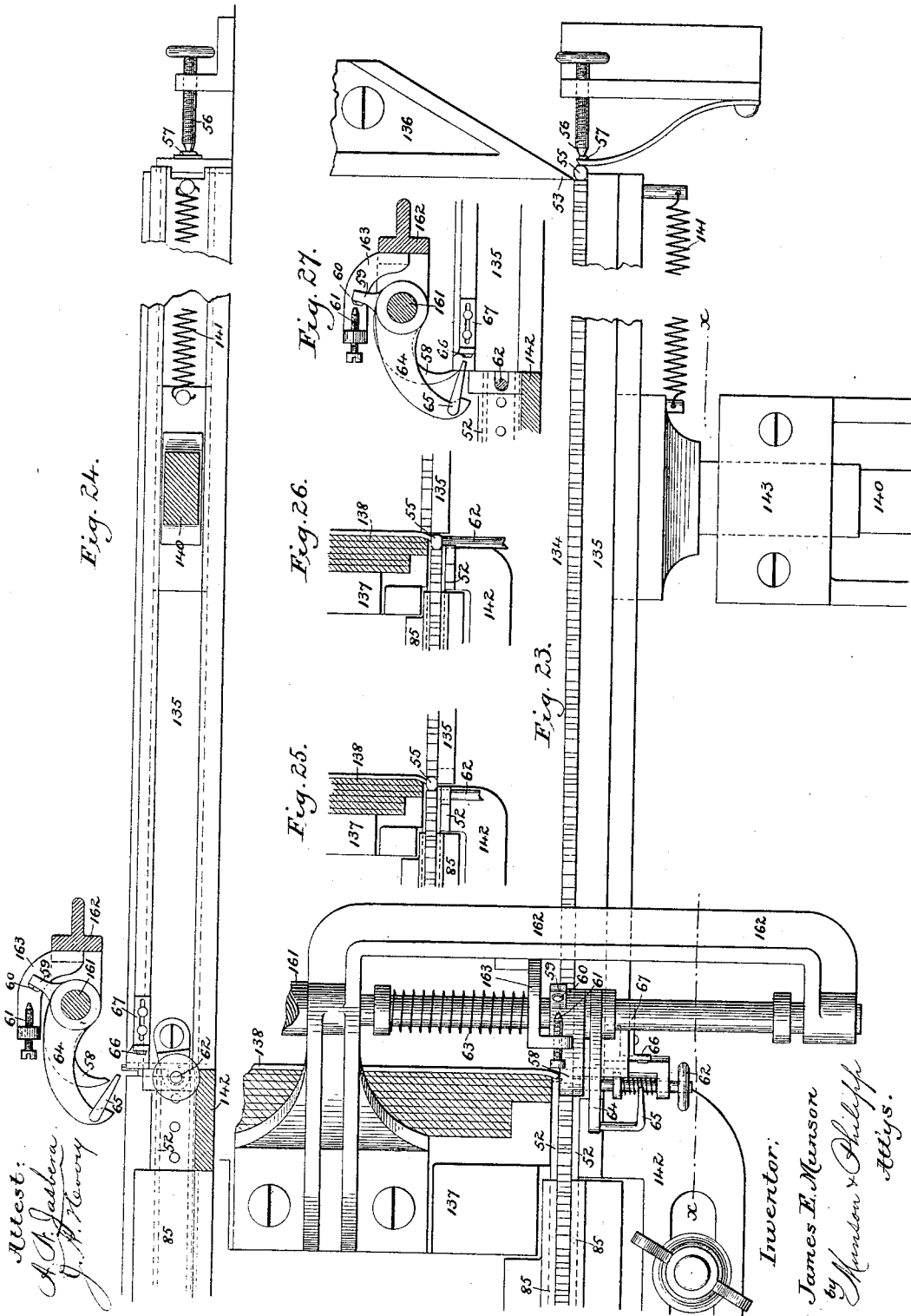
Inventor;

*J. E. Munson,*  
*by*  
*Munson & Philpp*  
*Attys.*

J. E. MUNSON.  
TYPE SETTING MACHINE.

No. 320,272.

Patented June 16, 1885.



Attest:  
*A. C. Gashner*  
*J. H. Flawry*

Inventor:  
*James E. Munson*  
*by Munson & Phillips*  
*Attys.*

(No Model.)

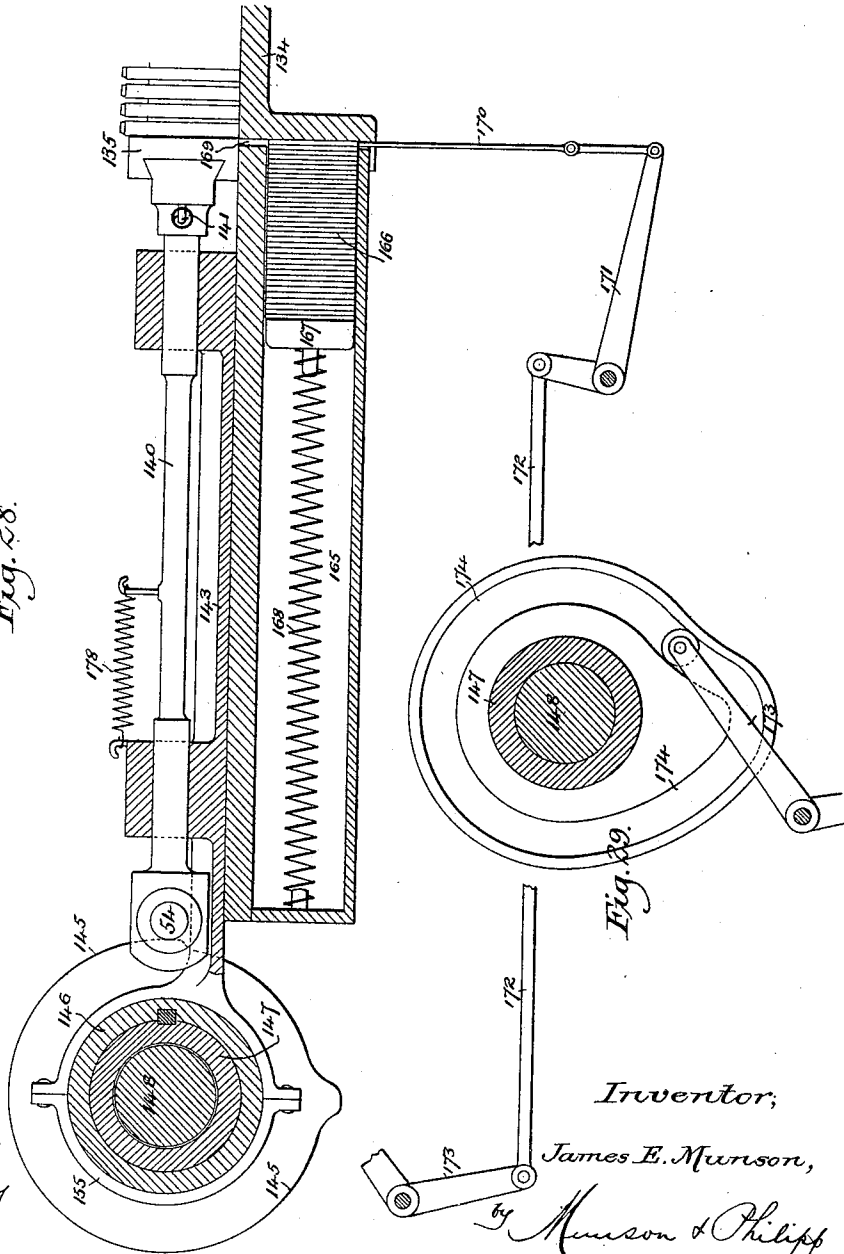
16 Sheets—Sheet 14.

J. E. MUNSON.  
TYPE SETTING MACHINE.

No. 320,272.

Patented June 16, 1885.

Fig. 28.



Attest:  
*Geo. N. Graham*  
*J. A. Harvey*

Inventor,  
*James E. Munson,*

*by Munson & Philipp*  
Attys.

J. E. MUNSON.

TYPE SETTING MACHINE.

No. 320,272.

Patented June 16, 1885.

Fig. 30.

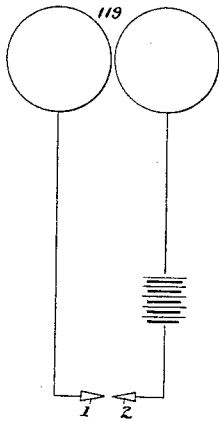


Fig. 31.

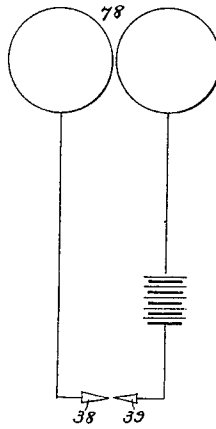


Fig. 32.

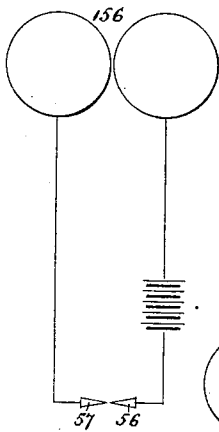


Fig. 33.

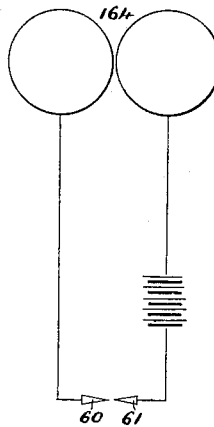
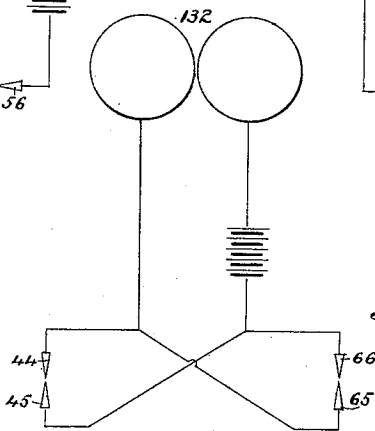


Fig. 34.



Attest:

*A. D. Jastrow*  
*J. P. Harvey*

Inventor:

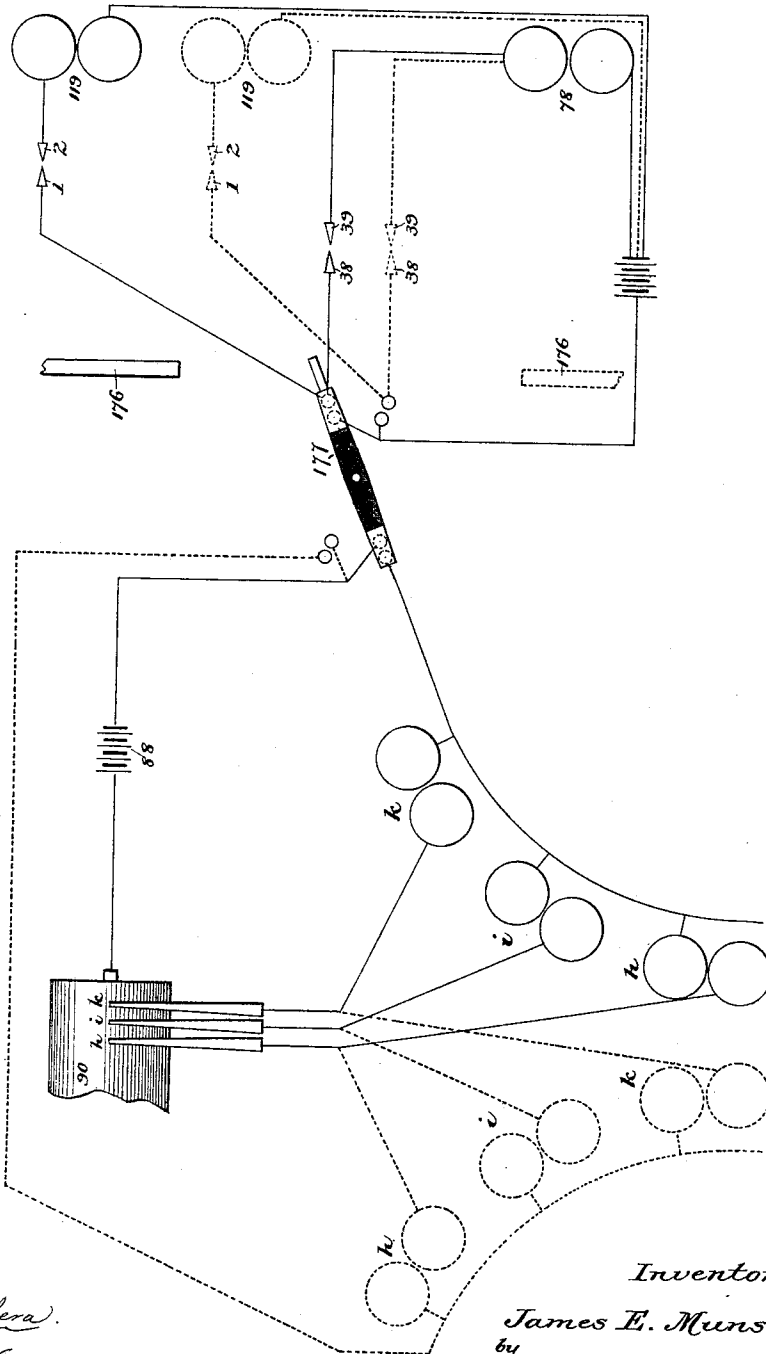
*James E. Munson*  
*by* *Munson & Philipp*  
*Attys*

J. E. MUNSON.  
TYPE SETTING MACHINE.

No. 320,272.

Patented June 16, 1885.

Fig. 35.



Attest:  
*A. J. Jastbera.*  
*J. A. Hovey*

Inventor;  
*James E. Munson,*  
 by  
*Munson & Philippi*  
 Attys



# UNITED STATES PATENT OFFICE.

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

## TYPE-SETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 320,272, dated June 16, 1885.

Application filed September 9, 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, and State of New York, have invented certain new and useful Improvements in Type Setting Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 In a former application for United States Letters Patent I have described a method of setting type by machinery in which the matter to be composed is indicated upon a ribbon or strip of paper or similar material by perforations representing the different types, "spaces," &c., the ribbon or strip thus prepared being afterward used to control the type selecting devices, thereby making the operation of the type-setting mechanism entirely automatic. In said application I have also described a method of correcting and justifying the composition upon the perforated ribbon before the same is used to operate the type-selecting mechanism.

25 The present invention relates to a type-setting mechanism which is designed and adapted to operate according to the method described in my said former application; and to aid in a ready understanding of its object and operation, the manner of preparing the operating-ribbon will be first briefly described.

30 The matter which is to be put in type is first indicated upon a ribbon of paper or similar material, of suitable width to be conveniently manipulated, by transverse rows of 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 perforations in each row may be the same or it may vary. Thus some of the types, &c., may be represented by a single perforation, and others by combinations of two, three, or more perforations; but, as set forth in said former application, it is preferable that the same number of perforations should be used for each of the types, &c., and that this number should be three, and also that the number of possible perforations in each row should be ten.

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

rows of perforations are separated from each other by spaces proportioned to the running thicknesses of the types, &c., which they represent.

55 The ribbon may be thus prepared by hand or by any suitable form of mechanism for that purpose—such, for example, as that shown in an application for Letters Patent heretofore filed by me.

60 After the ribbon has been thus prepared, it will be examined by the proof-reader, who will note thereon the necessary corrections, after which the ribbon will pass to the justifier.

65 By reason of the proportionate spacing before mentioned the proper points for dividing the composition into lines can be readily ascertained by the use of a suitable scale or measure, due allowance, of course, being made for the corrections noted by the proof-reader. In the process of correcting and justifying the composition, the changes noted by the proof-reader will be made by punching additional rows of perforations to represent types, &c., to be added, or by eliminating (by covering, filling, or otherwise) rows of perforations representing improper types, &c., or both; and additional rows of perforations will be made at the proper points to represent the spaces or quads to be added to fill out short lines, or rows of perforations, representing spaces, &c., which must be removed to shorten long lines, will be eliminated, or both. When a word is divided at the end of a line, a row of perforations representing the hyphen will of course be inserted and properly allowed for in the justification. At the end of each line the justifier will add a row of perforations representing a large quad, which will serve to indicate the line-divisions after the matter is put in type.

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100 The ribbon thus prepared may be used to control the operation of the type-selecting devices; but in order to permit the setting mechanism to operate uniformly and at its maximum speed, it is necessary that the rows of perforations upon the operating-ribbon should be uniformly spaced. The ribbon, therefore, after having its matter corrected and justified, is reproduced with its rows of perforations uniformly spaced, and this reproduction is used to control the type-selecting devices.

This reproduction of the ribbon may be accomplished automatically by means of a mechanism which will form the subject-matter of a future application for Letters Patent.

5 It is of course apparent that the rows of perforations may be evenly spaced upon the ribbon in the first instance, and this ribbon used for controlling the selecting devices, the matter being corrected and justified after it is  
10 in type in the usual manner. It is preferable, however, that the correcting and justifying be done upon the ribbon.

In operating the type setting mechanism in which the present invention is embodied, the  
15 ribbon, prepared as described, is advanced beneath the ends of a series of feelers located in an electric circuit and forming circuit-closers, so that when they are permitted to pass through the perforations in the ribbon,  
20 circuits are formed which operate a selecting mechanism, which acts upon the principle described in United States Letters Patent No. 246,411, and permits the types, spaces, &c., to be ejected from their respective reservoirs  
25 in the order in which they are represented upon the ribbon, thus making the operation of the type-setting mechanism entirely automatic.

The construction and organization of the  
30 various mechanisms by which this method is carried into practical operation will be hereinafter so fully described and particularly pointed out as to render further preliminary description unnecessary.

35 In the accompanying drawings, which illustrate the application and operation of the present invention, Figures 1 and 1<sup>a</sup> are a front elevation of a mechanism embodying the present invention. Figs. 2 and 2<sup>a</sup> are a plan view  
40 of the same, certain details being omitted in each of these figures for the sake of avoiding confusion. Figs. 3, 4, and 5 are, respectively, a side elevation, an end elevation, and a plan view, upon a smaller scale, showing the various  
45 shafts and gears by which motion is imparted to the various parts. Fig. 6 is an enlarged side elevation, partly in section, of the ribbon-feeding mechanism, showing, also, the mechanism for automatically arresting the feed under  
50 certain conditions. Fig. 7 is a plan view of the same, certain of the upper parts being partially broken away. Figs. 8 and 9 show details of the arresting mechanism. Fig. 10 is a diagram illustrating the connections between the feelers and the electro-magnets  
55 which operate the selecting-plates. Fig. 11 is a view showing the order of the perforations in these selecting-plates and in the front and back of the casing inclosing the same. Fig. 12 is a  
60 plan view upon an enlarged scale of the type-selecting mechanism and adjacent parts. Fig. 13 is a vertical section of the same taken upon the line *xx* of Fig. 12. Figs. 14 and 15 are vertical sectional details taken, respectively,  
65 upon the lines *zz* and *vv* of the same figure. Figs. 16 and 17 are details upon an enlarged scale, showing the parts of Figs. 14 and 15 in

different positions. Fig. 18 is a vertical section taken upon the line *xx* of Fig. 2<sup>a</sup>, showing, upon an enlarged scale, the cam and clutch  
70 mechanism for operating the type-pushers. Fig. 19 is a transverse vertical section of the same. Fig. 20 is a plan view of the lever for operating the pawl of said clutch. Fig. 21 is an enlarged plan view of a portion of the composing-stick and of the mechanism for advancing  
75 the line of matter therein, showing also a mechanism by which, under certain conditions, the machine will be automatically arrested. Fig. 22 is a side elevation of the same. Fig. 23 is an enlarged plan view of a portion of the galley and the column-pushing mechanism. Fig. 24 is a vertical section taken upon the line *xx* of Fig. 23. Figs. 25, 26, and 27  
80 are details, which will be hereinafter referred to. Fig. 28 is an enlarged vertical section taken upon the line *yy* of Fig. 2<sup>a</sup>. Fig. 29 is a like view taken upon the line *vv* of the same figure; and Figs. 30 to 35, inclusive, are diagrams illustrating the various electrical connections.  
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Referring now particularly to Figs. 1 to 10, inclusive, it is to be understood that the operating ribbon 10, after having been prepared in the manner hereinbefore stated, and as described in my former application, hereinbefore referred to, is led from a reel or other suitable support (not shown) to the feeding-roll 90, 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.  
95

In order to insure the positive and accurate feeding of the ribbon, it may be provided, in addition to the perforations indicating the composition, with one or more longitudinal rows of feeding-perforations, as 9, which will be engaged by suitable sprockets, as 8, upon the feeding-roll.  
100

The feeding-roll 90 receives motion from the main shaft 100, which is provided with the usual fast and loose pulleys, 101 102, and balance-wheel 103, and is connected by gears 98 99 with a counter-shaft, 97, which is provided with a worm, 96, which engages with a worm-gear, 95, the shaft 94 of which is connected by a ratchet-clutch, 92 93, the purpose of which  
105 will hereinafter appear, with the shaft 91 of said roll, the worm 96 and worm gear 95 being so proportioned that the ribbon will be advanced a distance equal to or somewhat less than the distance between two of its transverse  
110 rows of perforations during each revolution of the shaft 97.

The feelers *a b c*, &c., are insulated from the frame of the machine, and are connected by a series of wires, *a b c*, &c., (see Fig. 10,) with one pole of a series of electro-magnets, *a b c*, &c., corresponding in number with the feelers.  
115 The feeding-roll 90, which is of conducting-material, is also insulated from the frame of  
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130

the machine, and is connected by a wire, 89, and branch wires with the opposite pole of said magnets, the circuits thus formed being provided with suitable battery-power, as indicated at 88.

The armatures 50 of the magnets *a b c*, &c., are mounted upon the ends of a series of pivoted levers, *a b c*, &c., the opposite ends of which are connected to a series of selecting-plates, *a b c*, &c., (see Figs. 11, 12, and 13,) corresponding in number to the magnets, and arranged to operate upon the principle set forth in my former Letters Patent, before referred to. These plates, which, as herein shown, consist of thin strips of metal or other suitable material, are arranged side by side in a casing, 49, (see Figs. 2, 12, and 13,) located just in front of the type-pushers and in the rear of the composing-case. The front and back sides, 7, of the casing 49 (see Figs. 11 and 13) are provided with perforations corresponding to the type-pushers; but the perforations in the selecting-plates *a b c*, &c., are so arranged that when said plates are in their normal positions, as indicated in Fig. 11, 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 type-pusher, different plates being moved to permit the passage of the different pushers.

The composing-case 87 and the guiding apparatus 86, for conducting the types from said case to the composing-stick in which the line is formed, are, as herein shown, of substantially the construction described in United States Letters Patent No. 174,901, and consequently require no detailed description. It may, however, be said in passing that the case 87 contains a number of type-channels, 6, corresponding to the number of different types, spaces, &c., which the machine is capacitated to set, said channels being provided at their lower ends with openings 4, corresponding to the openings in the plates 7, through which the pushers enter the channels to eject the types, &c., and with openings 3, through which the types, &c., as they are ejected pass to the channels 5 of the guiding apparatus to be conveyed to the composing-stick, as indicated in Figs. 1 and 1<sup>a</sup>.

The type-pushers 12 (see Figs. 2, 2<sup>a</sup>, 12, and 13) are supported in grooves in a bed-plate, 104, in which they move freely, and are provided at their rear ends with extensions 11, which move freely in openings in a cross-bar, 105, which receives a forward and back movement by means of rods 106 and eccentrics 107, which are operated in a manner that will be hereinafter explained. The rear ends of the extensions 11 are provided with heads 13, which are larger than the openings in the bar 105, so that at each backward movement of the bar all of the pushers are withdrawn and forced against a series of springs, 14, which are secured to a fixed portion of the frame-work. The bar 105 is provided with a series of for-

wardly-extending spring-pawls, 15, corresponding in number to the pushers, and each of the pushers is provided upon its upper side with a notch, 26, arranged in such position as to normally lie directly beneath the end of its corresponding pawl. The bed-plate 104 is provided with a raised portion, 16, through which are cut channels for the pushers. The portion 16 is somewhat thicker than the height of the pushers, so that when the latter are in their retracted position, as shown in Figs. 2, 12, and 13, the pawls 15, which at their ends are wider than the pushers, will ride up upon the portion 16 and be held out of engagement with the notches 26.

As the types, &c., are ejected from their channels in the composing-case they pass into corresponding channels, 17, formed in the upper side of a tilting platform, 84, which is mounted upon a shaft, 83, journaled in the frame-work, and is normally held in a horizontal position by a spring, 82. The shaft 83 is provided with a rock-arm, 81, which at each forward movement of the bar 105 is engaged by a rod, 108, so that as soon as the selected type is ejected into its channel 17 the platform 84 will be tilted so as to discharge said type into the proper channel of the guiding apparatus.

The eccentrics 107, by which the bar 105 is reciprocated, are mounted upon a sleeve, 109, which turns loosely upon a shaft, 110, which receives a continuous rotary movement from the shaft 97 through the gears 111 112 113 114 and the vertical shaft 115, said gears being so proportioned that the shafts 97 110 revolve synchronically. The shaft 110 (see Figs. 18 and 19) is provided with a ratchet, 116, and the sleeve 109 with an arm, 117, the outer end of which is provided with a pivoted pawl, 18, which normally engages with said ratchet, so that said shaft and sleeve revolve together, thereby reciprocating the bar 105. The shaft 19, upon which the pawl 18 is mounted, is provided with an arm, 20, to the end of which is secured a rod, 21, carrying a bowl or stud, 22, which lies in the groove of a stationary cam, 118, said cam being so shaped that at the end of each revolution of the sleeve 109 the shaft 19 is rocked, so as to disengage the pawl 18 and arrest the movement of said sleeve, in which position the parts will remain until the pawl 18 becomes re-engaged with the ratchet.

The re-engagement of the pawl 18 is automatically effected at the proper time by means of electrical connections, as follows: The selecting-plates *a b c*, &c., are provided at one end with coinciding openings, 23, (see Fig. 15,) through which passes a bar, 24, mounted upon spring-arms 25, and carrying one of the contact-points, 1, of a circuit-closer, the opposite contact-point, 2, of which is mounted upon a bracket secured to the frame of the machine. The circuit in which this closer is located includes the electro-magnet 119, (see Fig. 30,) the armature of which is attached to a lever, 120, the inner end of which lies in the path of

the stud 22 as said stud is raised to disengage the pawl 18 at the end of each revolution of the sleeve 109. The lever 120 is provided with a lateral projection, 27, which, as the lever is raised by the stud 22, engages with a stud, 28, upon the arm 117, so as to arrest said arm and hold the same at the exact point it occupies when the pawl 18 is disengaged, the pawl when once disengaged being held in its disengaged position by the action of the spring 29. From this it results that whenever any one or more of the magnets *a b c*, &c., is or are energized so as to move any one or more of the selecting-plates the points 1 2 are brought together, so as to close the circuit through the magnet 119, as shown in Fig. 17, thereby energizing said magnet and causing it to draw the lever 120 downward, so as to disengage the projection 27 and stud 28 and re-engage the pawl 18 with the ratchet 116, as shown in Fig. 18. The contact-point 2 is made adjustable, so that its position may be accurately fixed with relation to the movements of the selecting-plates.

To prevent a second revolution of the sleeve 109, and through it a second reciprocation of the selected type-pusher, in case the selecting-plates should not retire in time to break the circuit through the magnet 119 before said sleeve had completed one revolution, the bar 24 is provided with a stud, 30, which, when the circuit is closed, is in position to be engaged by one arm of a bell-crank lever, 31, the other arm of which is in position to be engaged by a rod, 32, carried by the bar 105, said rod being of such length as to operate the lever 31 and depress the bar 24, so as to carry the points 1 2 out of contact and break the circuit through the magnet 119 just as the bar 105 reaches the limit of its forward movement. The bar 24 is provided upon its front side with one or more ribs, 33, which as the bar is depressed are forced by the springs 25 into corresponding recesses, 34, in the ends of the selecting-plates, thereby holding the bar depressed and keeping the circuit through the magnet 119 broken until the plates begin to retire, as shown in Fig. 16.

The operation of the mechanism thus far described is as follows: The driving-belt having been shifted onto the fast pulley so as to set the machine in motion, the operating-ribbon will be advanced by the roll 90 until the transverse row of perforations representing the first type 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 upon the operating-ribbon is not material, but that, for reasons elsewhere explained, it is preferable that each row should consist of three perforations. 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 i k*, so that said feelers will come into con-

fact with the roll 90, as indicated in Fig. 10. As soon as this happens circuits will be completed through the roll 90, wire 89, battery 88, and the magnets, wires, and feelers *a i k*, so that the magnets *a i k* will become energized. As soon as the magnets *a i k* are energized their armatures 50 will be attracted, thereby rocking the levers *a i k* and moving the corresponding selecting-plates to the left, so that at one point an opening will be formed through the entire series of selecting-plates and the front and back plates of their casing 49, as indicated upon the line *x x* of Fig. 11. As the selecting-plates *a i k* are moved to the left they will move the bar 24 so as to bring the contact-points 1 2 together and close the circuit through the magnet 119, as indicated in Figs. 17 and 30, thereby energizing said magnet and causing it to draw the lever 120 downward, so as to release the arm 117 and engage the pawl 18 with the ratchet 116, as shown in Fig. 18. As soon as this takes place the sleeve 109 will commence to revolve with the shaft 110, thereby, through eccentrics 107 and rods 106, advancing the bar 105. As the bar 105 advances the springs 14 will advance all of the pushers through the openings in the plate 7, where all, save the one upon the line *x x*, will be arrested by coming in contact with the solid portions of the selecting-plates before their notches 26 have passed beyond the edge of the projection 16. The single pusher upon the line *x x* will continue to be advanced by its spring 14 until its notch 26 has passed beyond the projection 16, when the corresponding spring-pawl, 15, will enter the notch 26 of said pusher and drive it forward through the opening formed in the selecting-plates and into the corresponding channel, 6, of the composing-case, thereby ejecting the selected type into the corresponding channel, 17, of the tilting platform 84, the other pawls, 15, in the meantime riding idly upon the smooth upper sides of their pushers. As the bar 105 nears the limit of its forward movement the rod 108 will engage with the rock-arm 81, so as to tilt the platform 84 and permit the type thus ejected to fall into its channel in the guiding apparatus and be conveyed to the composing-stick. At or about the same time that the rod 108 engages with the rock-arm 81 the rod 32 will engage with the bell-crank lever 31, thereby rocking said lever so as to break the circuit through the magnet 119, as already explained. As the bar 105 makes its return movement it will engage with the heads 13, so as to withdraw all the pushers and restore them to their original position against the springs 14, and the spring 82 will restore the platform 84 to its horizontal position. Shortly after the selected pusher has passed through the selecting-plates the feed of the operating-ribbon will carry the first row of perforations from beneath the ends of the feelers *a i k*, thereby breaking the circuits through the magnets *a i k*, so that upon the withdrawal of the se-

lected type-pusher the selecting-plates *a i k* will be at once restored to their normal position by the springs 35. When the bar 105 has reached the limit of its backward movement, the sleeve 109 will have completed a revolution, and the pawl 18 will be again disengaged from the ratchet 116 and the arm 117 arrested by the action of the cam 118; and so the operation will continue to be repeated as each new row of perforations passes beneath the ends of the feelers *a b c*, &c., the particular selecting-plates which in each case are moved and the particular type-pusher which is permitted to operate being determined by the position of the perforations in the operating-ribbon.

As the successive types, &c., are ejected from the composing-case, as just described, they pass downward in the conveying-channels of the guiding apparatus and are deposited one after another in the composing-stick 85, the line of types thus formed being gradually moved forward to make room for the incoming types by the line-pusher 121. (See Figs. 21 and 22.) This line-pusher is operated by a connecting-rod, 122, which receives motion from an eccentric, 79, (see Fig 1,) secured to a sleeve, 80, (see Fig. 2,) loosely mounted upon the counter-shaft 97. It is necessary to operate the line-pusher only when a type has arrived in front of it ready to be pushed along in the composing-stick, so that the number of reciprocations of the line-pusher shall correspond exactly to the number of types set. It is also important that the line-pusher shall operate immediately after the arrival of the type in the composing-stick. For this purpose the sleeve 80 and shaft 97 are connected by a clutch mechanism exactly similar to that shown in Figs. 18 and 19, so that as soon as the electro-magnet 78 thereof is energized, the line-pusher will make its forward and return motion and then be automatically arrested.

In order to energize the magnet 78 at the proper time, the bar 105 carries a forwardly-extending rod, 77, (see Figs. 2 and 12,) the end of which is provided with a hook, 36, which as the bar advances slips past the end of a yielding lever, 37, which is controlled by springs 40 41, and carries one of the contact-points of a circuit-closer located in the circuit of said magnet, as indicated in Fig. 31. As the bar 105 nears the limit of its backward movement the hook 36, instead of slipping past the end of the lever 37, engages with said end, thereby rocking said lever and bringing the contact-points 38 39 together, so as to close the circuit through the magnet 78 and start the line-pusher.

The rod 77 is made adjustable, so as to allow of regulating the time when the circuit is closed in such manner that, after the selected pusher has caused a type to be ejected, said type will have just enough time to pass down into the composing-stick before the line-pusher begins to operate.

To avoid the necessity of stopping the op-

eration of type-setting during the brief period of time when a line is pushed into the galley, as will be hereinafter described, the line-pusher is given a longer range of motion than is required for simply keeping the type removed from beneath the end of the guiding apparatus and is made yielding, so that several types may be pushed forward in the composing-stick, while the whole line remains stationary. To effect this the pusher 121 is made in two parts, which are arranged to telescope in the manner indicated in Figs. 21 and 22, the parts being connected by a rod, 76, which is rigidly secured to an ear, 75, upon the rear part of the pusher, but slides freely in a corresponding ear, 74, upon the forward part, said rod being provided with a spring, 73, the tendency of which is to hold the two parts of the pusher in their expanded position. By means of this arrangement it will be seen that when the pusher meets with any undue resistance—as when the whole line of type in the stick is temporarily arrested—its front part will yield sufficiently to allow the mechanism to continue to operate without danger of breaking.

If at any time, either from the catching or clogging of the types in the channels of the guiding apparatus, or by reason of the types in some of the channels of the composing-case becoming exhausted, the type-pusher should move forward without a type being in front of it, the feeding of the operating-ribbon and the type-setting will be automatically arrested in the following manner:

Referring to Figs. 6, 7, 8, and 9, it will be observed that the part 93 of the clutch, which connects the continuously-driven shaft 94 with the shaft 91 of the feeding-roll 90, is secured to a sleeve, 72, which is splined to the shaft 91, so as to be capable of a slight movement longitudinally of said shaft, and is provided with a circumferential groove, in which rests a loosely-fitting band, 71, which is pivotally attached to the arms 70 of a yoke, forming one arm of a bell-crank lever fulcrumed in a bracket, 131, and carrying upon its other arm, 69, the armature 68 of an electro-magnet, 132. The bracket 131 is bifurcated at its upper end so as to form cheek-pieces 46, which lie upon each side of the arm 69, one of said cheek-pieces being provided with a spring-pressed locking-pin, 47, which, when the arm 69 is raised, as in Fig. 6, rests against said arm, but which, when said arm is lowered, as in Figs. 8 and 9, enters an opening, 48, and locks said arm in its lowered position. By reason of this arrangement it will be seen that whenever the magnet 132 becomes energized, so as to draw its armature 68 downward, the yoke 70 will be rocked, so as to disengage the parts 92 93 of the clutch and arrest the feed of the operating-ribbon, and that said clutch, when so disengaged, will remain in that position until released by the withdrawal of the pin 47.

Referring now to Figs. 21 and 22, it will be observed that the inner wall of the composing-

stick 85 is provided, at a point just in advance of that at which the stick receives the types from the guiding apparatus, with a longitudinal slot, 42, across which is arranged a thin strip of spring metal, 43, against the outside of which rests one arm of a curved pivoted lever, 123, the opposite arm of said lever being acted upon by a spring, 124, in such manner as to bend the strip 43 inward and partially close the channel of the composing-stick. It will also be observed that the forward end of the line-pusher 121 is bifurcated, so as to straddle and not interfere with the strip 43 and the end of the lever 123. The longer arm of the lever 123 is provided at a point near its end with an opening, through which passes a rod, 125, which is pivotally attached to the end of a swinging bar, 126, carrying one contact-point, 44, of a circuit-closer, the opposite point, 45, of which is mounted in a bracket upon the frame of the machine, these points being in circuit with the magnet 132, as indicated in Fig. 34. The contact-points 44 45 are normally held away from each other by a spring, 127, which acts upon the bar 126, the position of said bar being regulated by a set-screw, 128. The rear part of the line-pusher 121 is provided with a laterally-projecting arm or bracket, 129, in which is mounted a yielding push-rod, 130, said rod being so positioned that as the line pusher advances it will engage with a projection, 51, extending from the rod 125, if the latter is allowed to remain in its normal position. From this arrangement it is apparent that when the line-pusher in its forward movement has a type in front of it such type will press outward the strip 43, and, by means of the lever 123, cause the end of the rod 125 to move to one side and allow the rod 130, in its forward movement, to pass the projection 51, and so not operate the circuit-closer, but that when no type is in front of the line-pusher the lever 123 will not be moved and the rod 125 will remain in its normal position, so that the projection 51 will be engaged by the rod 130, thereby carrying the points 44 45 into contact and closing the circuit through the magnet 132, so as to arrest the feed of the operating-ribbon and the operation of the machine. Any difficulty which may have occasioned the stoppage of the machine having been corrected, the pin 47 will be withdrawn by hand, upon which the spring 133 will at once re-engage the clutch and start the feed-roll 90.

Referring now particularly to figures 1<sup>a</sup> 2<sup>a</sup> and 23 to 29, the mechanism by which the line of composition in the composing-stick 85 is put into column or page form will be described. This mechanism consists, essentially, of a galley, 134, arranged at the end and upon one side of the composing-stick, and a column-pusher, 135, arranged opposite the open end of said galley. The side 136 of the galley is made stationary and, for a purpose which will hereinafter appear, is beveled so as to present a sharp edge, 53, at its forward end. The op-

posite side, 137, is made adjustable so as to capacitate the galley to receive any desired width of column or page, and is provided with a slightly elastic and yielding facing, 138, so that it may accommodate itself to lines which are slightly in excess of the proper length, it being slightly curved at its front end so as to readily receive such lines.

The composing-stick 85 is provided at its end with adjustable extension-pieces 52, one of which is attached to the side 137 of the galley and the other to an adjustable stop, 142, by means of which the length of the stick will be varied so as to conform to the different adjustments of the side 137 of the galley. The galley is also provided with a yielding follower, 139, which supports the head of the column or page and prevents the types from falling out of their places in the lines.

The column-pusher 135 is mounted upon and operated by a rod, 140, but, for a purpose which will hereinafter appear, it is so secured to said rod as to be capable of an endwise movement, and is provided with a spring, 141, the tendency of which is to constantly draw it to the left and hold it against the stop 142, and in such position, as shown in Figs. 2<sup>a</sup> and 25, that it must be moved slightly to the right before it can push a line of type into the galley. The column-pusher may be made extensible, so as to be capable of contraction or expansion to correspond with the different adjustments of the side 137 of the galley, or different pushers may be used for columns or pages of different widths. The rod 140, upon which the column-pusher is mounted, is provided with a stud or bowl, 54, which is acted upon by a cam, 144, so as to give to said rod a reciprocating motion. The cam 144 is mounted upon a sleeve, 146, which is splined to a second sleeve, 147, mounted loosely upon a shaft, 148, which is continuously driven from the main shaft 100 through gears 149 150, shaft 151, and gears 152 153, (see Figs. 2 and 2<sup>a</sup>.) said shaft 148 and sleeve 147 being provided with a clutch, 154, of the construction described in connection with Figs. 18 and 19, so that whenever they are connected the sleeve will make one revolution and then be automatically arrested. The rod 140 is mounted in bearings in an adjustable support, 143, which support is also provided with a yoke or band, 155, which embraces the sleeve 146, so that as the length of the column-pusher 135 is varied the rod 140 and its cam 144 can be shifted so as to always act against the center of said pusher.

The construction of the remaining portions of the column or page forming apparatus will now be described in connection with an explanation of its operation, which is as follows: The line of type in the composing-stick will continue to be advanced by the line-pusher until the forward type, 55, which is the large low quad before referred to for marking the line-divisions, has passed the edge 53 of the side of the galley, as shown in Fig. 23. As

the quad 55 passes this edge it presses a spring contact-point, 57, against a fixed contact-point, 56, thereby closing an electric circuit through a magnet, 156, as indicated in Fig. 32. As soon as the magnet 156 becomes thus energized it will attract its armature 157, (see Fig. 1,) and thereby, through the bell-crank lever 158, rod 159, and arm 160, rock a shaft, 161, which is mounted in a bracket, 162, rising from the adjustable side 137 of the galley. The shaft 161 is provided with a curved rearwardly-extending arm, 58, the end of which, as the shaft is rocked, enters the space above the large low quad and between the lines, and engages with the end of the column-pusher 135, (see Fig. 27,) so as to move said pusher away from the stop 142 and force it to the right until it is exactly flush with the last type in the line, as shown in Fig. 26. The arm 58 is provided with a projection, 59, carrying a contact-point, 60, which, as the arm reaches the limit of its forward movement, engages with a second contact-point, 61, mounted upon an arm, 163, thereby closing an electric circuit through the magnet 164 of the clutch 154, as indicated in Fig. 33, and operating said clutch so as to connect the shaft 148 and sleeve 147 and cause the cam 144 to advance the column-pusher and move the line of type into the galley, as shown in Fig. 26. The large low quad 55 at the foremost end of the line of type does not, in this operation, go into the galley, but is separated from the other types by the sharp edge 53 of the fixed side of the galley, and passes into a special reservoir (not shown) provided for it. To facilitate this part of the operation, the corners of the quad 55 are beveled a little, so as to more readily admit the sharp edge 53, as stated. As the quad 55 passes from the contact-point 57, the circuit through the magnet 156 will at once be broken, so that said magnet will release its armature and allow the arm 58 to resume its normal position. This return movement of the arm 58 will in turn break the circuit through the magnet 164, so that at the end of one revolution of the shaft 148 the sleeve 147 will be released and the column-pusher arrested in its normal position. The line of type in the composing-stick will then be advanced again, and the operation will be repeated at the proper time. In order to prevent the quad 55 at the head of the next line of type that is coming forward in the composing-stick from bearing against the end of the column-pusher while it is in motion, with the considerable force transmitted from the line-pusher, the column-pusher is provided with a spring-pressed stud, 62, which, as the pusher advances, passes forward through the space opened between said pusher and the side 52 of the stick, and presses the quad against the opposite side of the stick and holds it fixed there, thus stopping the forward movement of said quad, as well as that of all the types back of it, as long as the column-pusher is in motion, as shown in Fig.

26, but releasing the quad as soon as the pusher has returned to its position of rest, thereby permitting the line of types to again advance in front of the galley.

If, through a mistake of the justifier in the correction of the operating-ribbon, or from any other cause, a line comes before the galley that is either longer than the galley, with its flaring opening, can accommodate, or that is too short, the feed of the operating-ribbon, and through it the type-setting, is automatically arrested in the following manner: The arm 58 is mounted loosely upon the shaft 161, but is held in position by a spiral spring, 63, of proper strength, so that if said arm is arrested before it has reached the limit of its forward movement the shaft 161 can continue its movement for a short distance. The shaft 161 is also provided with a second arm, 64, which is so positioned as to travel a short distance behind the arm 58 in its movement toward the line of types. The arm 64 carries a contact-point, 65, which is so positioned that when said arm has reached the limit of its forward movement it will engage with a contact-point, 66, mounted upon a bracket, 67, which is adjustably secured to the column-pusher 135, provided said column-pusher has not been previously moved out of the way by the action of the arm 58. The contact points 65 66 are electrically connected with the magnet 132, as indicated in Fig. 34, so that when they are brought together a circuit is closed through said magnet, which at once operates the clutch 92 93 and arrests the feed of the operating-ribbon. From this arrangement it results that if a line of type is of the proper length to be admitted to the galley the arm 58 will be permitted to advance far enough to move the column-pusher, and with it the contact-point 66, out of the way of the contact-point 65, so that the circuit will not be closed through the magnet 132. When, however, the line is too long to be admitted to the galley, the arm 58 will be arrested before it has moved the column-pusher far enough to the right to carry the point 66 out of the way of the point 65, so that in such case the two points will come together, thereby closing the circuit through the magnet 132 and arresting the machine. The same action takes place when the line of type in front of the galley is so short that the arm 58, instead of entering the space over the low quad, strikes the face of a type behind said quad. It will thus be seen that the clutch 92 93, which controls the feed of the operating-ribbon, becomes automatically effective, not only in case of the clogging of or other accidents to the types on their way into the composing stick, but also when the lines in front of the galley are not of proper length.

In order to "lead" the composition as the column or page is formed in the galley a quantity of leads, 166, are arranged in a reservoir, 165, located beneath the column-pusher, as shown in Fig. 28. The reservoir 165 is provided with a follower, 167, and a spring, 168, by



which the leads are kept constantly pressed to the front of the reservoir. The reservoir 165 extends to a point just back of the line of advancing type and at that point the bottom of the galley 134 is provided with a narrow opening, 169, through which the leads are successively pushed at the proper times to be advanced into the galley with the lines of type.

The ejecting of the leads is effected by means of a pusher, 170, which passes through a narrow opening in the bottom of the reservoir 165 and is operated by a bell-crank lever, 171, which is connected by a link, 172, with one arm of a second bell-crank lever, 173, the other arm of which is provided with a stud, 175, which lies in the path of a cam, 174, mounted upon the sleeve 147, as shown in Figs. 2<sup>a</sup> and 29.

When the matter is to be leaded, it is evident that the extreme backward position of the column-pusher should be somewhat further removed from the line of type last pushed into column than when leading is not desired, so as to accommodate the thickness of the lead back of the line of type which is moving forward to the galley. For this purpose the sleeve 146 is provided with a second cam, 145, for operating the column-pusher when leading is desired. The column-pusher may be controlled by either cam 144 or 145 by simply shifting the stud 54 laterally, so as to engage with one or the other of said cams. When it is not desired to lead the matter, it is only necessary to disconnect the link 172 from the bell-crank lever 173.

The cam 145 is so shaped that when the sleeve 147 begins its revolution for pushing a line of type into the galley, the column-pusher will be caused to recede a short distance, so as to allow the lead to be pushed upward between it and the line of type, and will then be caused to advance and carry the line of type and the lead into the galley and recede to its original position, as shown in Fig. 28, where it will remain until the next line is completed.

The type setting mechanism just described may, if preferred, 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 and so as to discharge their types into the same guiding apparatus. In such case the type-pushers 12 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 105 of both sets of type-pushers will be provided with an extra pusher, as 176, (see Fig. 35,) 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, as 177, 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 types, or vice versa. Each set of selecting-plates will in such case be provided with connections, such as already described, for operating its type-pushers, and each bar 105 will be provided with connections for operating the line-pusher, all as indicated in Fig. 35, in which the full lines represent the magnets, connections, &c., for setting Roman, and the dotted lines the corresponding parts for setting Italic letters. In this case the magnets 78 and 119 are shown as connected with the same battery, to which battery the magnets 132, 156, and 164 may also be connected; or, if preferred, separate batteries may be used to operate the several magnets.

When the setting mechanism is thus organized, the compositor, in preparing the operating-ribbon, will, when he finds anything in the "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 pushers 176 to act, so that when the proper point is reached the switch 177 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.

In conclusion, it may be remarked that the mechanism herein described may be varied greatly in many of its details without departing from or sacrificing the advantages of the invention, and also that many parts of the invention may be used without the whole.

Instead of using a separate pawl, 15, for each type-pusher, I can employ a single piece extending across the entire series of type-pushers, and connected to the bar 105 at one or more points in such manner as to allow the front edge of said piece to rise and fall with a yielding force up and down from the fixed rest 16.

I do not confine my invention to the horizontal motion of the selecting-plates, as described. I can make them of greater breadth and give the necessary amount of motion in a vertical instead of a horizontal direction, correspondingly locating the perforations at different heights. This arrangement may, under some circumstances, be preferable. It will permit of the perforations being nearer together laterally and of the type-channels being placed correspondingly nearer together. The narrow spaces between the perforations in the plates will, under such conditions, be relieved from danger of injury from contact with the type-pushers.

Instead of making the selecting-plates straight, I propose in some instances to make them curved, giving them the form of an arc; but in every case their motion is reciprocating. When it is desired to move such curved selecting-plates in the manner most nearly corresponding to the horizontal motion of the se-



lecting-plates, (shown in the drawings,) an oscillating motion corresponding to their curvature will be imparted to them; but they may also be worked vertically, which would give them a motion nearly corresponding to a vertical motion of the straight selecting-plates; or said curved plates may be worked horizontally, which motion would, to a certain degree, correspond to a diagonal motion of the straight selecting-plates. The advantage of such curved form of selecting-plates and of a corresponding arrangement of the type-pushers and of the type-channels is that the distance which the types have to travel in order to get into line may be nearly or quite uniform. This is important in very rapid working.

Corresponding selecting-plates curved not regularly, but irregularly, or formed with sharp changes of direction, like the letter **V**, or even with more than one such change of direction, like the letter **W**, may be used. In short, the form of the selecting-plates may be modified to correspond with the location of the bottoms of the type-channels.

In adapting my invention to that class of type-setting machines in which the type-channels are arranged in a circular series, I can arrange my type-pushers and their connections in a corresponding manner, and employ selecting-plates or equivalent movable parts in the form of partial or complete rings or short cylinders. My selecting parts or plates in this form may reciprocate either horizontally or vertically.

Instead of moving the selecting-plates by means of electro-magnets, I can control the same by other means. In some cases I propose to move said selecting-plates by means of suitable keys arranged in a key-board, thus dispensing with the operating-ribbon.

What I claim is—

1. The combination, with the operating-ribbon, as 10, and means for advancing the same, of a series of feelers, as *a b c*, &c., a series of type-pushers, as 12, and connections whereby the signs upon said ribbon effect the proper selection of said pushers, all substantially as described.

2. The combination, with the operating-ribbon, as 10, and means for advancing the same, of a series of selecting-plates, as *a b c*, &c., a series of type-pushers, as 12, and connections whereby the signs upon said ribbon effect the proper movement of said plates to permit the action of the selected type-pusher, all substantially as described.

3. The combination, with the operating-ribbon, as 10, and means for advancing the same, of a series of feelers, as *a b c*, &c., a series of magnets, as *a b c*, &c., a corresponding series of selecting-plates, and connections, all substantially as described.

4. The combination, with a series of movable selecting-plates, as *a b c*, &c., of a corresponding series of magnets and connections, whereby the energizing of said magnets operates said plates, all substantially as described.

5. The combination, with the composing-case and its series of type-channels, of the series of type-pushers and the interposed series of movable selecting-plates, substantially as described.

6. The combination, with a series of type-pushers, as 12, of a series of selecting-plates, as *a b c*, &c., having openings so arranged that by shifting different plates said openings will be made to coincide at different points, and means for shifting said plates, all substantially as described.

7. The combination, with the series of selecting-plates *a b c*, &c., of the series of type-pushers 12, provided with springs 14, the reciprocating pawl or pawls 15, and projection 16, substantially as described.

8. The combination, with the series of type-pushers 12, of the series of selecting-plates *a b c*, &c., and means for shifting said plates and electrical connections, whereby the movement of any one or more of said plates effects the movement of the selected pusher, all substantially as described.

9. The combination, with the movable contact-point 1, actuated by the plates *a b c*, &c., of means for moving it laterally out of contact at the proper time and holding it thus laterally displaced until the plates are again readjusted, so that only a single movement of the pushers will be effected at each adjustment of the plates, all substantially as described.

10. The combination, with the type-pushers 12 and means for operating the same, of the line-pusher 121 and electrical connections, whereby the movements of the latter are controlled by the former, all substantially as described.

11. The combination, with the composing-stick, of the yielding line-pusher 121, and means for imparting to said pusher a reciprocating motion of such length as to permit the types to accumulate in front of it for a short period when the line is arrested in the stick, all substantially as described.

12. The combination, with the feeding-roll 90 and its clutch mechanism, as 92 93, of the line-pusher 121, and electrical connections, whereby the absence of a type in front of said line-pusher stops the feed of the operating-ribbon, all substantially as described.

13. The combination, with the composing-stick 85 and the line-pusher 121, of the spring 43 and lever 123, whereby the presence of a type in front of said pusher prevents the stopping of the setting mechanism.

14. The combination, with the composing-stick 85 and the galley 134, of the column-pusher 135 and its operating mechanism, and electrical connections, whereby the arrival of a line of type in front of the galley causes the column-pusher to operate, all substantially as described.

15. The combination, with the reciprocating column-pusher 135, of the galley 134, provided with a flaring elastic side, 137, substantially as described.

16. The combination, with the reciprocating column-pusher 135, of the galley 134, provided with the fixed side 136, having a sharp end, 53, substantially as described.
- 5 17. The combination, with the longitudinally-movable column-pusher, of the arm 58 and electrical connections, whereby said arm is set in motion by the arrival of a line of type in position in front of the galley, all substantially as described.
- 10 18. The combination, with the feeding-roll 90 and its clutch, as 92 93, of the arms 58 and 64, and electrical connections, whereby the feed of the ribbon is automatically arrested
- 15 when a line of improper length is presented to the galley, all substantially as described.

19. The combination, with the column-pusher 135 and the two cams 144 145, for operating the same, of the pusher-plate 170, its operating-cam 174, and connections, all substantially as described. 20

In testimony whereof I have hereunto set my hand, at New York city, this 8th day of September, 1882, in the presence of two subscribing witnesses.

JAMES E. MUNSON.

Witnesses:

A. H. GENTNER,  
CHARLES R. SEARLE.