

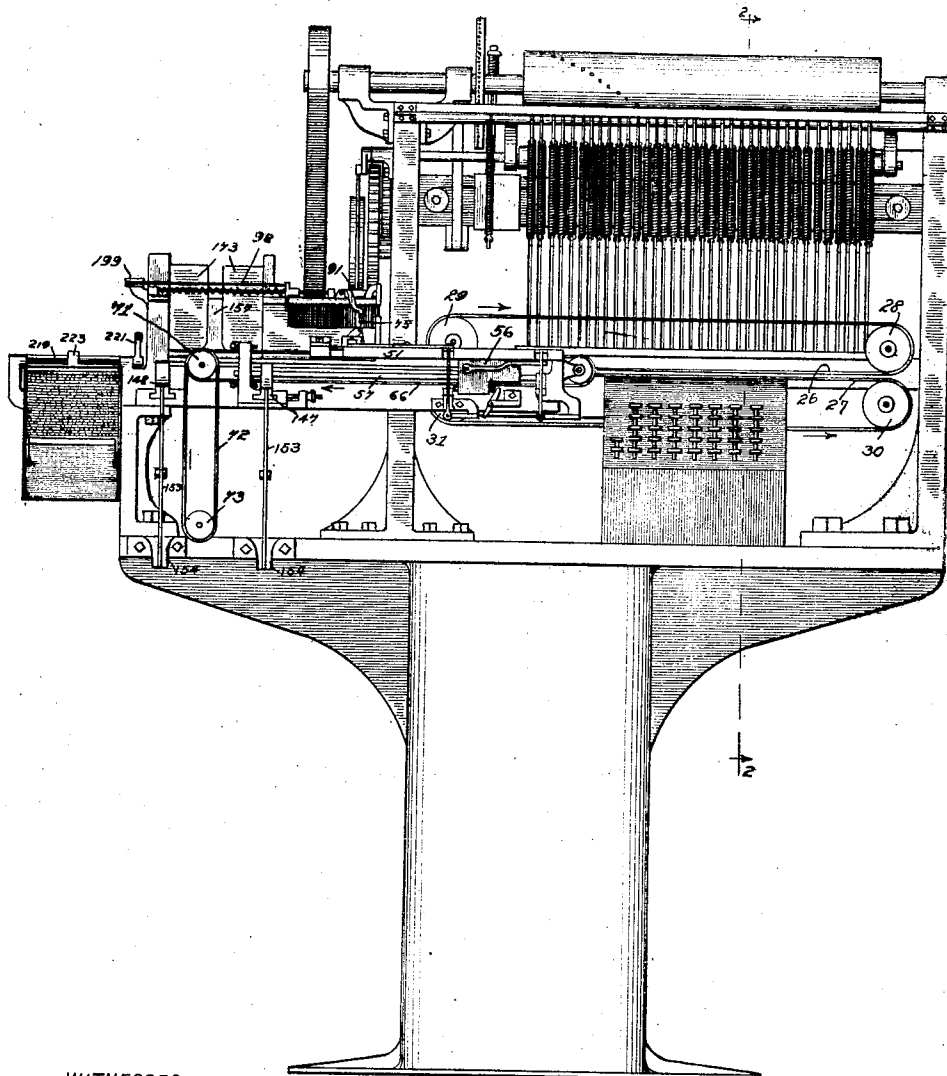
J. S. THOMPSON.
TYPE SETTING AND JUSTIFYING MACHINE.
APPLICATION FILED OCT. 31, 1904.

1,038,234.

Patented Sept. 10, 1912.

13 SHEETS—SHEET 1

Fig. 1.



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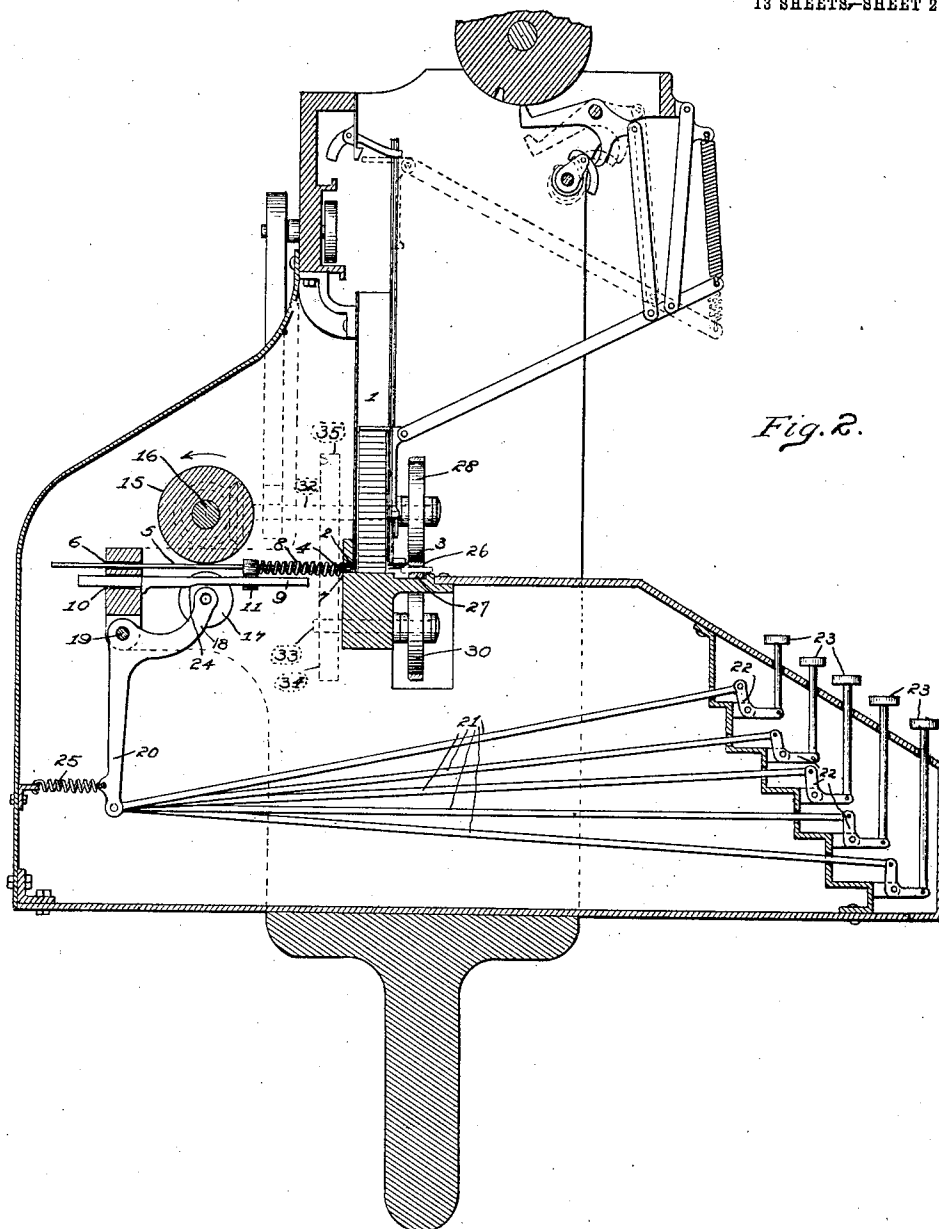


Fig. 2.

WITNESSES:

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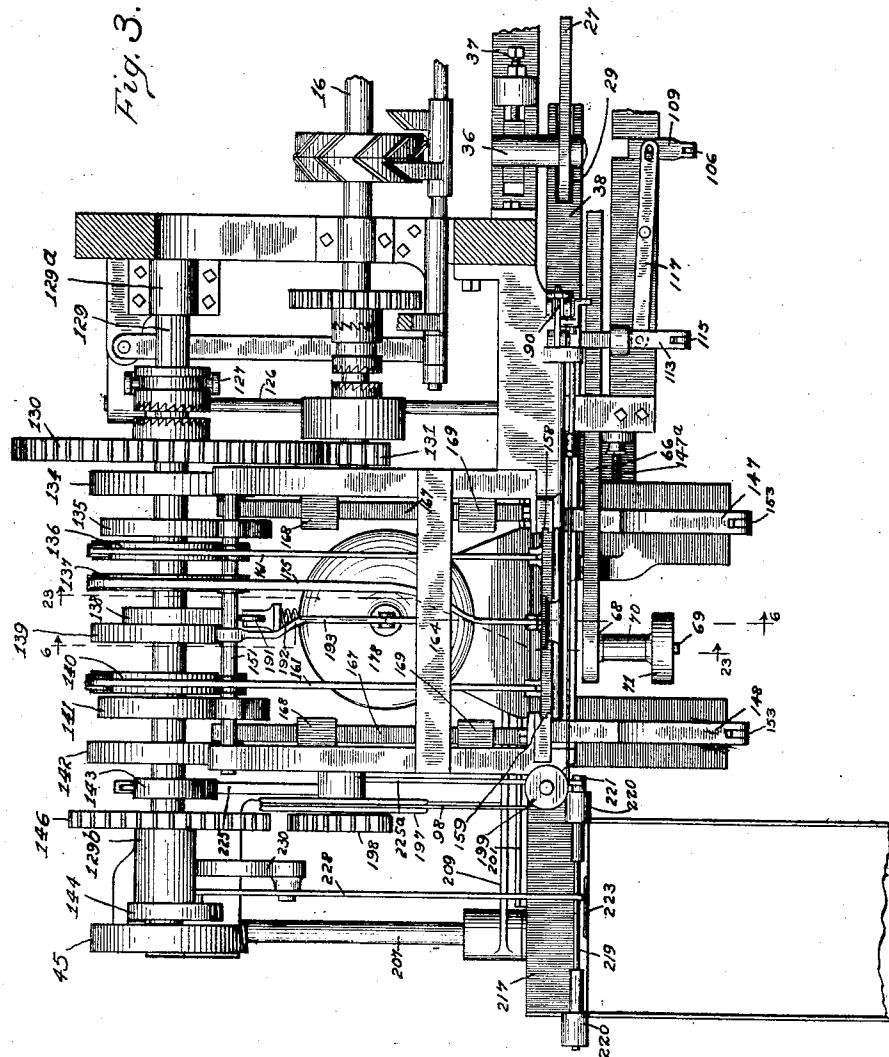
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13 SHEETS—SHEET 3



WITNESSES:

John Braumwelder

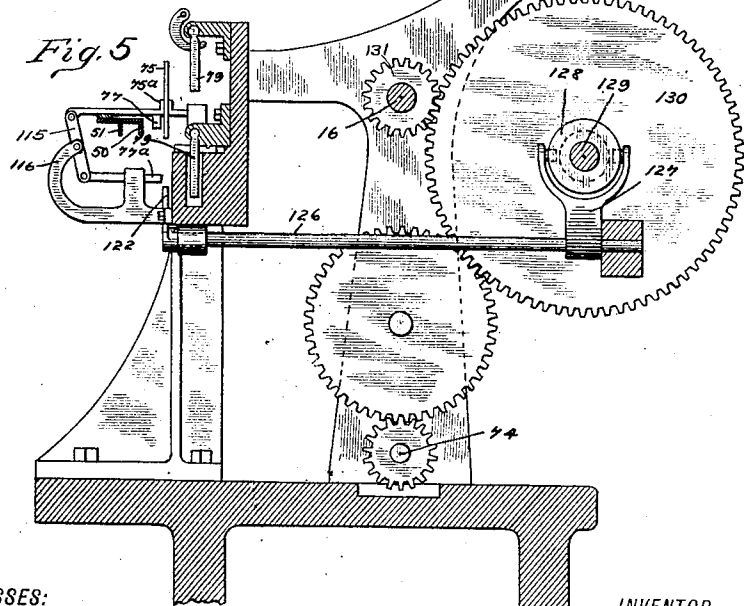
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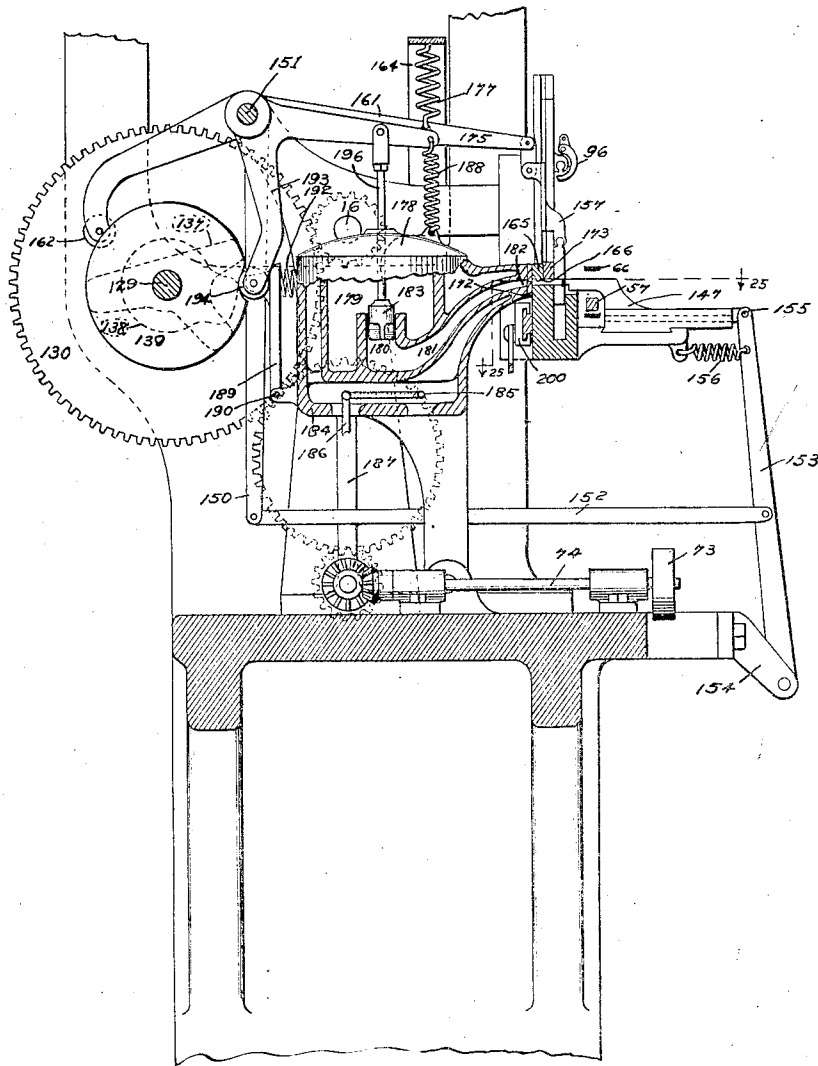
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13 SHEETS—SHEET 5.

Fig. 6.



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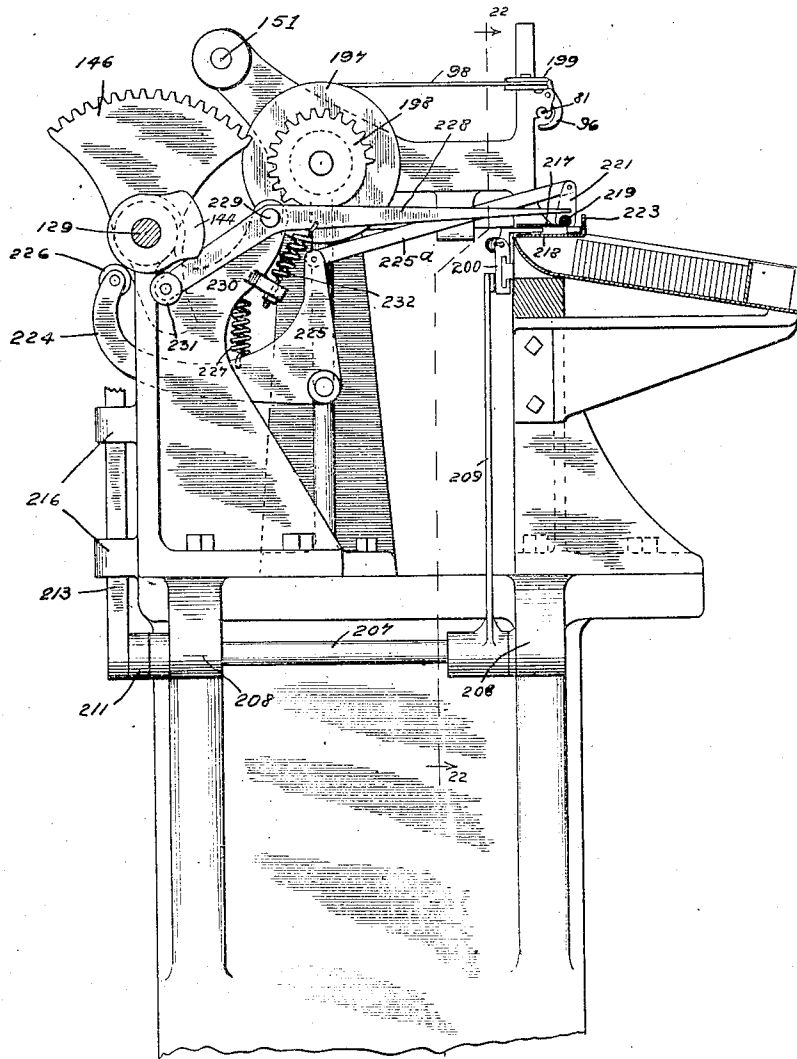
APPLICATION FILED OCT. 31, 1904.

Patented Sept. 10, 1912.

13 SHEETS—SHEET 6.

1,038,234.

Fig. 7.



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13 SHEETS—SHEET 7.

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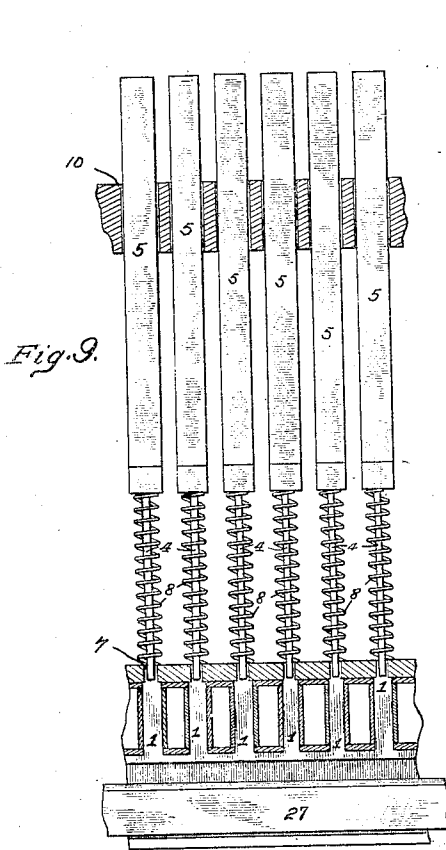


Fig. 9.

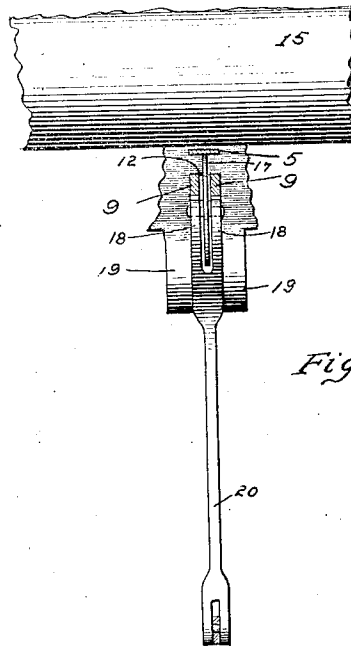


Fig. 8.

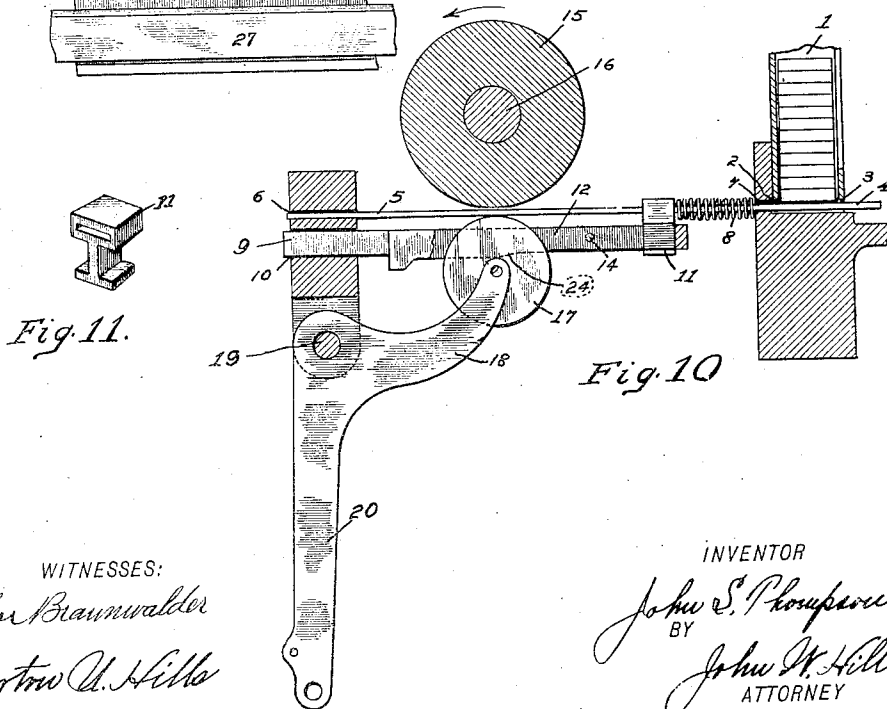


Fig. 11.

Fig. 10.

WITNESSES:
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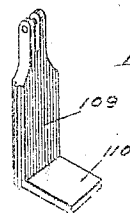
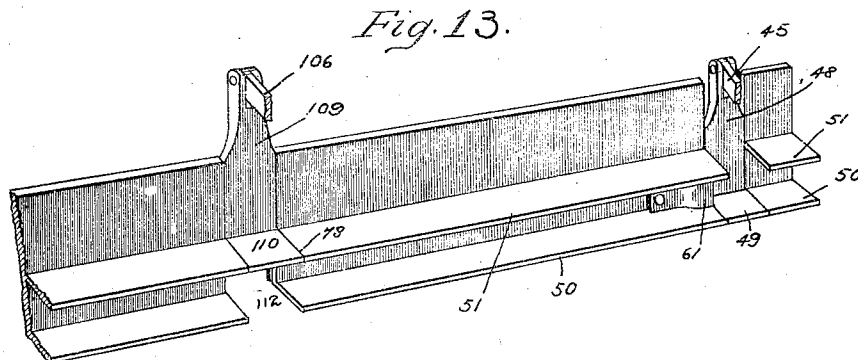
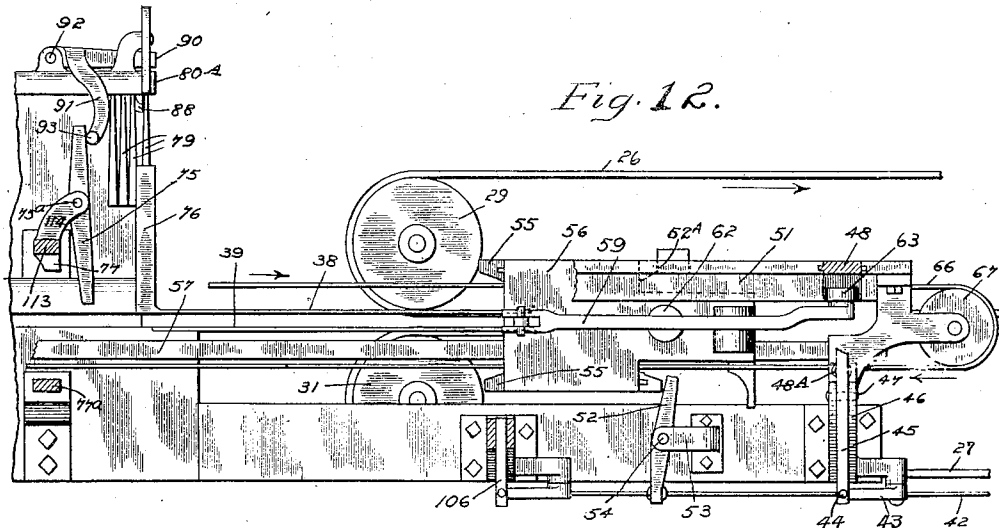
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13 SHEETS—SHEET 8.



WITNESSES:
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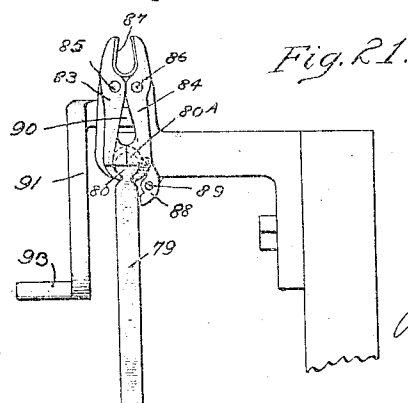
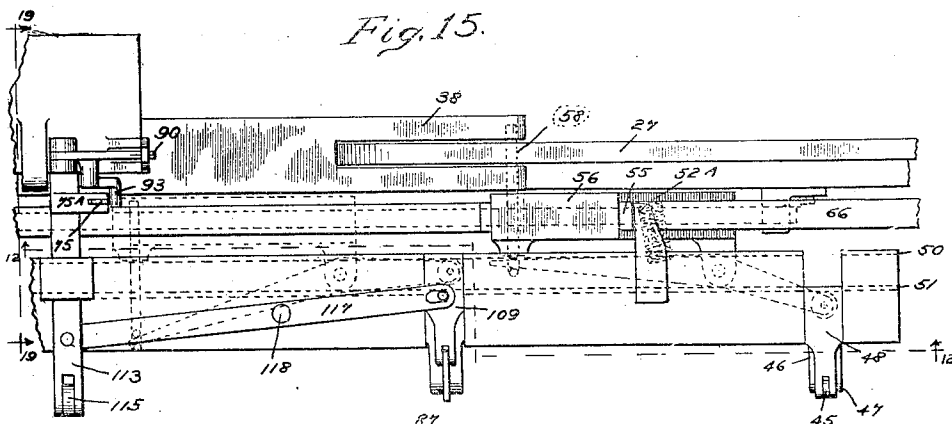
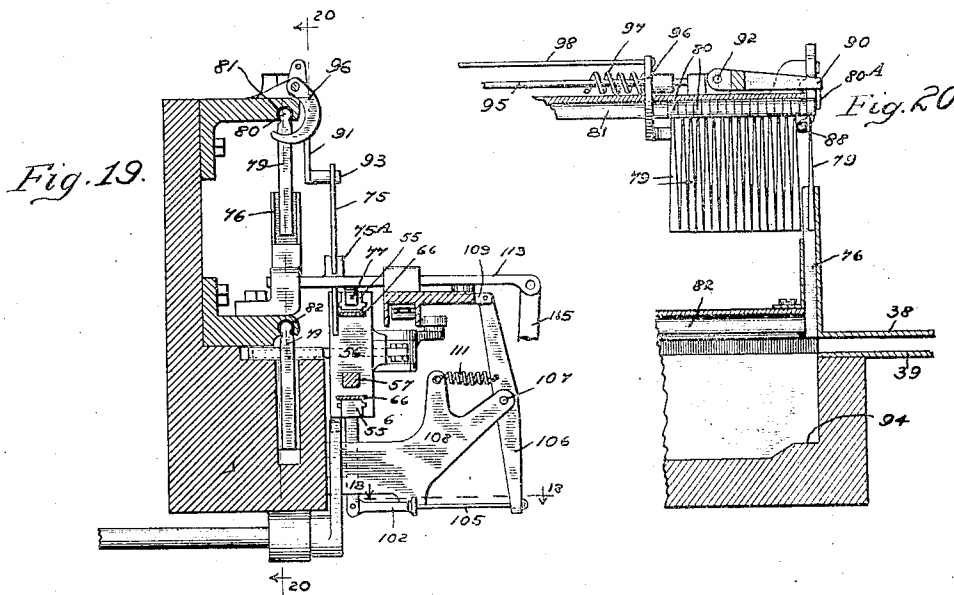
Fig. 14.
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13 SHEETS—SHEET 9.



WITNESSES:
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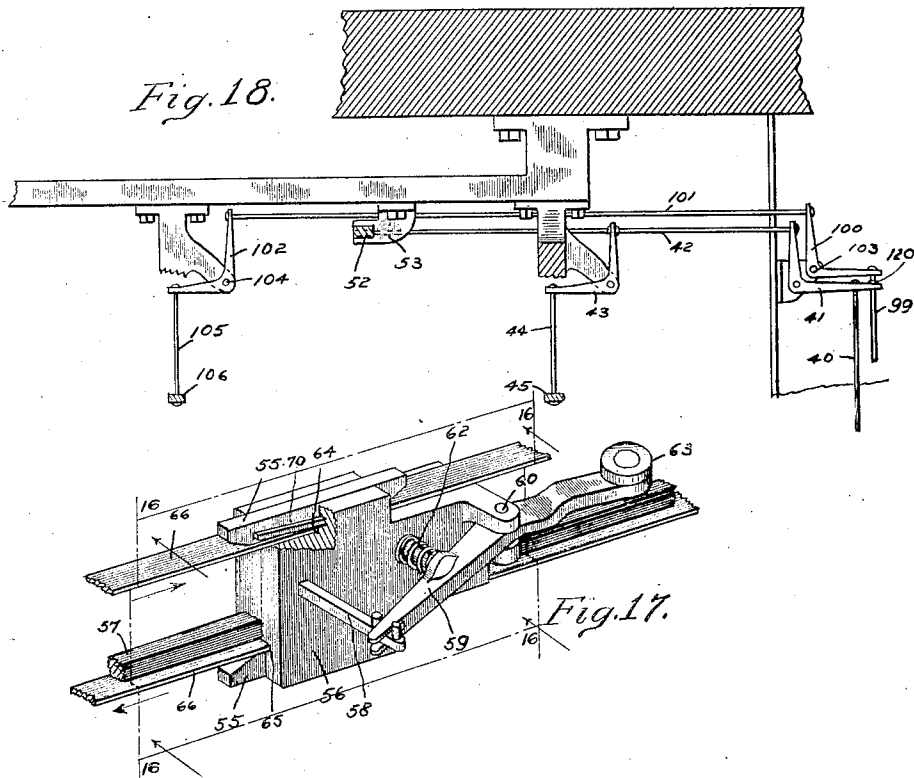
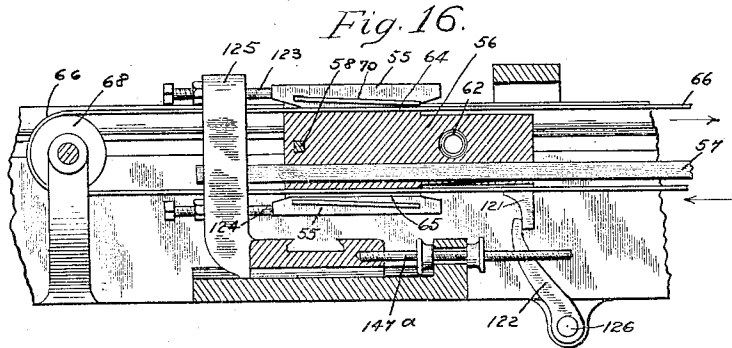
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13 SHEETS—SHEET 10.



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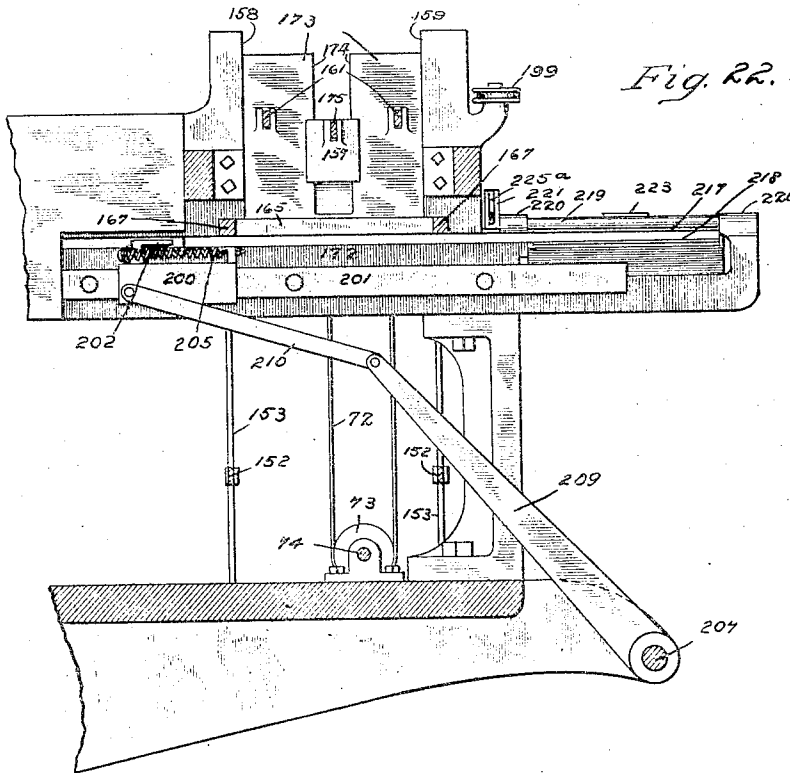


Fig. 22.

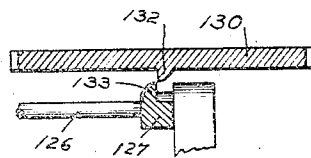


Fig. 26.

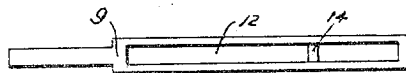


Fig. 27.

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APPLICATION FILED OCT. 31, 1904.

1,038,234.

Patented Sept. 10, 1912.

13 SHEETS—SHEET 12.

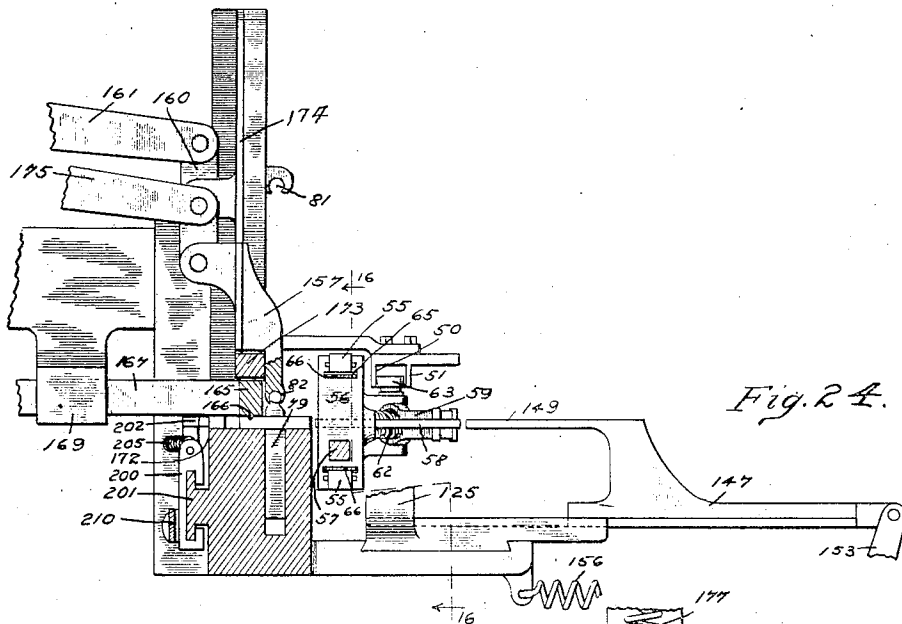


Fig. 24.

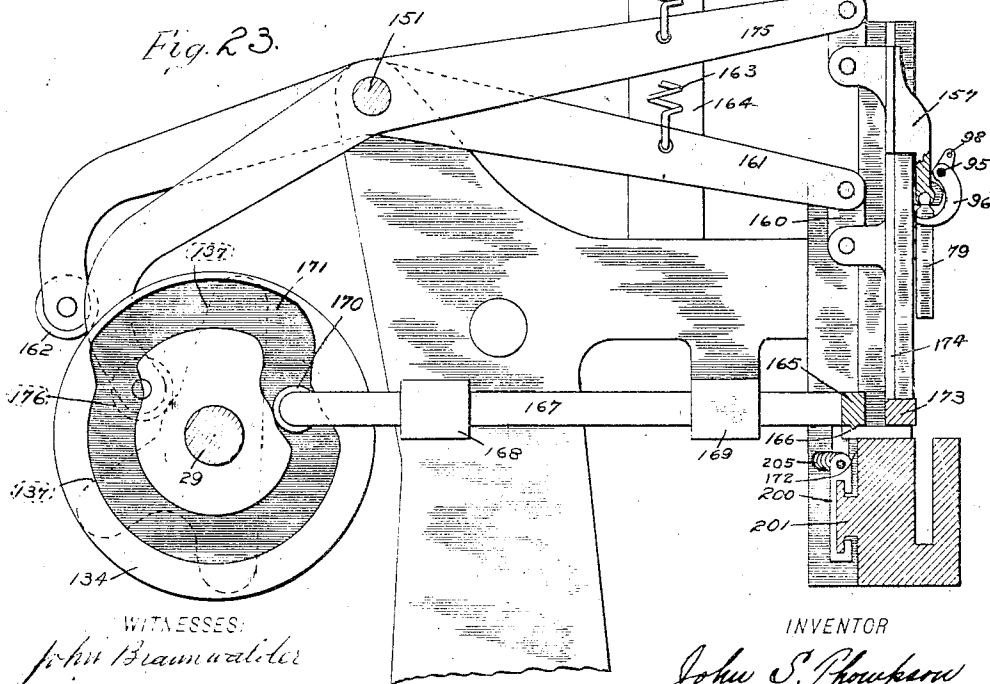


Fig. 23.

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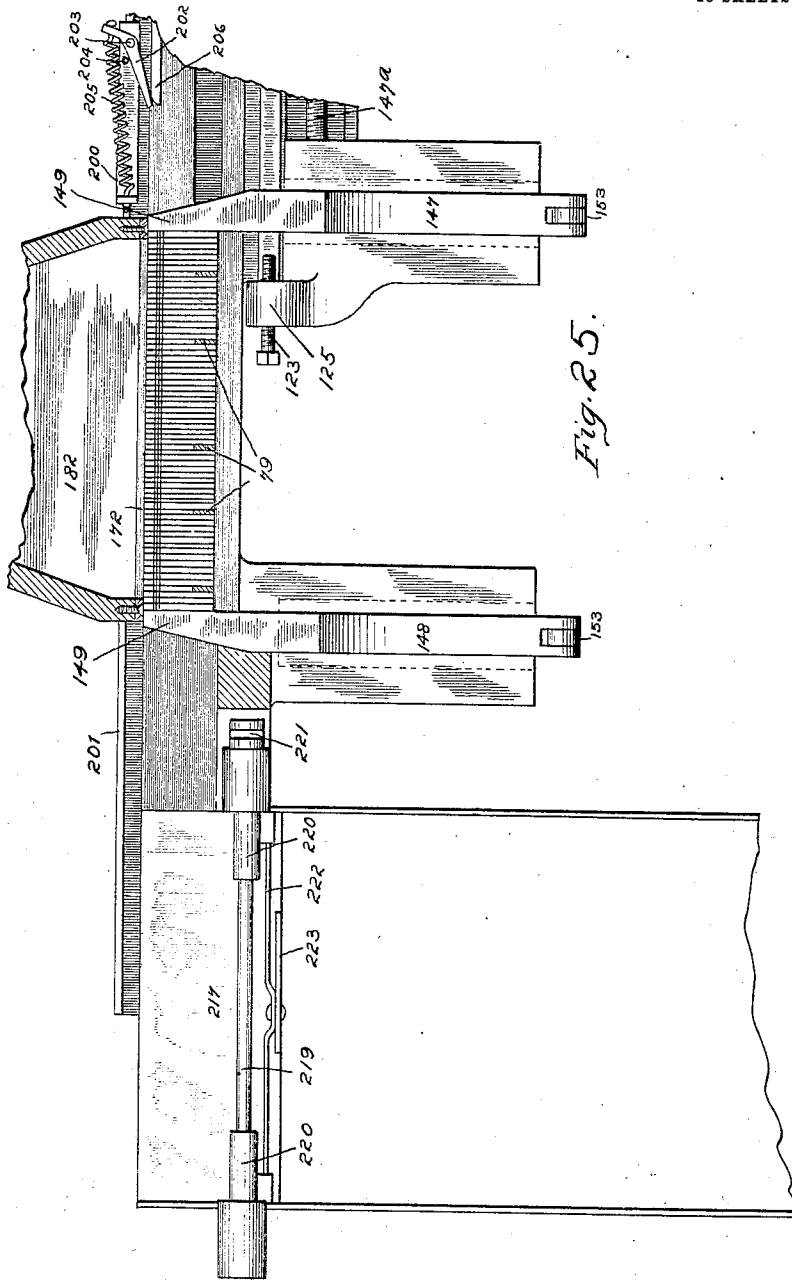
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J. S. THOMPSON.
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 APPLICATION FILED OCT. 31, 1904.

1,038,234.

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13 SHEETS—SHEET 13.



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UNITED STATES PATENT OFFICE.

JOHN S. THOMPSON, OF CHICAGO, ILLINOIS.

TYPE SETTING AND JUSTIFYING MACHINE.

1,038,234.

Specification of Letters Patent.

Patented Sept. 10, 1912.

Application filed October 31, 1904. Serial No. 230,755.

To all whom it may concern:

Be it known that I, JOHN S. THOMPSON, a citizen of the United States of America, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Type Setting and Justifying Machines, of which the following is a description.

My invention relates to that class of machines wherein printers' type are removed from a series of storage receptacles and arranged in lines to print words and sentences, and properly justified to column widths, all the operations being performed by mechanism controlled by suitable keys or levers.

The object of my invention is to produce a machine of the kind described, simple and convenient in construction and operation and adapted to perform the desired functions in an expeditious and positive manner, and to this end consists in the novel construction, arrangement and combination of parts herein shown and described and more particularly pointed out in the claims.

In the accompanying drawings wherein like or similar reference characters indicate like or corresponding parts:—Figure 1 is a front elevation of my device combined with a type casting and distributing machine. Fig. 2 is an enlarged partial section taken substantially on line 2—2 of Fig. 1. Fig. 3 is a plan view of the justifying portion of my device. Fig. 4 is a rear view of the justifying portion of my device. Fig. 5 is a section taken substantially on line 5—5 of Fig. 4. Fig. 6 is a section taken substantially on line 6—6 of Fig. 3. Fig. 7 is a section taken substantially on line 7—7 of Fig. 4. Figs. 8, 9, 10 and 11 are enlarged details of the mechanism for extracting type from the type storage receptacles. Fig. 12 is a section taken substantially on line 12—12 of Fig. 15. Figs. 13 and 14 are details of parts of the type transferring mechanism. Fig. 15 is a plan view of a portion of the type transferring mechanism. Fig. 16 is a section taken substantially on plane 16—16 and 16—16 of Fig. 17 in connection with the second type transferring carriage stop. Fig. 17 is a perspective view of the type transferring carriage and portions of associated parts. Fig. 18 is a partial section taken substantially on line 18—18 of Fig. 19. Fig. 19 is a partial section taken substantially on line 19—19 of Fig. 15. Fig. 20 is a partial section taken substantially

on line 20—20 of Fig. 19. Fig. 21 is a detail of the temporary spacer escapement and associated parts. Fig. 22 is a partial section taken substantially on line 22—22 of Fig. 7. Fig. 23 is an enlarged partial section taken substantially on line 23—23 of Fig. 3 with parts removed to more clearly show the construction. Fig. 24 is a portion of the mechanism shown in Fig. 23 in a different operative position, and other associated parts not shown in that figure. Fig. 25 is an enlarged partial section taken substantially on line 25—25 of Fig. 6. Fig. 26 is a partial section taken substantially on line 26—26 of Fig. 4, and Fig. 27 is a detail.

In the preferred form of my device the type to be employed are stored in a horizontal position in a series of receptacles 1 each arranged to contain a single vertical column of similar type and each provided at its lower end with the openings 2 and 3. The opening 2 is provided to enable the end 4 of an ejector 5, one of which is provided for each receptacle, to enter the same and engage a type therein to force the type out of the receptacle through the opening 3, which is preferably of such size and arrangement that only one type can be ejected therethrough at a time. Each of the ejectors 5 consists of a longitudinally movable flat strip of any suitable material, supported in suitable bearings 6 and 7 upon the frame of the machine and having a part 4 at one end of suitable dimensions to enter a type receptacle and eject a single type therefrom. A spring 8 or equivalent means is preferably positioned between a part of the frame of my machine and suitable engaging means upon the ejector, to normally hold the same in its extreme outer position.

Preferably a longitudinally movable cam bar 9 is positioned directly below the ejector 5, one end being supported in a suitable bearing 10 in the frame, and the other end supported by means of a suitable yoke 11 from the ejector. As shown, a vertical slot 12 extends longitudinally of the bar 9, the yoke 11 being arranged to slide longitudinally in one end thereof, its movement being limited by the end of the slot in one direction and a pin 14 or equivalent means in the other so that when the ejector 5 approaches the limit of its inward travel in ejecting a type from a receptacle, the yoke 11 engages the end of the slot 12 and moves the bar 9 in the same direction, for a pur-

pose which will be hereafter explained. When the ejector is released and is returned by the spring 8 to its normal position, as it nears the end of its travel the yoke 11 engages the pin 14 and returns the cam bar 9 to its normal position. The ejector 5 may be operated in any desired manner. As shown, a roller 15 is positioned parallel to and in the rear of the series of receptacles 1 with its surface in close proximity to the upper side of the several ejectors 5, and mounted upon a shaft 16 arranged to be rotated in the direction indicated by any preferred means.

15 The roller 15 may be composed of any suitable material but is preferably provided with an outer surface or covering of rubber or an equivalent material adapted to frictionally engage the ejectors 5 upon their being brought into contact therewith.

20 Preferably directly below each ejector 5 and projecting upward through the slot 12 in the bar 9 opposite the roller 15 I position a disk or wheel 17 rotatably mounted upon the arm 18 of a bell crank lever pivoted at 19 to a suitable portion of the frame of my device provided for that purpose. The arm 20 of the bell crank lever is connected near its extremity by a rod 21 to the bell crank connection 22 of one of the keys 23—23 so that when the key 23 controlling any particular ejector is depressed the wheel 17 below that ejector will be pressed upward against it, forcing the same upward against the moving surface of the roller 15, causing the ejector to move inward. With the wheel 17 in the position just described, the ends of the arm 18 upon either side of the wheel 17, or equivalent parts, are positioned in the path of the cam face 24 upon the bar 9; so that when the bar 9 is moved forward by the ejector 5 nearing the end of its travel, the cam face 24 forces the wheel 17 downward, releasing the ejector from its engagement with the roller 15, when it is returned to its normal position by the spring 8, and with it the bar 9, as heretofore explained.

50 A spring 25 or equivalent means is provided for normally maintaining each key at the upper limit of its stroke and the wheel 17 connected thereto out of operative engagement with the ejector 5. As shown, the spring 25 is attached at one end to the frame of the machine and at its opposite end to the depending arm 20 of the bell crank, to perform this function. As the type emerges from the receptacles 1 at the opening 3, it passes between and is gripped by the two belts 26 and 27, provided to receive the type from the several receptacles and carry them longitudinally of the machine to a point where they are assembled into words. As shown, the belt 26 is carried by a driving pulley 28 and an idler 29,

and the belt 27 by a driver 30 and an idler 31, the two belts being arranged to travel at the same velocity and lying directly in front of the openings 3 and spaced from each other a suitable distance to firmly hold the type which are pressed into the space between them.

The pulleys 28 and 30 (see Fig. 2) may be driven in any suitable manner. As shown, the pulley 28 is mounted upon a shaft 32 driven by bevel gearing or equivalent means for the purpose from the main driving shaft 16, and the pulley 30 is mounted upon a shaft 33 carrying a spur gear 34 driven by the spur gear 35 mounted upon the shaft 32. The idlers 29 and 31 may be mounted upon parts of the frame of my machine in any preferred manner, but preferably they are each mounted upon a longitudinally movable block 36 similar to that shown for the pulley 29 in Fig. 3. By this means the belts 26 and 27 may be kept at any desired tension by the adjustment of a set-screw 37 at each block. The type gripped between the belts 26 and 27 are released from the belts upon passing a point substantially on a line drawn between the centers of the pulleys 29 and 30. Before arriving at this point, however, they are engaged between the spring plates 38 and 39, (see Fig. 12) which are suitably spaced from each other to firmly hold the type which are delivered between them by the belts. Preferably portions of each plate extend a short distance at either side of its respective belt as it approaches the pulley at this point, and engage both ends of the type before it is released from between the belts. If preferred, these portions of the two plates may be slightly divergent at the ends to insure the easy entrance of the type and prevent their being disarranged. It will be observed that, by this arrangement, as the keys 22 are successively depressed, type corresponding to the keys operated will be delivered between the plates 38 and 39 in the order in which the keys were operated, and it is therefore an easy matter to so operate the keys as to place the type for any word or combination of characters between the plates as described. Upon the completion of a word or other fraction of a line, the character or characters composing it are transferred to the left, toward the justifying portion of my machine.

The carriage 56 is provided to move the type between the plates 38 and 39 from the point where they are delivered by the belts 26 and 27 longitudinally of the machine to such other positions as may be required. For this purpose, a guide or way 57 is positioned in front, slightly below, and parallel to the plates 38 and 39 to support the carriage 56 and guide it in its movements.

To move the carriage 56 forward and re-

turn it to its initial position, any suitable means may be employed. Preferably, I control both strokes of the type-transferring carriage by means of a single endless belt 66 mounted on pulleys 67-68; the forward stroke of the carriage being secured by attaching a suitable gripper or clutch to that side of the belt traveling in the proper direction to advance the carriage, and the return stroke being secured by detaching the above mentioned gripper or clutch and attaching a similar device to that side of the belt, which, after passing over the pulley, travels in the opposite direction. The attaching and detaching of the gripper device is performed in part automatically and in part manually, and will be more fully described hereafter.

The belt 66 may be arranged in any preferred manner to bring the parts in suitable position to operate the carriage as described. As shown, the pulleys 67 and 68 are provided of suitable diameter and each mounted upon the machine in a position to bring the parts of the belt 66 which rotatably connects them substantially parallel with the guide 57 and with the parts between the pulleys in the slots 64 and 65 respectively.

The belt 66 may be driven in the direction indicated by any suitable means. As shown in Fig. 3, the pulley 68 is mounted upon one end of a shaft 69 rotatably mounted in a suitable bearing 70 and having a second pulley 71 mounted upon its other end. The pulley 71 is connected by a suitable belt 72 (Fig. 1) to a pulley 73 mounted upon a shaft 74 (see Fig. 6) rotatably mounted in suitable bearing and connected by suitable gears or equivalent means to the main driving shaft 16, as shown in Fig. 5. To control the movements of the carriage 56, a word-key is preferably provided, with a bell crank connection similar to the connections 22 provided for the keys 23-23 shown in Fig. 2, and the movement of the word key is transmitted therefrom by the rod 40 (see Fig. 18) and the bell crank 41 to the rod 42. The movement of the rod 42 is transmitted by means of the bell crank 43, and the rod 44 (see Figs. 12 and 18) and the lever 45, pivoted to the bracket 46 at 47, to the slide 48.

Preferably the slide 48 (see Figs. 13 and 15) is provided with a flange 49 adapted to form a continuation of and fill a space between the sections of either of the flanges 50 or 51. Normally the slide 48 is held in a suitable position by a spring 48^a, extending from the lever 45 to a suitable point upon the bracket 46, to close a space between the sections of the flange 50, but by means of the mechanism just described, when the word key is depressed the slide 48 is temporarily moved outward and positions the flange 49 between the sections of the flange 51. The rod 42 also connects to a lever 52

pivoted to the bracket 53 with its free end projecting into the path of the movable gripper 55 upon the carriage 56. The functions performed by the movement of the slide 48 and the lever 52 will be fully explained hereafter. A movable finger 58 or equivalent means is provided upon the carriage 56 adapted to be laterally projected therefrom to a position to engage the last type delivered between the plates by the belts 26 and 27 and move it along between the plates in the same direction that it was carried by the belts.

The position and movements of the finger 58 may be controlled in any preferred manner. As shown, a lever 59 is pivotally attached at 60 to the carriage 56, and connected at one end in any suitable manner to the finger 58. A spring 62 or equivalent means is positioned between the carriage and a suitable part of the lever to hold the finger 58 normally withdrawn from its type-engaging position. An anti-friction roller 63 is provided at the free end of the lever 59 to bear against either the flange 50 or 51 to control the position of the finger 58.

When the carriage 56 is in its normal position, as shown in Figs. 12 and 15, the roller 63 rests upon the flange 49, which forms an extension of the flange 50, and when the flange 49 is moved forward into line with the flange 51, by depressing the word-key, the corresponding movement of the roller 63 projects the finger 58 between the belts 26 and 27 and into position to engage the type positioned between the plates 38 and 39. The carriage 56 is provided with two similar slots 64 and 65 extending longitudinally of the carriage, through which the two parts of the belt 66 pass. One side of each of the slots is preferably stationary and lies in close proximity to the belt 66 and may, if desired, be formed integral with the carriage. The opposite side preferably consists of the face of a longitudinally movable block or gripper 55 provided upon each edge with a laterally projecting rib or way 70 or equivalent means slightly inclined longitudinally to the face of the block and positioned in corresponding grooves in adjacent parts of the carriage so that the face of each block will lie substantially parallel with the stationary side of the slot, as shown. By this arrangement, any longitudinal movement of the block 55 will change the distance between the block and the stationary side of the slot, and it is obvious that with the parts of the belt 66 in the respective slots, moving in opposite directions, the carriage may be moved in either direction by moving one of the blocks 55 longitudinally to grip that part of the belt 66 which is moving in the desired direction. Preferably the blocks 55 are so constructed and arranged that, by moving them both in the same direction in

the carriage, the width of one of the slots 64 or 65 will be increased and the width of the other will be decreased.

With the parts arranged and constructed as shown in the drawings, the movement of the lower block 55 to the left closes the lower, or slot 65, upon the belt, and moves the carriage to the left. The above described movement of the lower block 55 is, as heretofore described, accomplished by a movement of the lever 52, produced by the depression of the word-key, which simultaneously moves the finger into suitable position to engage the type between the plates 38 and 39 as the carriage is moved to the left by the belt 66. The carriage 56 moves to the left, carrying the combination of type between the plates 38 and 39 forward, until it arrives at the position where the blocks 55—55 are engaged by suitable stops 77 and 77^a, and are both moved to the right in the carriage, thus disengaging the carriage from the lower part of the belt 66, which was moving to the left, and engaging the same with the upper part of the belt to move it to the right and return it to its normal position, where a suitable disengaging stop 52^a releases the gripper attached to belt 66. At the point where the stops 77—77^a engage the carriage the finger 58 passes the channel 76 and the roller 63 reaches the opening 78 in the flange 51 and is returned to its normal position against the flange 50 by the spring 62, this movement withdrawing the finger 58 from between the plates 38 and 39. The roller 63 may also be employed to prevent the carriage 56 from being accidentally moved from its normal position. This is preferably accomplished by placing a spring 61 or equivalent means between the flanges 50 and 51 in the path traveled by the rollers 63 when the carriage 56 is moving to its normal position, the spring being so formed that the roller will depress it as the carriage nears its normal position and releases it just as that position is reached, and then it will operate as a stop to engage the roller and prevent a return movement of the carriage. When it is desired to introduce a space between any words or combinations of characters, it is obvious that a "space" or "quad" of any desired width may be introduced in the same manner as the rest of the type by operating an appropriate key, but where it is desired to "justify" the line to some predetermined length it becomes desirable to introduce between the words or combinations of type, spaces whose width may be varied to produce the exact length of line desired.

The introduction into the line of variable spacing devices is accomplished in the following manner: At a suitable point to the left of the assembling point, and above the channel 76, a storage receptacle for wedge-

shaped spacers or spacebands is provided. The space-bands 79 are preferably wedge-shaped pieces, each provided with a head 80 of any suitable form at its thin end, whereby each space-band may be suspended by the engagement of the head 80 in a suitable groove or channel. As shown, the heads 80 are of circular form and the suspending channels or grooves 81 and 82 (Figs. 19, 20 and 21,) are formed to so far inclose the heads that the bands 79 will be fully supported and may be moved longitudinally of the groove without binding or other difficulty. The groove 81 is provided for storing the space-bands, and is preferably of sufficient length to carry all of the space-bands required for the operation of the machine. The right-hand end, or that part of the groove 81 directly above the vertical channel 76, is formed of the two opposing arms 83 and 84 pivotally attached to the other parts of the machine respectively at 85 and 86 and normally held in their proper relation to each other to form a continuation of the groove 81 by the spring 87. Preferably that part of the groove 81 formed in the arms 83 and 84 corresponds in length to the head of one of the space-bands and the outer end of the groove is provided with a stop 80^a to prevent the release of the space-bands by the heads passing longitudinally from the groove on the arms. A finger 88 pivoted at 89 is attached to one of the arms as shown (see Fig. 21,) so that when the lower ends of the arms are separated to release a space-band, the free end of the finger 88 will be positioned in the path of the next succeeding space-band and thus prevent the discharge of more than one band at a time.

Any preferred means may be employed to separate the lower ends of the arms 83 and 84 to discharge a space-band. As shown, one arm 90 of the bell-crank lever 90—91 is positioned between the arms 83 and 84, the bell-crank being pivoted at 92 as shown, while the arm 91 is extended downwardly and provided with a lateral extension 93 adapted to be engaged by the space-band releasing lever 75, pivotally mounted at 75^a, upon the bracket 114. It is obvious that by this arrangement the engagement of the carriage 56 with the lower part of the lever 75 will move the part of the arm 90 between the arms 83 and 84 toward the pivotal connections 85 and 86 of those arms, and thus force the lower ends of those arms apart and release the space-band which was held between them. The released space-band is directed by the channel 76 into a position to the right of and at substantially right angles to the type just delivered, and with its lower end resting upon a seat 94 or equivalent means to bring its head 80 in position to enter the directing groove 82 when the

next word is moved forward by the carriage. Obviously, as each space-band is released from the storage groove 81, it is desirable to provide means to move the remaining space-

bands to the right, so that at all times when the arms 83 and 84 are in their normal positions a space-band will be engaged by them in position to be released. This may be accomplished in any preferred manner. As shown, a rod 95 is positioned near the groove 81 and arranged parallel therewith, and a finger 96 arranged to move longitudinally thereon and provided with a part extending into a position to engage the space-bands suspended in the groove, and a spring 97 or equivalent means is provided to resiliently press the finger 96, and thus the space-bands, to the right for the purpose described. Preferably a cord 98 or other flexible connector is attached to the finger 96 in any suitable manner, and attached to other parts of my machine to move the finger 96 to the left when it is desired to replace the space-bands in the groove 82, as will be more fully described hereafter. In this manner, as soon as the final character of each word or combination of characters is delivered between the plates 38 and 39 by the belts 26 and 27, the complete word may be advanced and an adjustable space-band positioned so as to come between said final character and the first character of the next succeeding word in the line, and it is evident that, as this occurs, the preceding words in the line are engaged and moved forward, forming a line which increases in length as words are added, until a point is reached where the final word to complete the line is delivered between the plates 38 and 39 by the belts 26 and 27. Obviously, no space-band is required after the final word in a line, and also when a line is complete it should be moved to a position where it may be justified without interfering with the assembling of the next succeeding line. For these reasons, when the final word for a line is delivered between the plates 38 and 39, a line-key or lever may be operated.

The line-key is preferably connected by means of a bell crank 22 (see Fig. 2) to a rod 99 (Fig. 18), bell crank 100 and rod 101 to a bell crank 102; the bell crank 100 and 102 being pivotally attached at 103 and 104 respectively to suitable parts of the frame of the machine provided for that purpose. The bell crank 102 is connected by means of a rod 105 to a lever 106 pivoted at 107 upon the bracket 108 (Fig. 19). The free end of the lever 106 is attached in any preferred way to a slide 109 provided with a flange 110 (Fig. 13), and preferably formed and arranged to operate in all respects similar to the slide 48 previously described. A spring 111 or equivalent means extends from some convenient part of my machine to a

suitable part of the lever 106 to resiliently maintain the parts in such positions that the flange 110 upon the slide 109 will normally be positioned in, and fill the space 112 in, the flange 50, but when the line-key is operated the slide 109 is moved to bring the flange 110 forward and fill the space 78 in the flange 51, as shown in Fig. 13. This position of the flange 110 prevents lateral movement of the finger 58 at this point, and as it is desirable to cause a continuation of the movement of the now finished line to a convenient point for justification, and as no space-band is required after the last word in a line, it is evident that the space-band releasing lever 75 and the stops 77 and 77^a should be moved out of their normal positions in the path of parts of the carriage 56. This may be accomplished in any desired manner, but, as shown, a longitudinally movable bar 113 is mounted in suitable bearings, whereby the bar is positioned transversely of the carriage guide, and arranged upon the bar 113 is the stop 77 and the pivotal supports 114 for the lever 75. The stop 77^a is also connected to the bar 113, by means of a lever 115 pivotally supported upon the bracket 116, as shown in Fig. 5.

Any desired means may be employed to produce the longitudinal movement of the bar 113 and its associated parts by the operation of the line key, but preferably I provide a lever 117 pivotally supported at 118 and connected at one end to the slide 109 and at the opposite end to the bar 113, as shown in Fig. 15. The rod 99, in addition to communicating motion from the line key to the bell crank 100, is loosely embraced by an opening in one arm of the bell crank 41 and provided with a collar 120, whereby the movement of the line-key will be communicated to the bell-crank 41 and thus obviously projects the finger 58 between the belts 26 and 27, and grips the carriage 56 to the belt 66 in the same manner as when the bell-crank 41 is moved by the operation of the word-key heretofore described.

It is apparent from the foregoing that upon operating the line key the carriage 56 moves to the left, sweeping before it the entire line, comprising any number of words separated by adjustable space-bands, the words grasped between the extension of the plates 38 and 39, and the space-bands suspended from the groove 82. As the assembled line arrives at the justifying position, a portion 121 (Fig. 16) of the carriage 56 engages and moves a lever 122 positioned in its path; simultaneously the roller 63 reaches the end of the flange 51 and is returned by the spring 62 to its normal position against the flange 50, withdrawing the finger 58 from behind the line, and the two blocks or grippers 55—55 strike the stops 123 and 124 and, as previously explained,

the carriage is disengaged from that part of the belt 66 moving to the right and engaged with the part moving to the left, and is thus returned to its normal position.

5 Preferably the stops 123 and 124 are screws, as shown, inserted in suitably tapped holes in a stationary block 125 and provided with means for locking them in any desired position to prevent accidental disengagement, so that the final positioning of the line
10 at the justifying position may be controlled within certain limits. The movement of the lever 122 is communicated by means of a shaft 126 and a forked arm 127 to a clutch
15 128, mounted upon a shaft 129. The head 128 is secured to the shaft 129 by means of a feather or equivalent means which permits longitudinal movement of the head upon the shaft but prevents any rotary movement between them.

A gear 130, meshing with a suitable pinion 131 upon the main shaft 16, is loosely mounted upon the shaft 129 and provided with a part adapted to cooperate with the clutch head 128 to transmit the rotary movement imparted to the gear 130 by the pinion 131 to the shaft 129, which is rotatably mounted in suitable bearings 129^a and 129^b upon the frame of the machine. Normally the clutch head 128 is out of engagement with the gear 130, but when the lever 122 is moved by contact of the carriage 56, as heretofore described, the gear is engaged by the clutch head and the shaft 129 is rotated, and
35 as in the construction shown it is only necessary for the shaft 129 to make one complete rotation each time the clutch is engaged, any suitable means may be employed to disengage the clutch 128 at the completion of a single rotation of the shaft 129. As shown
40 a lug 132 provided with an inclined face is attached to the gear 130 and a similar lug 133 is arranged upon the forked arm 127 so that when the clutch is in engagement the lug 133 lies in the path of the lug 132, and upon the inclined faces of the two lugs coming in contact, the arm 127 is pushed away from the gear and carries the head 128 with it out of engagement with the gear 130.

50 Fixedly mounted upon the shaft 129 are the cams 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144 and 145 and a segmental gear 146. (See Figs. 3 and 4.) The cams 135 and 141 are of similar outline and are provided to control the movements of the gage blocks 147 and 148 respectively. Each gage block is provided with a projecting portion 149, normally held out of the path of the line, but each adapted to be positioned
60 at one end of said line after the same has reached the justifying position and again moved to their normal positions after the line has been justified. The distance between the adjacent faces of the parts 149 upon the blocks 147 and 148, when in their justifying

position, is equal to the desired length of the justified line. If preferred, the gage blocks may be arranged on guides converging toward the line to be justified so that as they move to their justifying position they will approach each other, thus affording increased clearance between the ends of the parts 149 and the ends of the line, and tending to avoid derangement of the type, both as the gage blocks move to and from their justifying positions, and an adjustment for the right hand guide is provided (147^a Fig. 25) to allow for varying the distance between the gage blocks.

The movements of the gage blocks may be transmitted from their operating cams in any preferred manner; as shown, at each of these cams a lever 150 is provided and pivotally supported upon a fixed shaft 151; a rod 152 connects the free end of each of the levers 150 to a lever 153, pivotally attached to a part 154 upon the frame of my machine, each with its end 155 connected to the guide block as shown (Figs. 3 and 6.) A suitable face is provided upon the levers 150 upon which the faces of the cams operate, said faces being kept in contact with the faces of the cams by the tension of the springs 156, connecting each of the levers 153 to a suitable portion of the machine, as shown in Fig. 6.

The cam 137 controls the vertical movements of the space-bands in the line to be justified. That portion of the groove 82 above the line to be justified is formed in a part 157 arranged to move vertically, and provided with suitable guides 174—174 to direct its movements, and is connected near its center by means of a suitable link to a lever 175, pivotally mounted upon the shaft 151, and provided at its opposite ends with a suitable antifriction roller 176, while a spring 177 connects the levers 175 to the bracket 164, and by its tension keeps the roller 176 in contact with the surface of the cam. As soon as the guide blocks 147 and 148 have reached their justifying position, the part 157 carrying all the space-bands in the line being justified is drawn upward, thus forcing the words in the line apart and lengthening the line until its ends engage the parts 149 upon the gage blocks and prevent further movement, when the part 157 is lowered, leaving the space-band 79 hanging loosely in the spaces between the words. The similar grooved cams 134 and 142 control the longitudinal position of the type in the line being justified; this is preferably accomplished by providing a separate section 165, which extends the length of the justified line, providing this section with a ridge 166 arranged to be positioned in the nick or notch in the type composing the line, and having ways or guides to direct its movements. Bars 167—167 are attached

near the ends of this section, each provided with bearings 168—169 and an antifriction roller 170 positioned in the groove 171 in its respective cam. As soon as the space-bands, which up to this time are positioned near the center of the length of the type, are lowered after having brought the line to its justified length, as shown in Figs. 5, 19, and 24, the part 165 and the type forming the line being justified are drawn backward until the space-bands are suspended at one end of the type and the opposite or foot end of the type are flush with the part 172 of the frame of the machine the entire length of the line, the part 165 being preferably so proportioned that it also presents a face flush with the foot ends of the type, (see Fig. 6) the ends of the parts 149 at either end of the line are likewise flush with the other surfaces mentioned when the parts are in this position, so that a smooth, flat surface is presented at this point, with the foot ends of the type composing the line forming the central portion; the only break in the surface being the spaces between the several words in the line. The part 157 is now raised again, the space-bands filling the ends of the spaces between the words, also forcing the type in each word into close contact with each other, and the type at the ends of the line firmly against the parts 149 of the gage blocks 147 and 148. The opening between the space-bands and the part 165 is now closed by a vertically movable bar 173, arranged to slide in suitable guides 158 and 159, and connected near its ends by means of the links 160—160 to the arms 161—161 which are pivotally mounted upon the shaft 151 and provided at their free ends with antifriction rollers 162—162 to bear respectively upon the face of the similar cams 136 and 140. A spring 163 or equivalent means, connects each of the arms 161 to the bracket 164, and by its operation maintains the rollers 162 in suitable contact with the cam faces.

The cam 138 controls the movements of the melting pot 178. This pot may be of the usual or any preferred construction; as shown, it consists of a reservoir 179 for containing a supply of metal and communicating therewith a well 180 connected by the channel 181 to the nipple or nozzle 182, where the metal contained within the pot is discharged by means of a suitable plunger 183 arranged to operate within the well. A jacket or shell 184 incloses the reservoir and channel and a burner 185 supplied with a suitable combustible fluid through the pipe 186 is arranged within the jacket below the reservoir 179 to supply the heat necessary to maintain the metal within the pot in a suitably fluid condition. The pot is pivotally mounted by means of the arms 187 to the frame of my machine, so that the face of

the nozzle 182 will suitably register with the flat surface of which the foot ends of the type composing the line and the surface 172 are a part, so that the opening of the nozzle 182 will be so positioned to the foot ends of the type that any metal discharged from the pot will be forced against the foot ends and into the spaces between the words in the line. Normally the pot is held out of the above described position by the spring 188 connecting the pot to a suitable portion of the machine, as shown, while an arm 189 pivotally attached to the pot at 190 extends upward, and at a suitable point is provided with an antifriction roller 191 to bear upon the face of the cam 138 to partially support the pot when in its normal position and transmit motion thereto from the cam. Preferably I position a spring 192 between the upper end of the arm 189 and the pot, to act as a cushion to insure a suitable contact with the nipple of the pot and the surface at the foot ends of the type and also to prevent damage to the pot nipple or opposing mold surface should a small obstruction be interposed between them.

The cam 139 controls the movements of the plunger 183 and the discharge of metal from the pot. Preferably a bell-crank lever 193 is pivoted upon the shaft 151. One arm of the lever is provided with an antifriction roller 194 to bear against the face of the cam 139, and the opposite arm is connected to a spring 188 to maintain the contact between the roller 194 and the cam, and to a rod 196 connected to the plunger 183. The parts are so timed that as soon as the nipple of the melting pot is properly positioned at the ends of the type, the plunger is depressed and a part of the contents of the pot is discharged into the spaces between the words forming the line. The melting pot and plunger 183 return to their normal position, and the part 157 is again lowered, freeing the space-bands from the type, which are again moved backward or away from the space-bands by the movement of the part 165 until the space-bands are entirely clear of the type and free to be moved in any direction, as shown in Fig. 23. Simultaneously, a sheave 197, fixedly attached to a segmental gear 198, and both rotatably mounted upon a suitable shaft fixed to the frame of my machine, is partially rotated by the segmental gear 146, or equivalent means, upon the shaft 129.

The cord or flexible connector 98, before described as attached to the finger 96, after passing a guide sheave 199 suitably positioned upon the frame of my machine, attaches to the periphery of the sheave 197. When this sheave 197 is partially rotated, as above described, the cord 98 is wound upon the sheave, and the finger 96 is drawn toward the sheave 199 until it passes above

and to the left of the part 157, which is immediately elevated until the groove in the part 157 registers with the storage groove 81 when, the segment 146 having passed and thus released the gear 198, the finger 96 is moved to the right by the spring 97, and the space-bands in the groove in the part 157 are swept before it into the storage groove 81. The line is now completely justified, the space-bands returned to the storage groove in readiness to be again employed, and it now only remains desirable to remove the justified line from the justifying position and deposit the same in its proper position in the galley.

The removal of the type from the justifying position is accomplished by the movement of a carriage 200 arranged to slide upon the guide or way 201, and provided with an arm 202 pivotally attached at 203 thereon (see Fig. 25). A stop 204 is also arranged upon the carriage and so positioned that when the arm 202 is in operative contact with the stop, the face of the arm will be at right angles to the direction of the motion of the carriage. A spring 205 is provided to extend from a portion of the arm to a suitable point upon the carriage to resiliently hold the arm in contact with the stop 204. A part 206 upon the frame of the machine engages the arm 202 when the carriage is near the right-hand limit of its movement and moves the arm away from the stop 204 and out of the path of the line as it moves to the justifying position. The movements of the carriage 200 are controlled by the grooved cam 145. A shaft 207 is rotatably supported in suitable bearings 208—208 upon the machine and provided with an arm 209, the free end of which is connected by means of the link 210 to the carriage 200, as shown in Figs. 7 and 22. Preferably, at one end of the shaft 207 a second arm 211 is provided, having a pin 212 projecting therefrom, as shown in Fig. 4. A longitudinally movable connecting bar 213 is provided to operate the shaft 207, having near one end a lateral slot 214, adapted to engage the pin 212, and at its opposite end suitable means 215 for engaging the groove of the cam 145, while the movements of the bar are directed by suitable bearings 216—216 attached to the frame of my machine. As soon as the justified line is moved backward to clear the space-bands, the jaws 147 and 148 are retracted from the path of the carriage 200 which moves to the left, the arm 202, assuming its operative position as soon as it is past the part 206, engages the justified line and moves the same to the galley, where the line is positioned between plates 217 and 218, while the carriage 200 returns to the right-hand limit of its movement. The

plate 217 is attached to a shaft 219, mounted in suitable bearings 220—220 and having the crank 221 attached near one end, as shown in Figs. 2, 22, and 25. The plate 218 is carried by the plate 217 by means of suitable guides at its ends, so that it may be moved laterally of the plate 217 without being disconnected therefrom, suitable stops being arranged upon the plates to limit the movements of the plate 218.

A spring 222, preferably attached to the flange 223 upon the plate 218, and engaging suitable parts upon the plate 217, is provided to normally hold the plates in suitable relation to receive and hold the lines of type delivered between them. The cam 143, 144 controls the movements of the plates 217 and 218. A bell crank lever 224, 225 (Fig. 7) is pivoted upon a suitable portion of the frame of my machine, the arm 224 being provided with an antifriction roller 226, resiliently held in contact with the face of the cam 143 by the spring 227, connecting the arm 224 to a suitable portion of the machine, as shown. The arm 225 is connected to the crank 221 by means of a link 225^a. As soon as the line is delivered between the plates, the shaft 219 is partially rotated by the above described means and the line is carried downward and stood upon its feet in the galley, with the plate 218 between the line being placed therein and the lines previously in the galley, which are arranged to be moved forward slightly by each new line as it is placed therein. When the plates 217 and 218 have reached the above described position, a portion of the flange 223 is positioned directly above one end of the arm 228, pivotally supported at 229 upon the bracket 230 and provided at its opposite end with an antifriction roller 231 in contact with the face of the cam 144, the spring 232 extending from the arm 228 to a suitable part of the machine resiliently maintaining such contact. As soon as the shaft 219 has rotated to bring the flange 223 in the desired position above the end of the arm 228, the movement of the shaft is arrested and the cam 144 operates to elevate the end of the arm below the flange, which, upon engaging the flange, raises the plate 218 until its lower edge clears the type when the shaft 219 is rotated in the reverse direction to bring the plates to their normal position, and the end of the arm 228 is lowered, allowing the spring 222 to return the plate 218 to its normal relation to the plate 217, completing the operation.

In the foregoing I have described only the single form of my device shown in the drawings, but it is obvious that various immaterial modifications may be made without departing from the spirit of my inven-

tion, hence I do not wish to be understood as limiting myself to the exact form and construction shown.

What I claim as new, and desire to secure by Letters Patent is.

1. A device of the kind described, comprising a plurality of receptacles for storing type, means adapted to remove a type from any of said receptacles as desired, mechanism for moving the type so removed to the word assembling position and arranging the same to form a word, a carriage arranged to move each word as completed to the line assembling point and automatically position temporary adjustable spacers between the successive words, said carriage also being arranged to move the completed line to the justifying position and start automatic mechanism adapted to justify said line by adjusting said spacers, form unconnected permanent spacers of suitable size between said words, and remove said temporary spacers, in combination with mechanism for moving said line to and positioning the same in a suitable position in a galley.

2. A device of the kind described, comprising a plurality of receptacles for storing type, means adapted to successively remove a type from any of said receptacles as required, assemble said type so removed into words, transfer each completed word to a line assembling point and automatically insert a temporary adjustable spacer between the adjacent words, and means adapted to automatically adjust said spacers to justify said lines and simultaneously replace each temporary spacer with a permanent one of suitable size by introducing molten metal into the spaces between the words in each line, in combination with mechanism for moving said line to and positioning the same in suitable position in a galley.

3. A device of the kind described, comprising a plurality of vertical receptacles each adapted to contain a plurality of horizontally disposed type, means for removing type from said receptacles as required, consisting of a rotatable roller, a horizontally movable ejector for each receptacle resiliently held at the outer limit of its travel, means operated by suitable keys or levers for frictionally engaging a part of any of said ejectors with said roller, and means for positively releasing said engagement when said ejector reaches the inner limit of its travel.

4. A device of the kind described, comprising a plurality of vertical receptacles, each adapted to contain a plurality of horizontally disposed type, a lever adapted to be manually operated and mechanism connected therewith for each receptacle to control the discharge of type therefrom, and

means for assembling the type discharged from the receptacles in suitable position in a line for printing, and means for simultaneously forming any desired number of spacing units in said line to control its ultimate length, in combination with mechanism for moving said lines to and positioning the same in a suitable position in a galley.

5. A device of the kind described, comprising means for storing type, mechanism for selecting and positioning any of said type in the grip of opposing members, arranging the same in suitable position in a line for printing, and means for forming any desired number of spacing members in said line to justify the same, in combination with means for moving said line to and positioning the same in suitable position in the galley, without at any time releasing said type from the grip of opposing members controlling the position thereof.

6. A device of the kind described, comprising a plurality of vertical receptacles, each adapted to contain a plurality of horizontally disposed type, a lever adapted to be manually operated and intermediate mechanism connected therewith for each receptacle to control the discharge of type therefrom, means adapted to assemble said type so discharged into words, assemble said words into lines with a temporary adjustable spacer between the adjacent words therein, and means adapted to automatically adjust said spacers to justify said line and replace each temporary spacer with a permanent one of suitable size by introducing molten metal into the spaces between the words therein, in combination with mechanism for moving said line to and positioning the same in suitable position in a galley.

7. A device of the kind described, comprising a plurality of vertical receptacles each adapted to contain a plurality of horizontally disposed type, a lever adapted to be manually operated and mechanism connected therewith for each receptacle to control the discharge of type therefrom, means for moving the type so discharged to the word assembling position and arranging the same to form a word, a carriage arranged to move said words as completed to the line assembling point and automatically position temporary adjustable spacers between the successive words, said carriage being also arranged to move the completed line to the justifying position and start automatic mechanism adapted to justify said line by adjusting said spacers, forming permanent spacers of suitable size between said words, and removing said temporary spacers, in combination with mechanism for moving said line to and positioning the same in suitable position in a galley.

8. A device of the kind described, com-

prising means for storing type, a lever adapted to be manually operated and intermediate mechanism connected therewith for selecting and positioning any of said type in the grip of opposing members arranging the same in suitable position in a line for printing, and means for forming any desired number of spacing members in said line to justify the same, in combination with means for moving said type to and positioning the same in suitable position in a galley, without at any time releasing said type from the grip of opposing members controlling the position thereof.

9. A device of the kind described, comprising a plurality of vertical receptacles each adapted to contain a plurality of horizontally disposed type, means for removing type from said receptacles as required consisting of a rotatable roller, a horizontally movable ejector for each receptacle resiliently held at the outer limit of its travel, means operated by suitable keys or levers for frictionally engaging a part of any of said ejectors with said roller, means for positively releasing said engagement when said ejector reaches the inner limit of its travel, mechanism for assembling said type so removed into words, arranging said words into lines with a temporary adjustable spacer between the adjacent words therein, means adapted to automatically adjust said spacers to justify said lines, and replace each temporary spacer with a permanent one of suitable size, in combination with mechanism for moving said line to and positioning the same in suitable position in a galley.

10. A device of the kind described, comprising a plurality of vertical receptacles each adapted to contain a plurality of horizontally disposed type, means for removing type from said receptacles as required, consisting of a rotatable roller, a horizontally movable ejector for each receptacle resiliently held at the outer limit of its travel, means operated by suitable keys or levers for frictionally engaging a part of any of said ejectors with said roller, and means for positively releasing said engagement when said ejector reaches the inner limit of its travel, mechanism for moving the type so removed to the word assembling position and arranging the same to form a word, a carriage arranged to move each word as completed to the line assembling point and automatically position temporary spacers between the successive words, said carriage also being arranged to move the completed line to the justifying position, and start automatic mechanism adapted to justify said line by adjusting said spacers, form unconnected permanent spacers of suitable size between said words, and remove said temporary spacers, in combination with mechanism

for moving said line to and positioning the same in suitable position in a galley.

11. A device of the kind described, comprising a plurality of vertical receptacles each adapted to contain a plurality of horizontally disposed type, means for removing type from said receptacles as required and positioning the same in the grip of opposing members controlling their position, consisting of a rotatable roller, a horizontally movable ejector for each receptacle resiliently held at the outer limit of its travel, means operated by suitable keys or levers for frictionally engaging a part of any of said ejectors with said roller, and means for positively releasing said engagement when the ejector reaches the inner limit of its movement, means adapted to arrange the type so removed in suitable position in a line for printing, and means for forming any desired number of spacing members in said line to justify the same, in combination with means for moving said line to and positioning the same in suitable position in a galley, without at any time releasing said type from the grip of opposing members controlling the position thereof.

12. A device of the kind described, comprising a plurality of receptacles for storing type, means for successively removing a type from any of said receptacles as required, positioning the same between opposing surfaces and assembling said type so removed into words, mechanism for assembling said words into lines with a temporary adjustable spacer between the adjacent words therein, and means adapted to automatically adjust said spacers to justify said lines and simultaneously replace each temporary spacer with a permanent one of suitable size, in combination with means for moving said lines to, and positioning the same in suitable position in a galley, without at any time releasing said type from the grip of opposing members controlling the position thereof.

13. A device of the kind described, comprising a plurality of receptacles for storing type, means adapted to remove a type from any of said receptacles as desired, mechanism for moving the type so removed to the word assembling position between movable opposing surfaces, and arranging the same to form a word, a carriage arranged to move the completed word to the line assembling point and automatically position temporary adjustable spacers between the successive words therein, said carriage being also arranged to move the completed line to the justifying position and start automatic mechanism adapted to justify said line by adjusting said temporary spacers, form permanent spacers of suitable size between said words, and remove said tem-

porary spacers, in combination with means for moving said line of unconnected type to, and positioning the same in suitable position in a galley, without at any time releasing said type from between opposing members controlling the position of the type.

14. A device of the kind described, comprising a plurality of receptacles for storing finished type, mechanism adapted to remove a type successively from any of said receptacles as required, arrange the same in a suitable line in position for printing, and means for simultaneously forming any desired number of unconnected spacing units in said line to control its ultimate length, in combination with mechanism for moving said line of unconnected type to and positioning the same in suitable position in a galley.

15. A device of the kind described, comprising means for storing type, mechanism controlled by a plurality of manually operated levers for selecting any of said type, arranging the same in suitable position in a line for printing, and means for simultaneously forming any desired number of unconnected spacing units in said line to control its ultimate length, in combination with mechanism for moving said line of unconnected type to and positioning the same in suitable position in a galley.

16. A device of the kind described, comprising means for storing type, mechanism for selecting any of said type, arranging the same in suitable position in a line for printing, and means for simultaneously forming any desired number of unconnected spacing units in said line to control its ultimate length, in combination with mechanism for moving said line of unconnected type to and positioning the same in suitable position in a galley.

17. A device of the kind described, comprising means for arranging previously completed type in a suitable line for printing, in combination with means for justifying said line of individual type by simultaneously casting separate spacers of suitable size between the words in said line after its composition is completed.

18. In a device of the kind described, and in combination a plurality of receptacles for storing finished type, means adapted to remove a type successively from any of said receptacles as required, arrange the same in a suitable position for printing, mechanism adapted to simultaneously form any desired number of separate spacing units in said line to control its ultimate length and means for discharging said finished line.

19. In a device of the kind described, the combination of a carriage adapted to trans-

fer words as assembled, from the word assembling position to the line assembling position, and automatically release and position after each word so transferred, except the last word in each line, a temporary adjustable wedge-shaped spacer adapted to sustain the type when said carriage is retracted.

20. In a device of the kind described, means for expanding a line of individual type by adjusting the position of temporary spreading devices arranged between the several words thereof, means for simultaneously introducing in lieu of said temporary spreading devices permanent unconnected spaces, the width of the permanent spaces being determined by the adjustment of the temporary spacers.

21. In a device of the kind described, and in combination vertical receptacles each adapted to contain a plurality of horizontally disposed type, means for successively removing the type from said receptacles, consisting of a rotatable roller, a longitudinally movable ejector resiliently held at its point of movement farthest from said receptacle, means for frictionally engaging said ejector with said roller, and means for positively disengaging the same when the ejector arrives at the opposite limit of its travel.

22. In a device of the kind described, the combination of a storage groove adapted to engage the head of each of a plurality of temporary spacers to suspend the same, means for releasing a spacer from said groove near one end thereof when required, a second groove adapted to engage the head of said spacers, a transfer groove normally registering with and forming a continuation of said second groove, means for automatically moving said transfer groove to control the vertical position of said spacers, and also to bring said transfer groove into registry with said storage groove, to return the spacers thereto from said transfer groove.

23. In a device of the kind described, a mold for casting spacers to justify a line of type, comprising means for rigidly securing a plurality of type in position to form two sides of the mold, mold elements arranged to form two sides of the mold, means for holding a spacer element in position to form another side of the mold, and a space casting element arranged to form the remaining side of the mold.

24. In a device of the kind described, provided with temporary spacers, a pair of opposing jaws adapted to cooperate to loosely engage a spacer to suspend the same in position, in combination with mechanism adapted to temporarily separate said jaws to release the spacer supported thereby.

25. In a combined typesetting and justi-

- fying machine, the combination of means for assembling individual type to form a word or fraction of a line, a carriage for first transferring said portion of a line to a point where temporary spacers are inserted, and then transferring said line to the justifying point, where permanent unconnected spacers are simultaneously formed and inserted between the successive words or portions of the line, of such size as will cause the assembled line to fill a predetermined measure, and means for operating said carriage.
26. In a device of the kind described, and in combination means for assembling type from type-containing receptacles, type-conveying belts between which the type are ejected and conveyed to the word-assembling point, means for transferring the words as completed to the line assembling point, and introducing temporary spacers between said words, in combination with means for casting permanent unconnected spacers between the words to justify the line.
27. In a combined typesetting and justifying machine, the combination of means for assembling individual type to form a word or fraction of a line, a carriage for first transferring said portion of a line to a point where temporary spacers are inserted, and then transferring said line to the justifying point where permanent spacers of such size as will cause the assembled line to fill a predetermined measure are simultaneously inserted between said words in lieu of said temporary spacers and means for operating said carriage.
28. In a device of the kind described, the combination of wedge-shaped temporary spacers supported by a storage channel or groove, means for releasing said spacers from said groove and positioning the same at selected positions in the line, said releasing means being controlled by a type transferring carriage, and means for operating said carriage.
29. In a device of the kind described, and in combination a longitudinally movable transfer carriage provided with a laterally movable finger adapted to be positioned to engage a word at the word assembling point and by the movement of said carriage transfer said word to the line assembling point, means for moving said finger to avoid engagement with type at the word assembling point as said carriage returns to its starting position, and means for operating said mechanism.
30. In a device of the kind described, the combination of a longitudinally movable carriage, and means for positively moving said carriage in either direction, consisting of oppositely movable flexible members positioned substantially parallel to the line of movement of said carriage, each arranged to pass between a stationary and a movable gripper upon said carriage, the longitudinal movement of either of said movable grippers being adapted to engage the same with its respective movable member to move said carriage, and the opposite movement of said member being adapted to disengage the same.
31. In a device of the kind described, the combination of a longitudinally movable carriage provided with means for engaging a word at the word assembling point, means for moving said carriage and said word to the line assembling point, a word-stop positioned in the path of the carriage adapted to determine the position of each word as it is delivered at the line assembling point, a lever also positioned in the path of said carriage adapted by its movement to release a temporary spacer and position the same in the line after said word, and means adapted to be operated when the final word in a line is assembled to move said word-stop and said lever out of the path of said carriage permitting the same to move the completed line to the justifying position.
32. In a device of the kind described, the combination of a longitudinally movable carriage, oppositely movable members positioned substantially parallel to the line of movement of said carriage, grippers attached to said carriage for each movable member each gripper consisting of a stationary and a movable jaw, the longitudinal movement of said movable jaws in the carriage being adapted to engage or disengage said carriage with the respective movable members, stops arranged in the path of said carriage to engage and move said movable jaws, and means for disengaging said carriage from one movable member and engaging the same with the other when desired.
33. In a device of the kind described, a mold for casting a plurality of separate spacers between the successive words in a line of type, comprising a frame formed of stationary and movable parts of said device adapted to inclose said type and arranged to register with a nozzle connected to a suitable metal pot, a line of type with spaces between the successive words, positioned in and filling said frame, temporary spacers arranged in said spaces and against the back of said frame, whereby when said nozzle is applied to said frame, metal ejected from the nozzle will be forced into and fill said spaces without escaping at the back of the frame, or connecting the type in the frame.
34. In a type-setting and justifying machine, the combination of a plurality of receptacles for storing type, means for eject-

ing type from said receptacles as required, mechanism for assembling said type so ejected into words, means for transferring each word as assembled to a line assembling point and automatically positioning a wedge-shaped temporary spacer transversely between the successive words forming a line, means for transferring said line to the justifying point, adjusting said temporary spacers to justify said line, and simultaneously casting unconnected permanent spacers between said words, removing said temporary spacers from between said words and finally transferring said line of unconnected type units to, and positioning the same in a vertical position in a galley.

35. In a device of the kind described, the combination of a storage receptacle for type, and means for discharging the type therefrom, consisting of a rotatable roller, a longitudinally movable ejector positioned adjacent thereto, and resiliently maintained at the outer limit of its movement, a key for putting said ejector into operation, a lever connected with said key for pressing a portion of said ejector against said roller to frictionally move the ejector toward said receptacle, a longitudinally movable bar loosely connected to said ejector, and arranged to be moved, thereby when said ejector nears the limits of its movements, a cam-face formed upon said bar adapted to engage said lever when the ejector nears the inner limit of its movement and retract said lever from said ejector, thereby releasing the same from engagement with said roller.

36. In a device of the kind described, a plurality of vertical type containing receptacles each adapted to contain a single column of horizontally disposed type, and an opening near the bottom of each receptacle for the discharge of type therefrom, in combination with means for removing type from said receptacles as desired, consisting of a rotatable roller, a plurality of longitudinally movable ejectors positioned adjacent to said roller and each resiliently maintained at the outer limit of its movement, a key for each ejector for putting the same into operation, a lever connected with each key for pressing a portion of the ejector against said roller to frictionally move said ejector toward said receptacle, a longitudinally movable bar loosely connected to each ejector and arranged to be moved thereby when said ejector nears the limits of its movements, each bar provided with a cam-face adapted to engage said lever when its ejector nears the inner limit of its movement, and retract said lever from said ejector thereby releasing the same from its engagement with said roller.

37. In a device of the kind described, means for transferring assembled type,

word by word, to a line assembling point and positioning wedge-shaped temporary spacers at substantially the mid-length of said type between the successive words forming a line, means for transferring said line to the justifying point, adjusting said temporary spacers to justify said line, and means for moving said temporary spacers into a position near the ends of said type, in combination with means for casting permanent spacers between said words, and moving said line to, and positioning the same in suitable position in a galley.

38. In a device of the kind described, means for successively positioning lines of horizontally disposed type in a vertical position in a galley, consisting of a plate normally held in a horizontal position and pivotally supported near one edge, a second plate positioned parallel to said first plate laterally slidable thereon and suitably spaced therefrom to receive and clamp a line of type between the plates, mechanism for positioning a line of type between said plates, means for partially rotating said plates upon said pivotal support, mechanism for moving said second plate transversely of said first plate to release said type, and means for returning said plates to their normal position.

39. In a device of the kind described, a horizontal storage groove adapted to engage the head of each of a plurality of temporary spacers to suspend the same, a finger extending into the path of said spacers, arranged to move longitudinally of said groove and provided with resilient means tending to force said finger toward one end of said groove, whereby said spacers when suspended from said groove are resiliently pressed toward the discharge end thereof.

40. In a device of the kind described, the combination of a storage groove adapted to engage the head of each of a plurality of temporary spacers to suspend the same, means for releasing a spacer from said groove near one end thereof when required, consisting of a pair of arms pivotally supported near the end of said groove, the opposing faces of said arms forming an extension to said groove adapted to engage a single spacer, and a stop arranged to prevent the release of said spacers when said arms are in their normal position, in combination with means for forcing said arms apart to open said groove and release a single spacer therefrom and means to prevent the escape of the next succeeding spacer from said groove while said arms are separated.

41. A device of the kind described, a storage groove, a directing groove, and a transfer groove, each similarly formed to engage the heads of temporary spacers to support the same, said transfer groove normally registering with said directing groove, in com-

ination with means for adjusting the vertical position of said transfer groove to control the position of said spacers in a line of type to justify the same, means for positioning said transfer groove in registry with said storage groove to return said spacers to said storage groove, and means for returning said transfer groove to its normal position.

42. In a device of the kind described, a plurality of vertical type containing receptacles, each adapted to contain a single column of horizontally disposed type, an opening near the bottom of said receptacles for the discharge of type therefrom, means for successively discharging a single type from any of said receptacles when desired, in combination with two opposing movable surfaces arranged to receive and grip between them each type as discharged from said receptacles, and thus transfer said type to the assembling point.

43. A type setting and justifying machine, comprising means for storing type, mechanism for ejecting said type as required into a space between movable opposing surfaces which grip each type and transfer the same to an assembling point, a carriage adapted to transfer each word as assembled to a line assembling point, automatically insert temporary wedge-shaped spacers between the words, and transfer the assembled line to the justifying point, means for adjusting said spacers to justify said line, and mechanism for simultaneously replacing each temporary spacer by a permanent one of a size to exactly justify said line, in combination with means for transferring the line of unconnected type to and positioning the same in a galley.

44. In a device of the kind described, a plurality of wedge-shaped temporary spacers adapted by their position between the words forming a line of type to control the spaces between said words to justify said line, in combination with means temporarily connected to the thin end of said spacers to control their position.

45. In a device of the kind described, individual type composing and line assembling mechanisms, in combination with a storage receptacle adapted to contain a plurality of wedge-shaped temporary spacers, means for automatically releasing said spacers as required and successively inserting the same between the several words in the line, mechanism for automatically adjusting the position of said spacers to justify said line, means for forming permanent unconnected spaces between said words, and means for removing said spacers and simultaneously returning them to their storage receptacle.

46. In a device of the kind described, indi-

vidual type composing and line assembling mechanisms, in combination with a storage receptacle adapted to contain a plurality of wedge-shaped temporary spacers, means for automatically releasing said spacers as required and successively inserting the same between the several words in the line, mechanism for automatically adjusting the position of said spacers to justify said line, means for simultaneously forming permanent unconnected spaces between said words, and means for removing said spacers and simultaneously returning them to their storage receptacle.

47. In a device of the kind described, individual type composing and line assembling mechanisms, in combination with a storage receptacle adapted to contain a plurality of temporary spacers, means for positioning said spacers at any desired position in said line, mechanism for adjusting the position of said spacers to justify said line, means for casting unconnected permanent spaces in the intervals formed by the temporary spacers, and means for simultaneously removing and returning said spacers to their storage receptacle.

48. In a device of the kind described, individual type composing and line assembling mechanisms, in combination with a storage receptacle adapted to contain a plurality of temporary spacers, means for positioning said spacers at any desired position in said line, mechanism for adjusting the position of said spacers to justify said line, means for simultaneously forming unconnected permanent spaces in the intervals formed by the temporary spacers, and means for simultaneously returning said spacers to their storage receptacle.

49. In a device of the kind described, means for inserting a plurality of wedge-shaped temporary spacers in a line of type for separating the several words or groups of characters in the line, and means for simultaneously forming permanent unconnected spaces in said line, the number and width of which are wholly controlled by said temporary spacers.

50. In a device of the kind described, a space-forming mold consisting of a stationary base, movable side walls, and a divided, movable cap, one portion of which is movable at right angles to the path of movement of the other portion, the several parts being adapted to clamp a line of individual type between them in position to receive the proper number and size of spaces to exactly justify the line.

51. In a device of the kind described, and in combination, a type mold consisting of a base, two side walls, and a two-piece cap adapted to engage a plurality of type between them, a rib formed on one of said

pieces, arranged to engage the nicks formed in the type inclosed therein, and means for moving the type by said engaging means.

52. In a device of the kind described, a mold for simultaneously casting a plurality of unconnected spaces in the intervals between the words in a line, comprising top and bottom mold members, cooperating side members, space determining members operating to close one side of the mold, and space forming mechanism cooperating with the opposite side of the mold.

53. In a device of the kind described, a space forming mold comprising a stationary base, two movable side walls adapted to receive a plurality of type between them, and a divided cap adapted to cooperate with said base and type to form a mold, one portion of said cap being movable vertically and the other portion horizontally.

54. In a device of the kind described, mechanism for simultaneously forming all of the spaces for justifying a line of type, comprising a mold in which the line of type is clamped with temporary spacers positioned at intervals therein, a metal pot, means for operating the metal pot to form a plurality of unconnected spaces by forcing metal from the pot into the intervals in the line formed by the temporary spacers.

55. In a device of the kind described, mechanism for simultaneously forming all of the spaces for justifying a line of type, comprising a mold in which the line of type is clamped with temporary spacers positioned at intervals therein, a metal pot, means for operating said metal pot to form a plurality of unconnected spaces by forcing metal from the pot into the intervals in the line formed by the temporary spacers, and means for simultaneously withdrawing the temporary spacers.

56. In a device of the kind described, mechanism for simultaneously forming all of the spaces for justifying a line of type, comprising a mold in which the line of type is clamped with temporary spacers positioned at intervals in the line, a metal pot, means for operating the metal pot to form a plurality of unconnected spaces by forcing metal from the pot into the intervals in the line formed by said temporary spacers, a magazine for storing said temporary spacers, means for simultaneously withdrawing the temporary spacers from the line and means for simultaneously returning the same to their magazines.

57. A type-setting and justifying machine, comprising means for assembling type into a line, mechanism for preliminarily justifying said line, and means for permanently justifying said line by simultaneously substituting permanent spaces in place of the temporary justifiers by the introduction of molten metal into the inter-

vals in the line formed by said temporary justifiers to form individual disconnected justifying spaces between the words.

58. In a device of the kind described, means for automatically inserting a spacer between adjacent words of groups of characters in a line of individual type, means for adjusting the position of said spacers to justify the line, and means for simultaneously substituting permanent unconnected spaces for said temporary spacers.

59. In a device of the kind described means for assembling a plurality of individual type and a plurality of temporary spacers into lines with a spacer positioned between each of the several words therein, and means for transferring said lines from the line assembling position, in combination with intermittently operated mechanism for simultaneously replacing each temporary spacer with an independent permanent spacer, and means controlled by said transferring mechanism for starting the operation of said spacer replacing mechanism.

60. In a machine of the class described, means for assembling type into words, means for transferring the words singly from the word assembling point to a line assembling point, and means for inserting a temporary spacer between the successive words in the line, said inserting means being brought into operation by said transferring means.

61. In a device of the kind described, means for assembling a plurality of individual type into a line with a temporary spacer between the several groups of characters therein, means for expanding said line by changing the position of said temporary spacers, and means for simultaneously replacing said temporary spacers in the line with permanent unconnected spaces.

62. In a device of the kind described, means for assembling a plurality of type into lines and automatically placing wedge shaped temporary spaces between the several groups of characters therein, in combination with a storage magazine for said temporary spacers, mechanism for expanding the line by the movement of said temporary spacers, means for simultaneously replacing all of said temporary spacers in a line with permanent disconnected spaces, and means for simultaneously returning all of said temporary spacers to their magazines.

63. In a device of the kind described, a type mold comprising a cap, a base, and two side walls movable at right angles to said cap and base and adapted to be thrust forward before the casting operation and retracted thereafter, said mold parts being adapted to inclose the several word groups comprising a line of type and clamp them tightly during the operation of justifying the line.

64. In a device of the kind described, a transfer carriage adapted to be reciprocated in a fixed path, a constantly rotating device, means for alternately engaging and disengaging said carriage with opposite sides of said rotating device to reciprocate said carriage.

65. In a device of the kind described, a transfer carriage, and means for operating it, consisting of a constantly traveling belt and means for engaging one side of said belt with a gripping device to move the carriage in one direction, and means for automatically releasing said gripping device and engaging said belt with another gripping device to move the carriage in the opposite direction.

66. In a device of the kind described, a plurality of space wedges and a receptacle for storing said wedges, in combination with laterally movable means arranged to cooperate to engage the opposite sides of the foremost space wedge in the receptacle to retain it in said receptacle, and means for simultaneously retracting said engaging means to release said space wedge from the receptacle.

67. In a device of the kind described, a plurality of space wedges and a receptacle for storing said wedges, in combination with laterally movable means arranged to cooperate to engage the foremost space wedge in the receptacle to retain said wedge in said receptacle, means for simultaneously retracting said engaging means to release said space wedge from the receptacle, and means

for simultaneously engaging the succeeding space wedge in the receptacle to prevent its escape from the receptacle.

68. In a device of the kind described, provided with temporary spacers, a pair of cooperating ways formed in the opposite walls of a groove and arranged to loosely support a plurality of said spacers, and a pair of opposing jaws positioned at one end of said ways adapted to cooperate to engage a single spacer between them to support the same in position in combination with mechanism adapted to temporarily separate said jaws to release the spacer supported thereby.

69. In a device of the kind described, provided with temporary spacers, a pair of cooperating ways formed in the opposite walls of a groove and arranged to loosely support a plurality of said spacers, and a pair of opposing jaws positioned at one end of said ways adapted to cooperate to engage a single spacer between them to support the same in position, in combination with mechanism adapted to temporarily separate said jaws to release the spacer supported thereby, and means adapted to prevent the escape of succeeding spacers from said ways while said jaws are separated.

In testimony whereof, I have hereunto signed my name in the presence of two (2) subscribing witnesses.

JOHN S. THOMPSON.

Witnesses:

BURTON W. HILLS,
CHARLES I. COBB.