

No. 667,210.

Patented Feb. 5, 1901.

J. C. FOWLER.

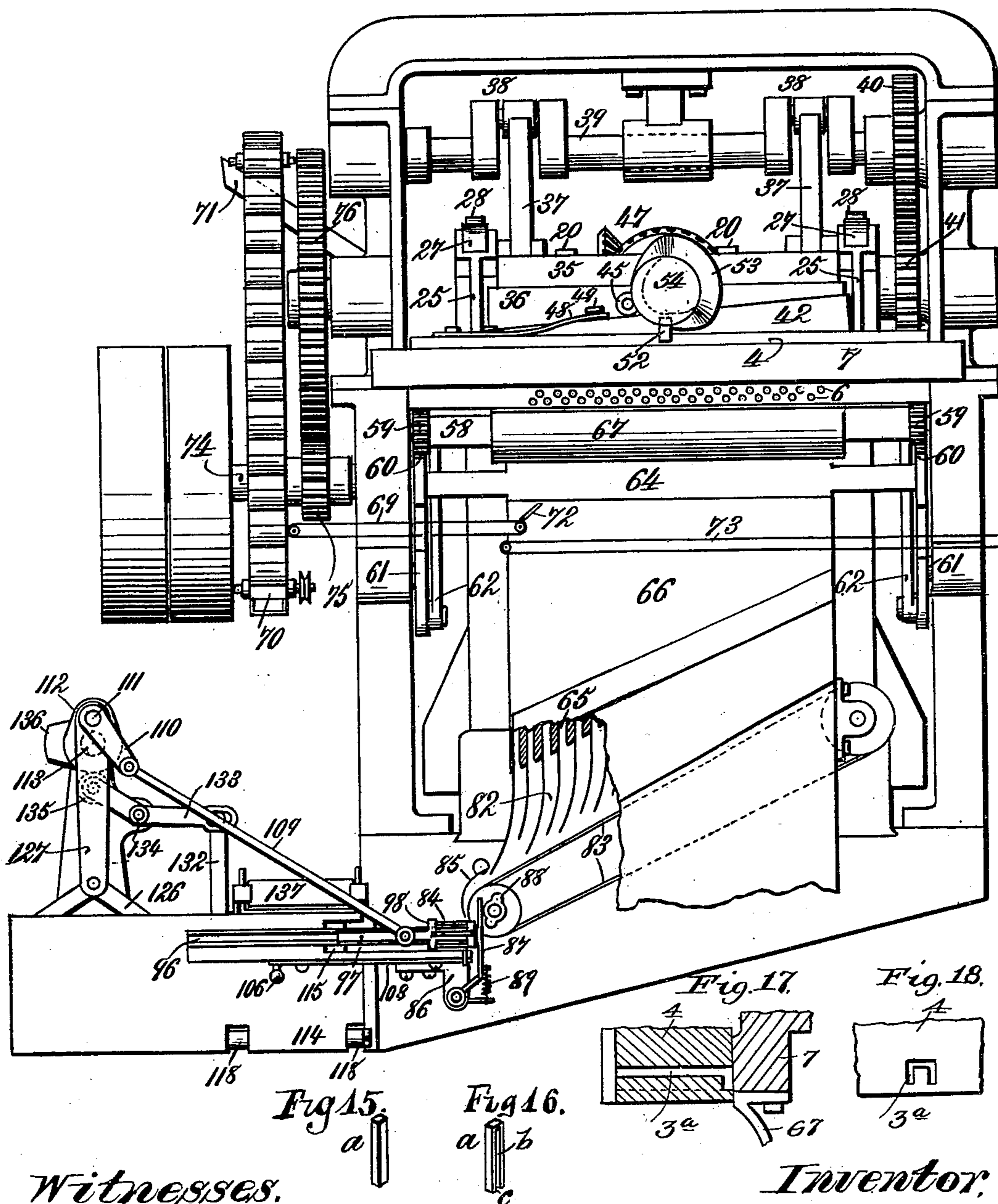
MACHINE FOR CASTING AND SETTING TYPE.

(Application filed Aug. 21, 1899. Renewed July 9, 1900.)

(No Model.)

5 Sheets—Sheet 1.

Fig. 1.



Witnesses.
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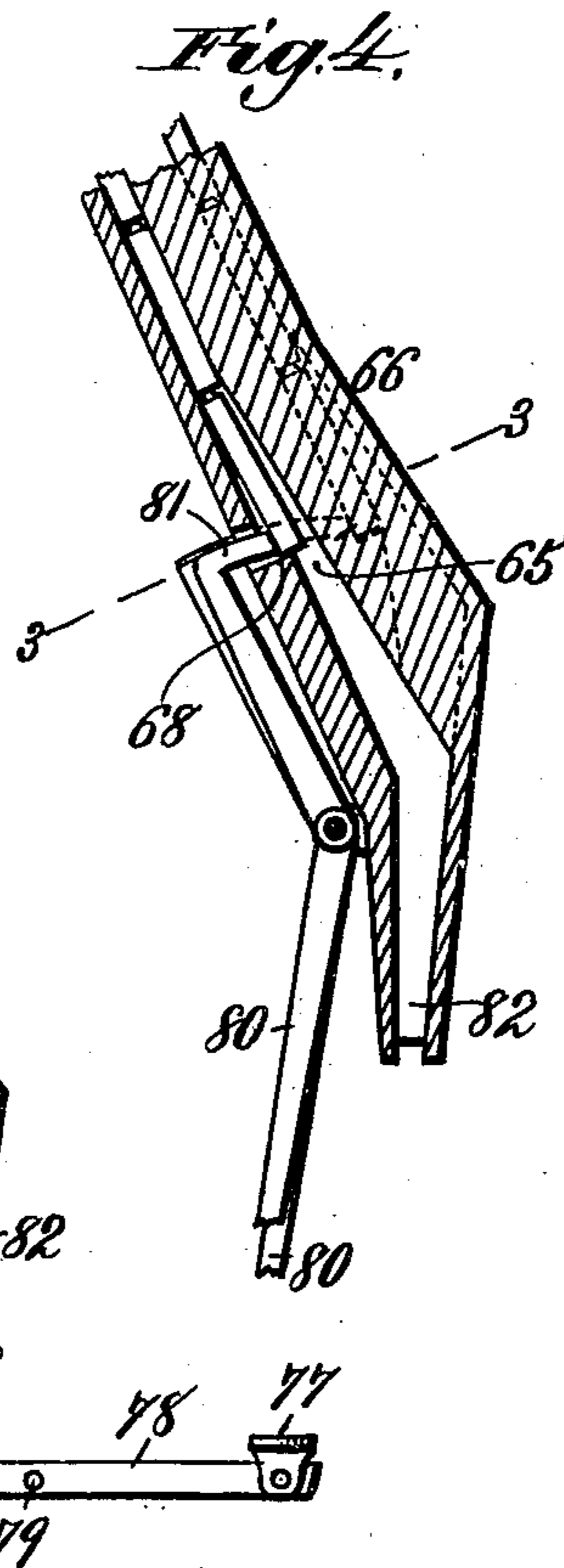
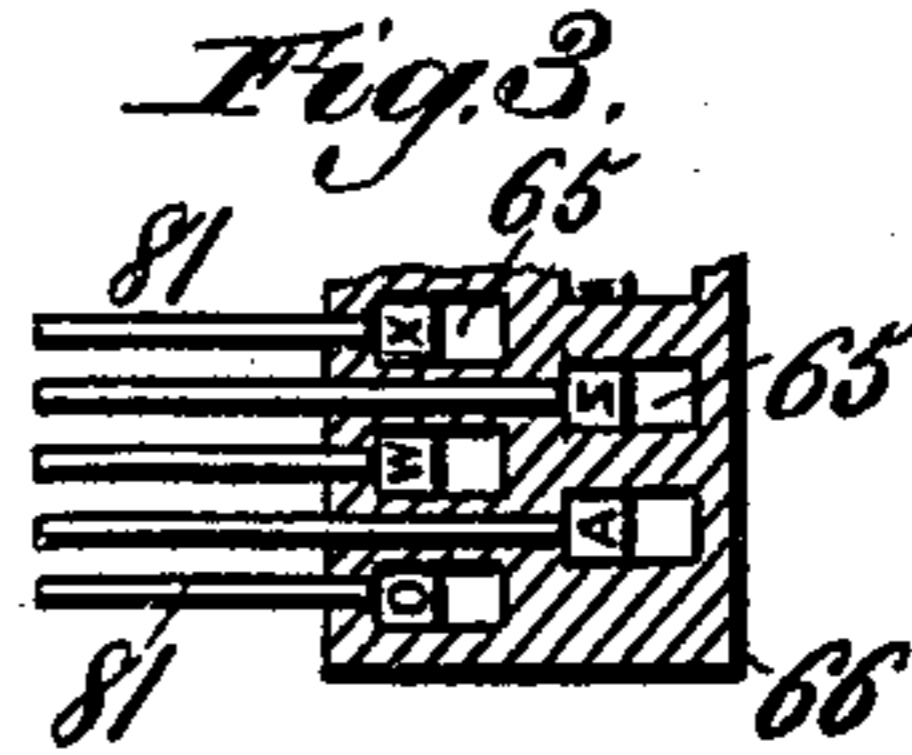
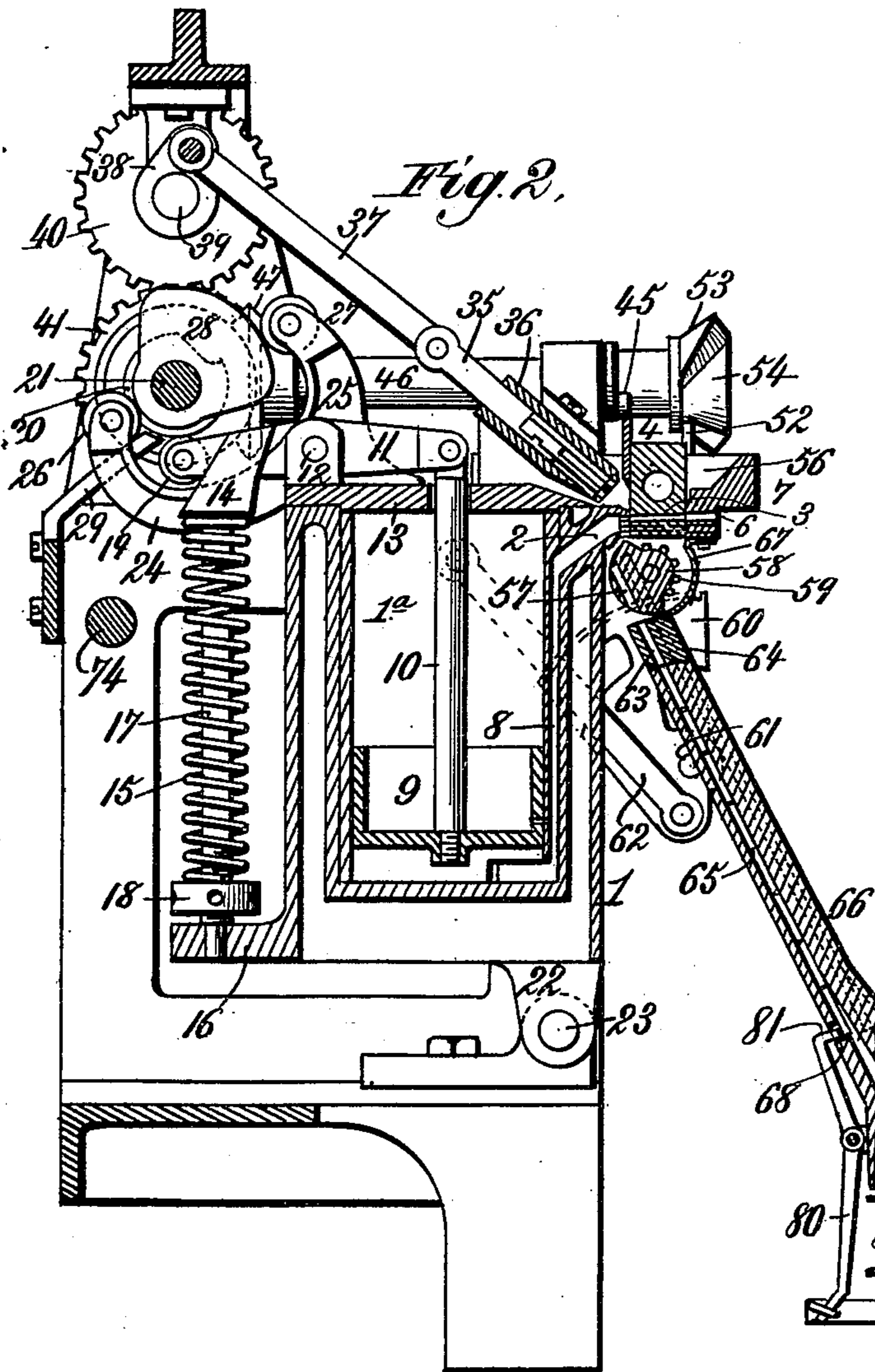
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5 Sheets—Sheet 2.



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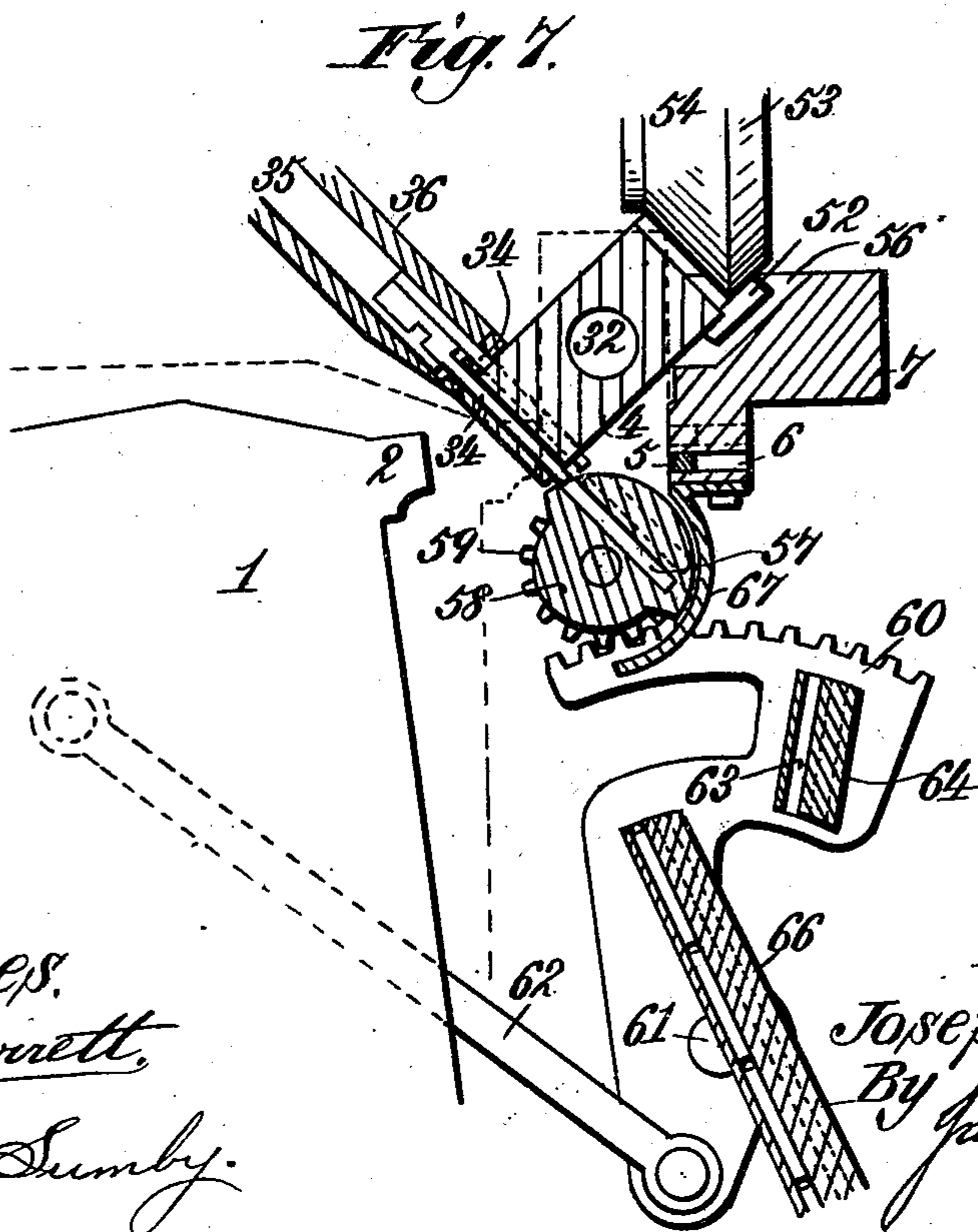
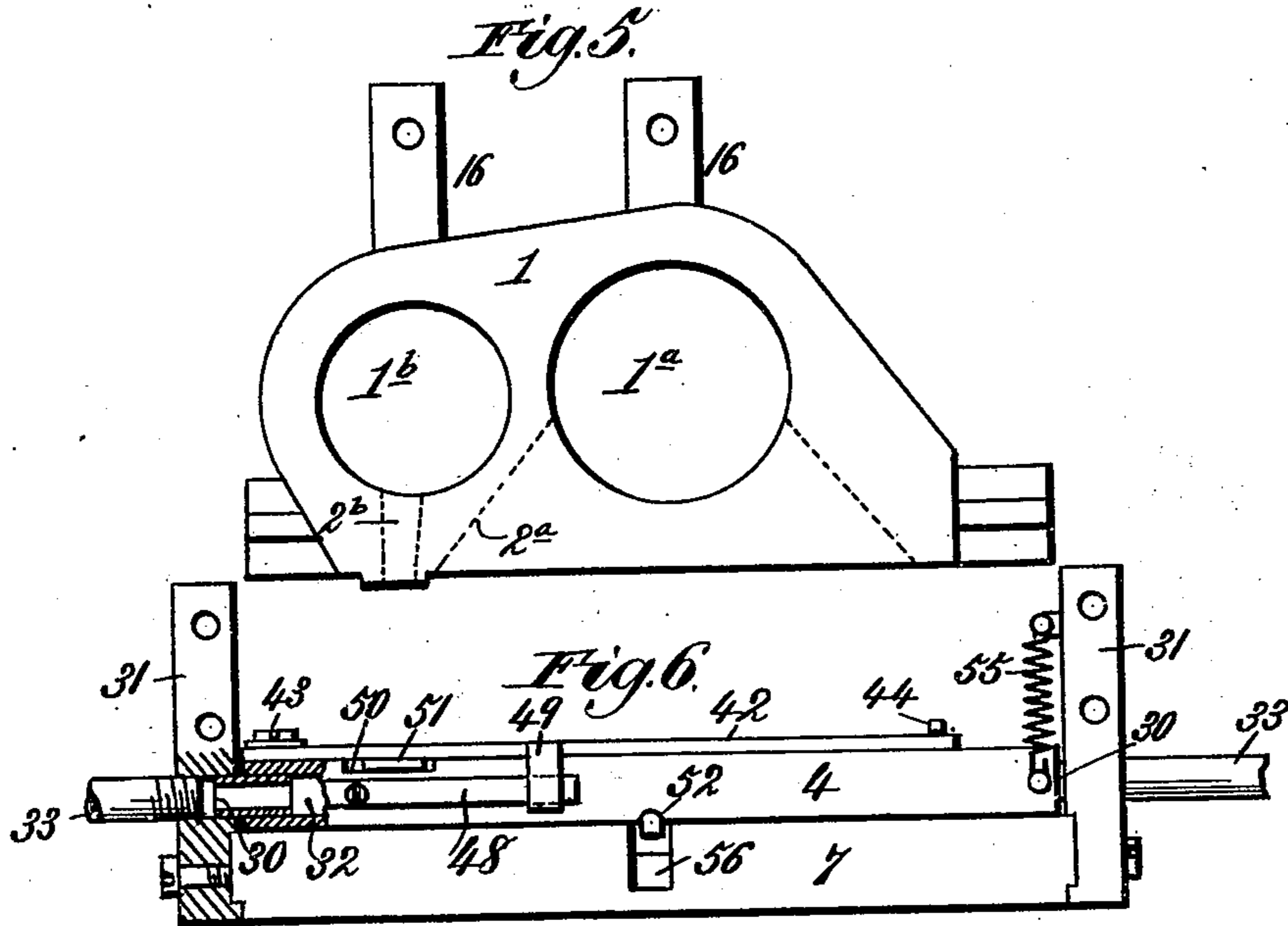
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MACHINE FOR CASTING AND SETTING TYPE.

(Application filed Aug. 21, 1899. Renewed July 9, 1900.)

(No Model.)

5 Sheets—Sheet 3.



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5 Sheets—Sheet 4.

Fig. 8.

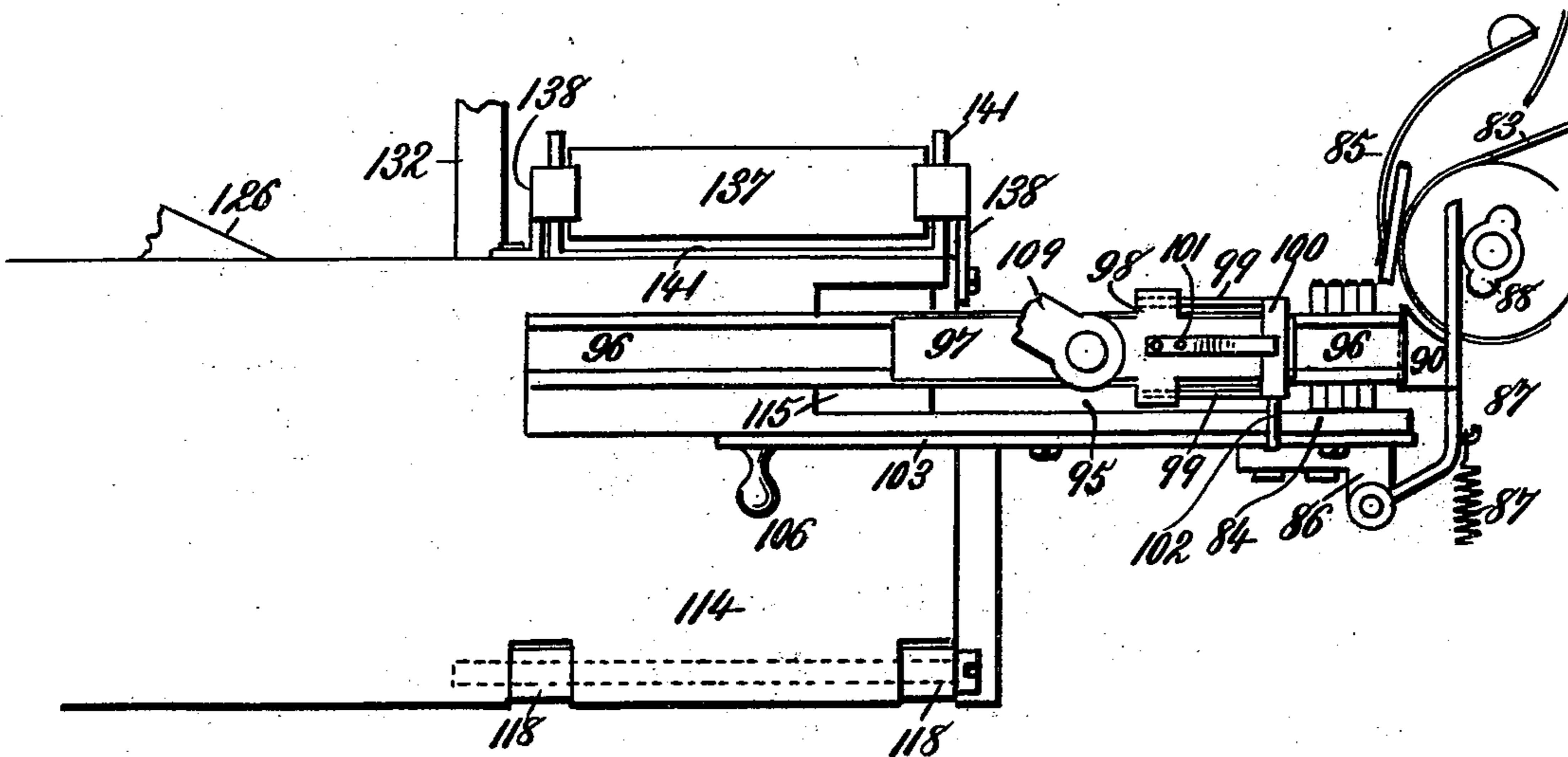


Fig. 9.

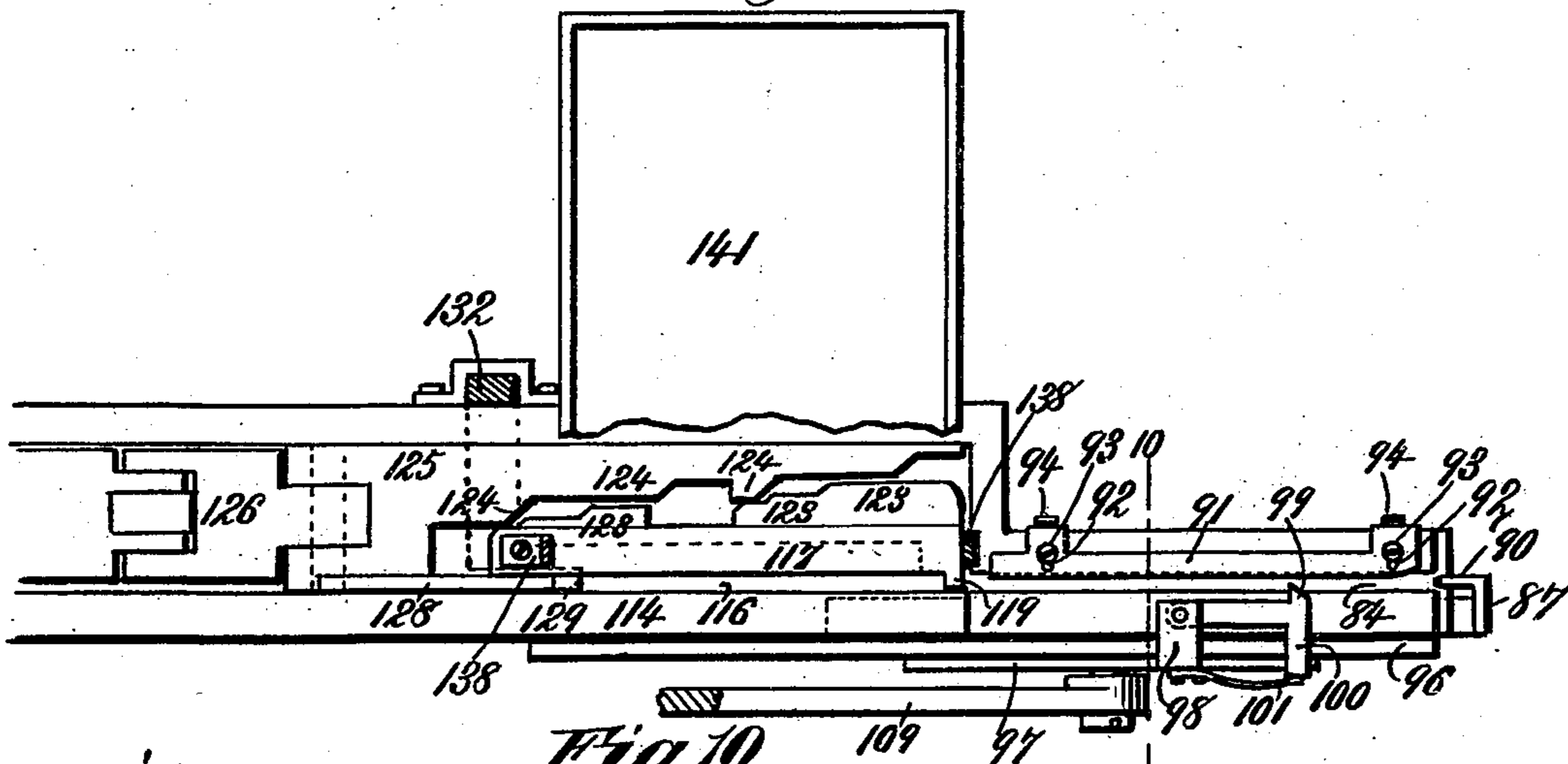
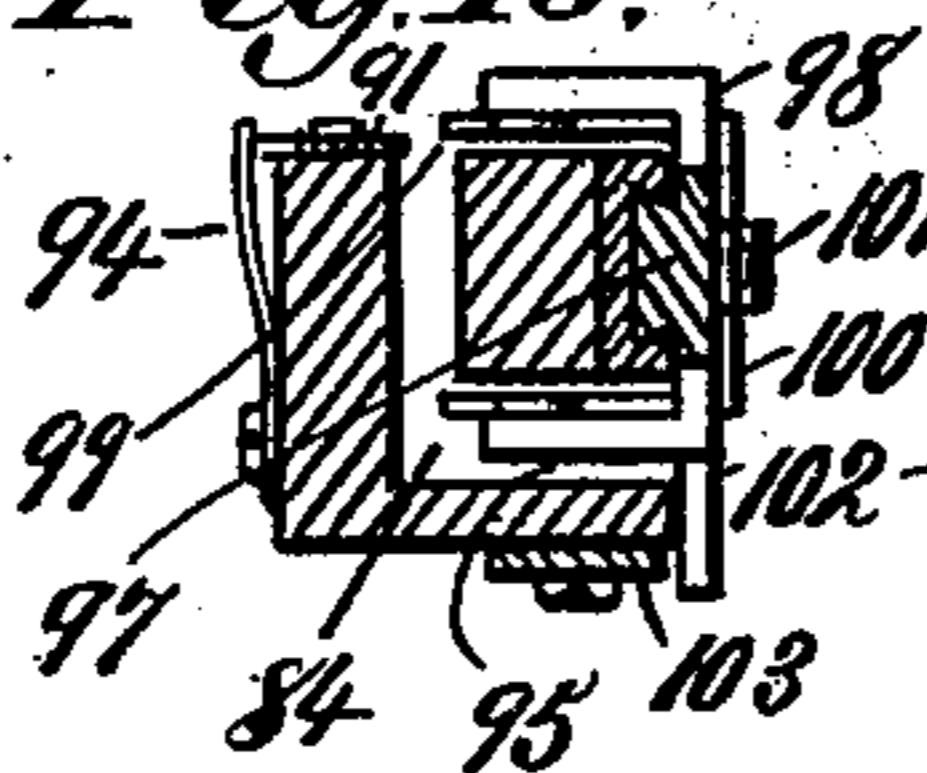


Fig. 10.



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5 Sheets—Sheet 5.

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Fig. 11.

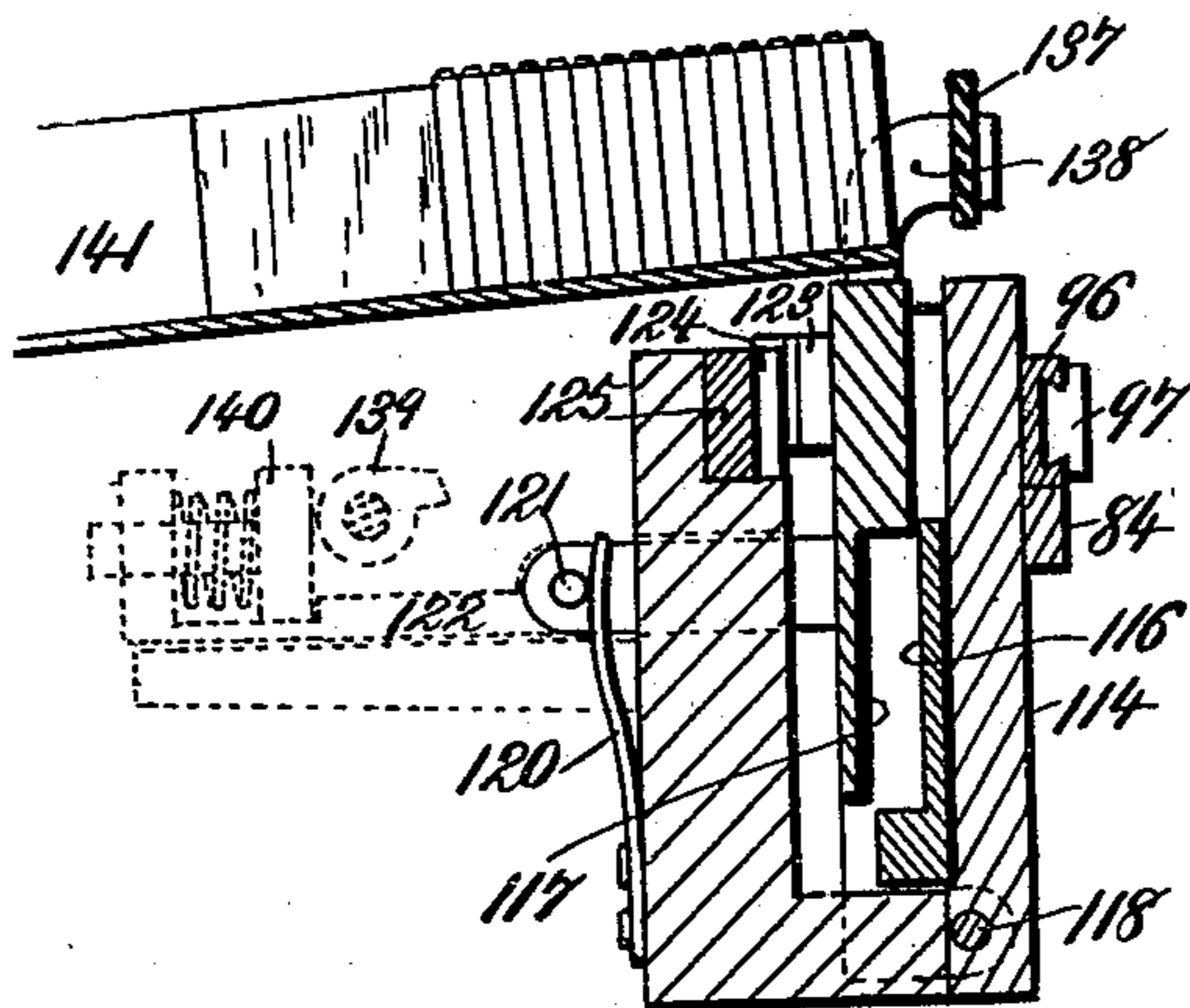


Fig. 12.

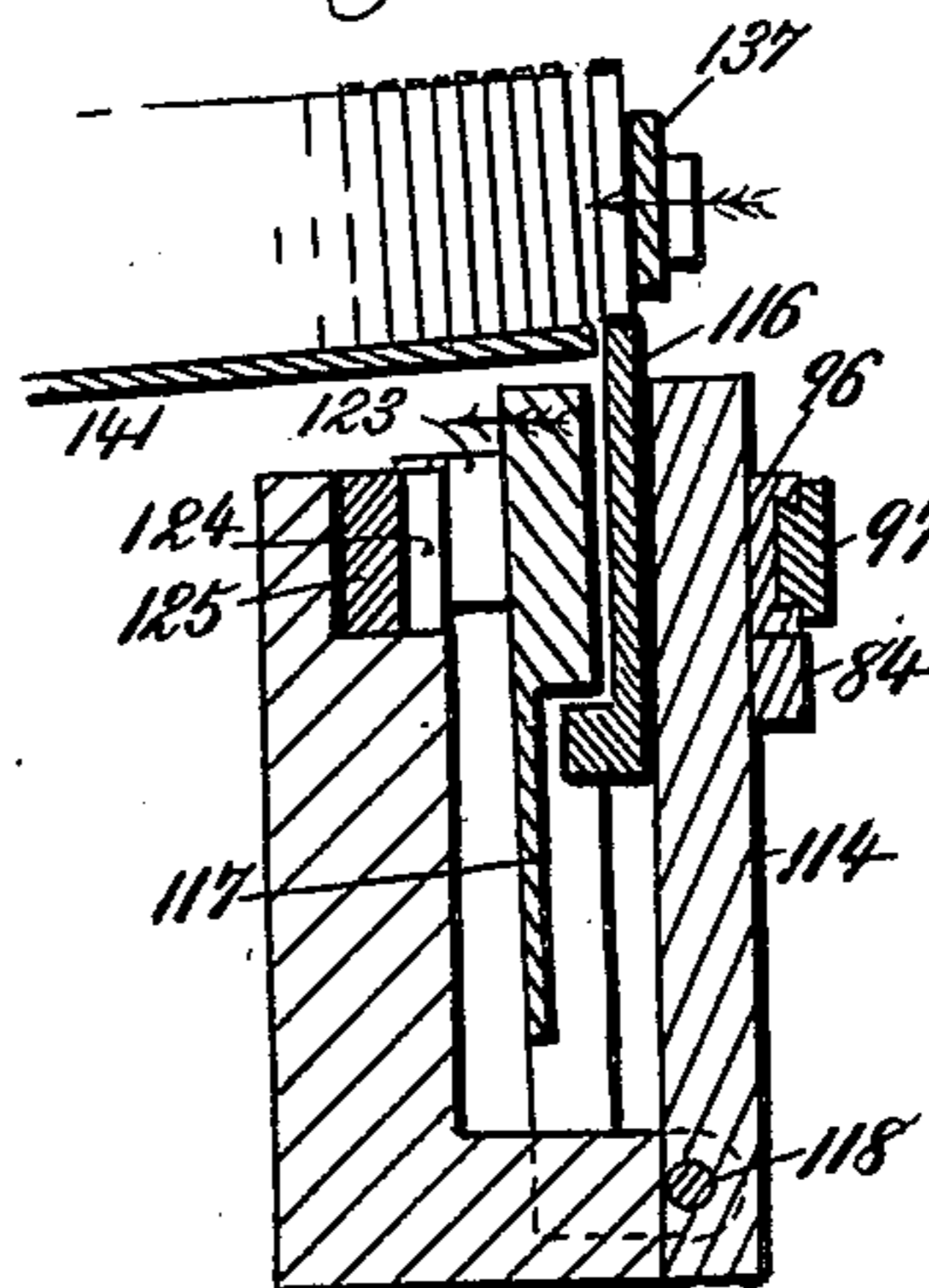


Fig. 13.

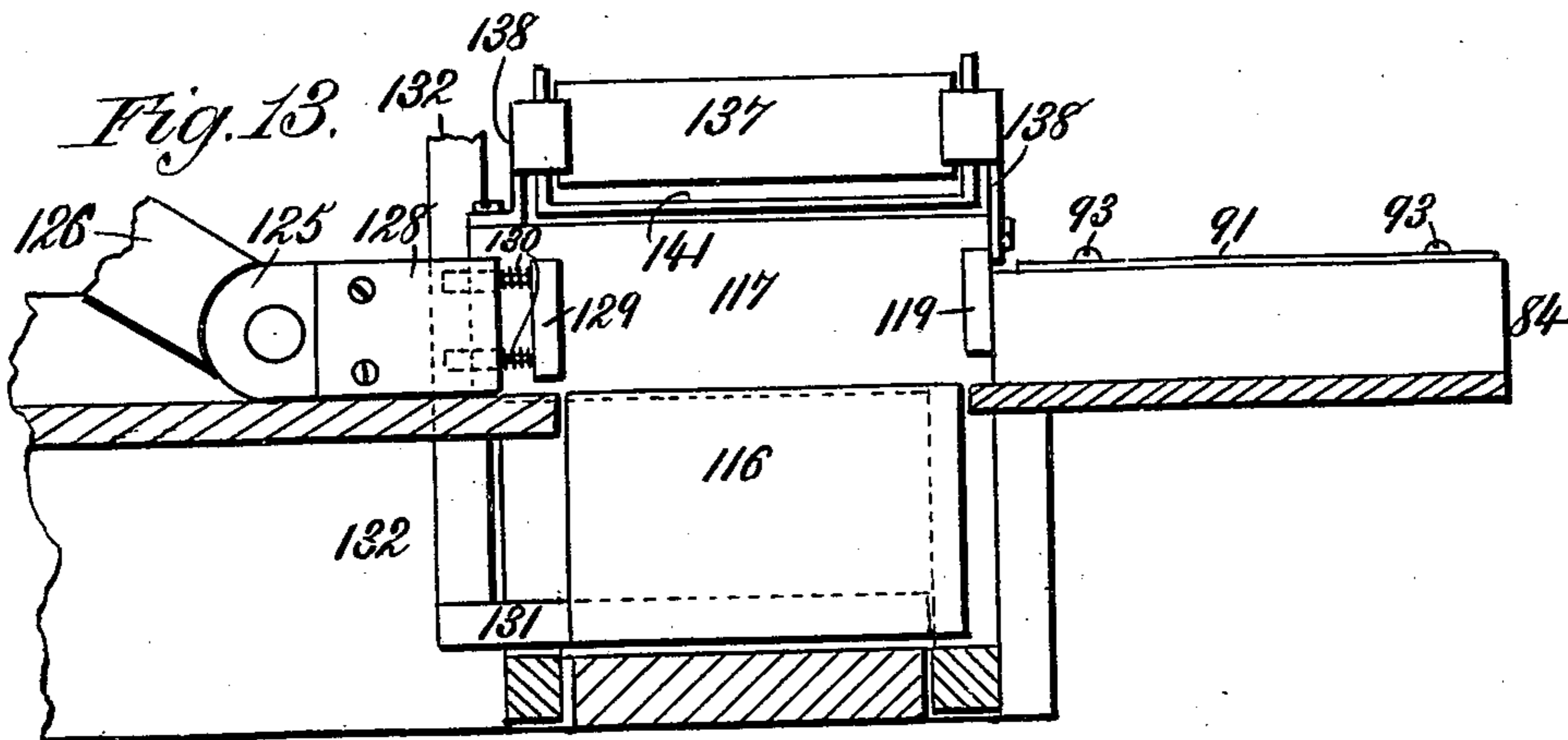
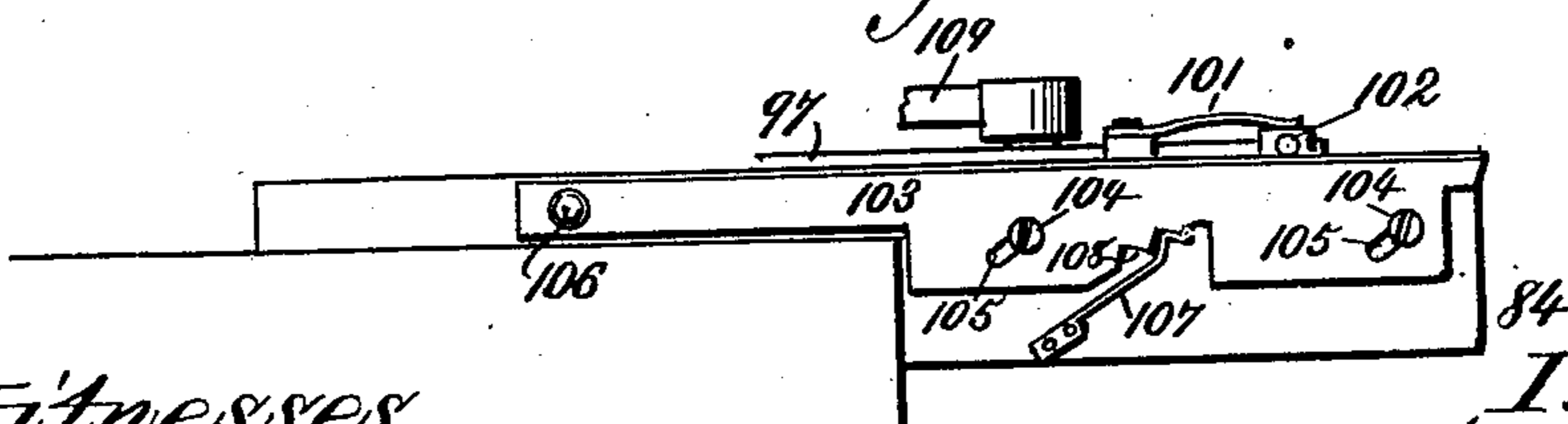


Fig. 14.



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UNITED STATES PATENT OFFICE.

JOSEPH C. FOWLER, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE FOWLER
COMPOSING AND TYPE-SETTING COMPANY, OF CHICAGO, ILLINOIS.

MACHINE FOR CASTING AND SETTING TYPE.

SPECIFICATION forming part of Letters Patent No. 667,210, dated February 5, 1901.

Application filed August 21, 1899. Renewed July 9, 1900. Serial No. 23,044. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH C. FOWLER, a citizen of the United States, residing at Baltimore city, in the State of Maryland, have
5 invented new and useful Improvements in Machines for Casting and Setting Type, of which the following is a specification.

This invention has for its general object to improve and simplify machines for casting
10 and setting type; and it relates more especially to a machine of the character described and claimed in Letters Patent No. 532,368, granted to me January 8, 1895, (assigned to the Fowler Composing and Type-Setting Com-
15 pany, of Chicago, Illinois,) and wherein provision was made for the simultaneous casting of a group or set of types bearing different characters, the transferring of the cast types to the respective receptacles of a type-setting
20 mechanism wherein the types are accumulated in assorted columns or piles, the releasing of the types in the order required, and the assembling of the types in line, to be subsequently set in columns for newspaper or book
25 or other printing.

My present invention consists, among other things, in certain hereinafter-described improvements in the various parts of a type casting and composing machinesuch as above
30 referred to and also in other novel features and combinations of devices, including means for disposing of surplus types and slugs or spaces when their respective magazines or receptacles are filled or sufficiently supplied
35 without suspending the operation of any part of the machine, and, further, in the addition of novel means for justifying an assembled line of types and for setting such types in columns or pages, as hereinafter more par-
40 ticularly set forth.

In the annexed drawings, forming part of this specification, Figure 1 is a part-sectional front elevation, with portions removed, of a type casting and composing machine, illus-
45 trating my invention. Fig. 2 is a vertical sectional view of portions of the machine from front to rear with parts in position for casting types. Fig. 3 is a section on the line 3 3 of Fig. 4, showing some of the type recepta-
50 cles or magazines and levers for releasing types therefrom. Fig. 4 is an enlarged ver-

tical section of a portion of a type receptacle or magazine with lever mechanism. Fig. 5 is a plan of the casting-pot. Fig. 6 is a part-sectional plan of the mold and the accompa-
55 nying trimming-knife and support for the matrices. Fig. 7 is a detail vertical sectional view, on a large scale, showing parts of the machine in position for ejecting cast types from the mold. Fig. 8 is an enlarged front
60 elevation of mechanism for assembling a line of types, justifying the assembled line, and setting successive lines in a column or page for newspaper, book, or other printing. Fig. 9 is a plan of the same. Fig. 10 is a vertical
65 transverse section of a portion of the same on the line 10 10 of Fig. 9. Figs. 11 and 12 are sectional detail views of the justifier and mechanism for setting successive lines of types in a column or page. Fig. 13 is a front
70 elevation of the same in part vertical longitudinal section. Fig. 14 is an inverted plan of part of the mechanism concerned in transferring a line of types from the assembling-box to the justifier. Fig. 15 is a view of a
75 hollow slug, showing its closed side. Fig. 16 is another view of the same, showing the open side of the slug. Fig. 17 is a sectional detail view showing a mold-cavity 3^a for casting a compressible space or slug. Fig. 18 is
80 an elevation of a portion of the mold, showing in end view one of the cavities for casting compressible spaces or slugs.

This improved type casting and composing machine is organized for the simultaneous
85 casting of a group or set of types bearing all the different required characters or blanks or spaces, letters, numerals, punctuation-marks, and other signs that may be desired, with provision for trimming or dressing the cast types
90 and blanks or spaces, for ejecting the same from the respective mold-cavities and transferring the cast types and blanks or spaces to the individual receptacles constituting the magazine of a type-setting mechanism, in
95 which the types and blanks are accumulated in assorted columns or piles; for disposing of surplus types and blanks or returning them, if desired, to the casting-pot without suspending the operation of any part of the machine,
100 and for releasing individual types and blanks in the order required, assembling the types in

line, justifying an assembled line, and setting successive lines in column preparatory to printing or stereotyping.

An important feature of this machine is the provision of a separate reservoir for molten lead or other soft metal from which to cast compressible blanks, slugs, or spaces, another reservoir being provided for molten type-metal from which to cast the character-bearing types, the types and the compressible slugs or blanks being cast simultaneously in a mold constructed with appropriate mold-cavities for the different types and the said compressible spaces, so that when the single types and compressible spaces are accumulated in their appropriate magazine cells or channels and subsequently released therefrom in assembling or composing a line it will be possible by means of the compressible spaces to bring each and every line to a determined length in the justifying operation.

The casting-pot 1, Figs. 2, 5, and 7, will be heated in any usual or convenient manner, and it is adapted to move to and fro or swing or rock to place its outlet-mouth portion 2 against the rear ends of the individual mold-cavities 3 in a mold 4, so that molten metal can flow into said cavities to form the bodies of the types and the required slugs, blanks, or spaces.

In Figs. 17 and 18 there is shown a preferred form of mold-cavity 3^a for casting from soft metal the hollow or longitudinally-channeled compressible space or slug shown in Figs. 15 and 16.

For the purpose of forming the type characters there is provided a series of matrices, preferably formed in matrix-blocks 5, Fig. 7, that may be supported in cavities 6 of a matrix-supporting bar 7, Figs. 1, 2, 6, and 7, and when the parts of the casting mechanism are in the position shown in Fig. 2 these matrix-blocks 5 close the mold-cavities 3 fluid-tight at their front ends.

In the drawings there is shown a casting-pot having two receptacles 1^a and 1^b, Fig. 6, for containing, respectively, a suitable molten type-metal composition for casting the character-bearing types and molten lead or other soft metal for casting slugs, blanks, or spaces. The outlets 2^a and 2^b of these receptacles should be coextensive with the series of mold-cavities appropriated to the casting of types and blanks, respectively, so that the molten metal may be caused to simultaneously enter all the mold-cavities for producing a complete set of type characters and spaces at one operation; but the number of casting pots or receptacles therein is immaterial so long as the construction is such as to provide separate reservoirs for molten type-metal and molten lead or other soft metal, one for casting types and the other for casting compressible blanks or spaces, the said reservoirs to be so arranged that the two kinds of molten metal can be caused to flow into a plurality of mold-cavi-

ties in the mold simultaneously. Each casting pot or receptacle therein is provided with a channel 8, Fig. 2, leading to the outlet, and a plunger 9 is arranged in each pot or receptacle to be operated in such manner that when the plunger is depressed or forced inward the molten metal will be thereby caused to flow through the channel 8 and mouth 2 into the mold-cavities in the mold. The stem 10 of each plunger connects with one end of a lever 11, that is fulcrumed intermediate its ends at 12, Fig. 2, on the cover 13 of the casting-pot. An outer end portion of each lever 11 carries a bearing 14 for the upper end of an expansively-acting spring 15, the lower end of which is supported from a bracket 16 on a lower rear portion of the casting-pot. On the guide-stem 17 of each spring there may be placed a nut 18 for regulating the force to be exerted by said spring in depressing the plunger. The outer end of each lever 11 supports a roller 19 in contact with a cam 20 on a rotary shaft 21, Fig. 2, whereby the lever 11 is operated to raise the plunger 9 and at the same time compress the spring 15, so that as soon as the said cam 20 revolves a sufficient distance to bring a cut-away portion thereof opposite the roller 19 the spring 15 will be free to expand, and thereby actuate the lever 11 in such manner as to depress the plunger 9, and thus cause it to force some of the molten metal through the channel 8 and mouth 2 into the mold-cavities of the mold. There is a cam 20 for raising each plunger 9, and each cam is so shaped that in acting on the roller 19 it will lift the plunger gradually without causing it to exert any suction on the molten metal in the channel 8, that might prevent complete filling of the mold-cavities, while, however, the cut-away portions of these cams 20 are so formed as to permit a sudden action of the springs 15, that will cause the plungers 9 to be depressed with such power as to forcibly shoot or expel the molten metal through the channels 8 to the outlets of the casting-pot and thence into the cavities of the mold.

In order to provide for moving the casting-pot toward and from the mold 4, said casting-pot is provided at suitable points with bracket-arms 22, Fig. 2, mounted on a shaft or pivots 23, so that the pot can be swung or rocked. For this purpose the upper part of the casting-pot is provided with rigid arms 24 and 25, that respectively carry rollers 26 and 27 at their outer ends. On the shaft 21 there are cams 28, one between and in contact with each pair of rollers 26 and 27, as indicated in Figs. 1 and 2. These cams 28 are so formed that in acting on the rollers 26 they will move the casting-pot 1 rearward or away from the mold 4, while in acting on the rollers 27 they serve to move the casting-pot forward to place its mouth 2 against the mold, as shown in Fig. 2. The pot is thus capable of being positively moved or swung in both directions, and when

in the casting position, as shown in Fig. 2, a fluid-tight closure of the pot-mouth against the rear face of the mold is obtained.

When the casting-pot is swung rearward or away from the mold, the rollers 19 of the plunger-levers 11 pass from the cams 20 onto a slightly-concaved bearing-surface 29, Fig. 2, the curvature of which corresponds with the segment of a circle having its center coincident with the pivot or pivots 23 of the casting-pot, and thus the plunger-depressing springs 15 are held under compression while the casting-pot is in its rearward position, so that the plungers cannot at this time operate to expel any metal.

The mold 4 is provided with end trunnions 30, Fig. 5, that may be mounted in suitable bearings provided in frame-pieces 31, to which the matrix-supporting bar 7 is secured. These trunnions 30 may be hollow to communicate with a passage 32 through the mold and with pipes 33 at each end for circulation of any suitable cooling medium. By means of its trunnions the mold is adapted to rock or oscillate, so that when a set of types has been cast the mold can be turned from the perpendicular position (shown in Fig. 2) to the inclined position, as shown in Fig. 7, to place the mold-cavities 3 and 3^a in coincidence with a series of type-ejectors 34, Figs. 2 and 7, that are made to enter said mold-cavities and act against the bases or butt-ends of the types to eject them from the mold. The type-ejectors 34 are carried by a plate 35, adapted to reciprocate in an inclined guide-frame 36, arranged at the rear of the mold. This reciprocating plate 35 is actuated through links 37, connecting with cranks 38 on a shaft 39, having thereon a gear 40, through which said shaft is driven from a gear 41 on the shaft 21, as shown in Figs. 1 and 2.

After the types and blanks or slugs have been cast in the mold 4 and while the mold is yet in its perpendicular position, as shown in Fig. 2, the bases or butt-ends of the cast types are dressed or trimmed by means of a knife or cutter 42, one end of which is pivoted to the rear side of the mold, as at 43, Fig. 6. If desired, a guide 44 may be arranged for the other end of said knife. The knife 42 is depressed or moved downward at proper intervals to dress the types by means of a roller 45, Figs. 1 and 2, carried by an arm on a shaft 46, that is driven by bevel-gearing 47 from the shaft 21, hereinbefore mentioned. A spring 48, Figs. 1 and 6, is mounted on the mold 4 in position to engage beneath a lug 49, projecting from the knife 42, so that after the knife has been depressed to dress or trim the butt-ends of the cast types the said spring 48 will restore the knife to its normal position for a subsequent operation. As shown in Fig. 6, that portion of the mold 4 in which are located the cavities for casting slugs, blanks, or spaces may be cut away or recessed, as at 50, it being usual to cast the slugs, blanks, or spaces of a less length than the

types that bear letters or other characters. The outlet 2^b, Fig. 5, of the casting-pot receptacle or compartment 1^b will be extended sufficiently to enter the recess 50 in close juxtaposition with the mold-cavities there located, and the knife 42 will carry at this point a supplemental cutter 51, Fig. 6, for trimming the bases or butt-ends of the slugs, blanks, or spaces so that they will be shorter than the types, as required. After the casting-pot is moved away from the mold 4 the knife 42 operates to trim or dress the butt-ends of the cast types and slugs while the mold remains stationary in the perpendicular position, (shown in Fig. 2,) and then the mold 4 is rocked or oscillated on its trunnions to bring the mold-cavities into coincidence with the ejectors 34, so that said ejectors can enter the mold-cavities, as shown in Fig. 7. For the purpose of rocking the mold 4 to the inclined position (shown in Fig. 7) there is provided on the front face of said mold an upward-projecting tappet 52, Figs. 1, 2, 6, and 7, that is engaged at the proper time by an inclined acting-surface 53 of a cam 54 on the front end of the shaft 46, Fig. 6. This cam is so constructed as to gradually rock the mold 4 to the position shown in Fig. 7 against the action of a spring 55, Fig. 6, by which the mold is returned to its normal perpendicular position after the cast types and slugs or spaces have been ejected. A recess 56, Figs. 2, 6, and 7, is provided in the matrix-supporting bar 7 to accommodate the tappet 52 when the mold is rocked from its perpendicular casting position.

While the parts of the machine are in the position represented in Fig. 7, with the casting-pot 1 swung rearward and the mold 4 occupying its inclined position, the cast types and slugs will be pushed by the ejectors 34 from the mold-cavities and into pockets 57 in a rocking or oscillatory reversing-bar 58, Figs. 1, 2, and 7, having its ends suitably journaled in the frame of the machine. This oscillatory reversing-bar 58 is provided at its ends with segment-gears 59 in mesh with oscillatory or swinging racks 60, fulcrumed at 61 in the machine-frame. Each rack 60 is connected with one side of the casting-pot by means of a link 62, Figs. 1, 2, and 7, so arranged that when the casting-pot is moved rearward the racks 60 will be actuated in such direction as to turn the reversing-bar 58 into a position where the open ends of its pockets 57 will coincide with the mold-cavities 3 in the inclined mold 4, so that the ejectors 34 will be permitted to push the cast types and spaces from the mold and into said pockets 57 of the reversing device. When the casting-pot moves forward, however, the racks 60 will be swung in the opposite direction, thereby turning the reversing device 58 into such position that its pockets 57 will be now inverted and have their open ends brought into coincidence with a corresponding series of type-passages 63 in a transfer-bar 64, that is supported between

and carried by the two swinging racks 60, through which the oscillatory reversing device 58 is actuated. The cast types and spaces carried in the pockets 57 of the reversing device 58 will now fall through the type-passages 63 of the transfer-bar 64 into a corresponding series of cells or receptacles 65, constituting a magazine 66, in which the cast types and spaces are accumulated for subsequent use in the operation of composing or type-setting. The purpose of the shifting transfer-bar 64 is to provide for disposing of surplus cast types and slugs or spaces when their respective magazine cells or receptacles 65 are already filled or sufficiently supplied, and this is accomplished, as hereinafter described, without interrupting the operations of any part of the machine.

By reference to Figs. 2 and 7 it will be observed that the pockets 57 are located in the oscillatory reversing-bar 58 on one side of the axis of said bar, the other side of the bar being reduced in diameter to provide a suitable clearance for the rocking mold 4 in changing its position at proper time intervals. There may be one or more series of mold-cavities in the rocking mold 4, according to the required capacity of the machine for casting and accumulating types, there being of course a corresponding number and arrangement of ejectors 34, reversing-pockets 57, type-passages 63, and magazine-cells 65, as shown. With more than one series of each of these elements the individuals of each series preferably alternate in position or break joints with the individuals of adjoining series, thereby combining compactness of structure with greater efficiency and certainty in the automatic operations of casting, ejecting, and assorting the types.

In front of and extended partly below the reversing-bar 58 there is a concaved shield or guard 67, that may be supported from the under side of the matrix-supporting bar 7 or in any other convenient manner. This guard 67 serves to prevent the cast types from falling out of the inverted pockets 57 until the open ends of said pockets are brought into accurate coincidence with the type-passages 63, this result being further assisted by the alternating arrangement of the individual pockets and passages in adjoining series of each by reason of the webs between the passages 63 of one series serving as supports for the butt-ends of the types in one series of pockets 57 until they are brought into coincidence with the proper passages 63, through which they are to enter their appropriate cells in the magazine. The open ends of the reversing-pockets 57 receive the cast types from the mold with the ends of the types bearing the characters lowermost; but by the rocking of the bar 58 the types are reversed in position to bring their butt-ends lowermost before the open ends of said pockets come into coincidence with the type-passages 63 in the trans-

fer-bar 64, through which the types drop into the magazine-cells.

The magazine 66 is stationary and comprises a suitable number of cells or receptacles 65 appropriate to the required variety of types to be accumulated, together with the necessary supply of slugs, blanks, or spaces, punctuation-marks, and other characters. For the greater portion of its length each magazine-cell 65 occupies an inclined position, and below its inclined portion each cell may descend vertically to its lower open end, as shown in Figs. 2 and 4. The inclined portion of each magazine-cell should have a width from side to side and a depth from front to rear sufficiently ample to receive one type loosely upon another, end to end, with the butt-end of the lowermost type resting on a ledge or shoulder 68 in the lower part of the inclined portion of each cell. The distance from this ledge 68 to the upper open end of each cell should be just sufficient to receive a definite number of types without leaving in the upper portion of the cell any space insufficient to receive the full length of a type. With this construction the types cannot get out of position in their respective cells and no type can project above a magazine-cell to obstruct the required movements of the mechanism that transfers the types from the mold.

In composing or setting types some characters are more frequently used than others, and consequently some types will accumulate in their respective magazine-cells so rapidly that other types cannot enter. Whenever this occurs, the types that enter the transfer-passages 63 from the inverted pockets 57 of the reversing-bar 58, and which cannot get into any already-filled magazine-cell, will remain in the transfer-bar 64 until said bar is swung, with the racks 60, from the position shown in Fig. 2 toward the position shown in Fig. 7, and then as soon as the bar 64 clears the top of the magazine 66 the surplus types or slugs will fall from said transfer-bar. Any surplus blanks, slugs, or spaces that thus fall from the transfer-bar 64 may be received on an endless traveling belt 69, Fig. 1, and be thereby conducted to a suitable conveyer 70, discharging into a chute 71 for delivering such slugs, blanks, or spaces into the casting-pot chamber or compartment 1^b, where they will be remelted. A deflector or guard 72, Fig. 1, may be arranged at one end of the endless belt 69 to prevent the surplus lead blanks or slugs from falling onto an endless traveling belt 73, that is arranged to convey away any surplus types falling from the transfer-bar. If desired, there may be employed in connection with this endless belt 73 a conveyer and chute (not shown) for delivering the surplus cast types to the casting-pot chamber or compartment 1^a for remelting, or some of such surplus cast types can be reserved for making corrections in proof or for any other purpose.

It will be understood that the pockets 57 in the reversing-bar 58 and the type-passages 63 in the transfer-bar 64 will be sufficiently large to permit the cast types and blanks or spaces to pass freely without liability to sticking. The cells of the magazine are also of such dimensions as to permit free passage of the types and blanks one after another to the supporting ledge or shoulder 68 in each cell, whereby the various types and the blanks are supported end to end in columns or piles within their respective cells.

The power for operating the described type casting, ejecting, reversing, and transferring devices may be applied to a driving-shaft 74, having thereon a pinion 75, Fig. 2, meshing with a gear 76 on the shaft 21, which in turn is geared with the shaft 39, as before described. Any suitable means may be provided for actuating the conveyer mechanism that disposes of the surplus types and blanks. It will be seen that by means of the shifting transfer-bar 64 and the conveyer-belts 69 and 73 all surplus cast types and blanks that cannot enter the filled magazine-cells are readily and automatically disposed of without interrupting or suspending the operation of any part of the machine. By casting a complete set of types at each operation of the machine the magazine-cells are always kept supplied, the supply being constantly renewed as the types are used.

I propose to construct the machine with such dimensions and of such capacity as to cast at each operation a complete set of all the various characters, including blanks or spaces, that may be required for various kinds of printing, and the cast types are to be accumulated in their respective magazine-cells in such quantities as to provide a sufficient supply for all the conditions required in the rapid composing or setting of the types for book, newspaper, or other work. All types of the same kind will be deposited in one magazine-cell, and so on throughout the set of types cast by the mold. The letters or other characters, numerals, punctuation-marks, or other signs, blanks, or spaces will all be rapidly accumulated in their respective magazine-cells, and the surplus types and blanks that cannot enter the filled cells will be automatically disposed of in the manner hereinbefore described.

In the operation of type setting or composing the individual types and blanks will be released from their respective magazine-cells in the order required by means of keys 77, arranged in a suitable keyboard. Each key 77, Fig. 2, acts upon one end of a key-lever 78, pivoted at 79, and which has its inner end engaged with the lower end of a vertically-arranged lever 80, pivoted at the back of the magazine. The upper end of each lever 80 carries a finger 81, adapted to enter the back of a magazine-cell and push a type from the ledge or shoulder 68 therein, as shown in Figs. 2, 3, and 4. There will of course be a key and its connected type-releasing mechanism

for each magazine-cell. As shown in Figs. 2 and 4, each magazine-cell is somewhat enlarged at and below its interior ledge or shoulder 68 for facilitating release and descent of the required type. As each type is released it drops butt-end downward through a cell-outlet 82 and is received on an endless traveling belt 83, Figs. 1, 2, and 8, that is supported and operated beneath the magazine. The individual types and blanks are carried in the required order by the belt 83 to an assembling box or receptacle 84, Figs. 1, 8, 9, 10, and 13, in which the types are properly assembled in line to be subsequently justified and set in column. A suitable guide 85, Figs. 1 and 8, is arranged at a proper distance from the delivery end of the belt 83 to cause the successive types to assume a perpendicular position butt-end downward in entering the assembling-box. To a bracket 86 beneath the assembling-box there is pivoted the lower end of a vertically-extended lever 87, the upper portion of which is acted on at intervals by a suitable cam 88 in such manner as to impart a vibratory movement to said lever. This cam 88 may be carried on the shaft of one of the rollers supporting the belt 83, as shown. A spring 89 is connected with the lever 87 to hold it against the cam 88 and assist in producing the required vibratory movements. The vibratory lever 87 carries a pusher 90, Figs. 8 and 9, that is adapted to enter one end of the assembling-box 84 against one side of the type that was last received in the line, thereby feeding the same along to make room for succeeding types to complete the line. By the action of the spring 89 this pusher 90 is made to retreat in season to admit each successive type required. On top of the rear wall of the assembling-box and extended along the same there is mounted a yielding pressure plate or bar 91, having transversely-arranged slots 92 therein for passage of screws 93, that attach said plate or bar to the box. By means of springs 94 on the back of the box 84 this plate or bar 91 is normally pressed forward beyond the inner edge of the rear wall of the assembling-box to exert a sufficient pressure against the rear side of the line of types to force the line toward the front wall of the box and hold the types upright and in suitable alinement while being assembled. In the front wall of the assembling-box, at or near its bottom, there is a longitudinally-extended slot 95, Figs. 8 and 10, and above this slot there is a longitudinally-grooved guide-plate 96, that is extended along the front of the box 84 and also in front of the justifier mechanism, to be presently described. In the groove of this guide-plate 96 there is engaged a slide 97, carrying a yoke 98, Figs. 1, 8, 9, and 10, having a horizontal upper arm extended inward over the front wall of the assembling-box and a similar lower arm extended into the slot 95, as shown in Fig. 10. To the inner end of each yoke-arm there is pivoted the shank portion of a pawl 99, and the

two pawls are connected by a yoke 100, having one of its arms above the front wall of the assembling-box and the other arranged in the slot 95, as shown. A spring 101 is secured at one end to the outside of the slide 97 or vertical portion of the yoke 98 and bears at its other end against the yoke 100 in such manner as to press the pawls 99 into the assembling-box in position to engage the end of the line of assembled types at the proper time and feed the line into the justifier. The extent to which the pawls 99 can enter the assembling-box may be limited by a pin 102, depending from the yoke 100 at a point on the outside of the assembling-box, so as to bear against the same. While the line is being assembled, however, the pawls 99 are held out of the assembling-box by means of a suitable adjustment imparted to a slide 103, Figs. 8, 10, and 14, in such manner as to cause it to press the pin 102 outward, thereby retracting the pawls. This slide 103 is attached to the under side of the assembling-box 84 by means of screws 104, engaging diagonally-arranged slots 105, Fig. 14, in such manner that when said slide is moved lengthwise in one direction by means of a handle 106 the pin 102 will be pressed outward against the action of the spring 101, consequently withdrawing the pawls 99 from the assembling-box, while, on the other hand, a movement of the slide 103 in the opposite direction will relieve the pin 102 from pressure and permit the spring 101 to force the pawls 99 inward and into engagement with one end of the assembled line to carry the same to the justifier. A spring-detent 107, Fig. 14, may be arranged on the under side of the assembling-box to engage either one of two notches 108 in one edge of the slide 103, so as to hold the slide in adjusted position, as required. To the pawl-carrying slide 97 there is connected one end of a pitman 109, the other end of which connects with an arm 110, Fig. 1, that is rigid on a wrist 111, carried by a crank 112 on a rotary shaft 113, (indicated by a dotted circle in Fig. 1,) and to which power may be applied in any convenient manner. Through these driving connections the pawl-carrying slide 97 receives its required reciprocatory movements; but, as already explained, the pawls 99 are held out of the assembling-box while a line of types is being assembled. When a complete line is assembled in the box 84, the operator will push the slide 103 in the proper direction to move it away from the pin 102, and thus permit the spring 101 to press the pawls 99 into the assembling-box, so as to carry the assembled line to the justifier. In the front wall of the justifier 114, at the end next to the assembling-box 84, there is an opening 115, Figs. 1 and 18, to admit the yoke 98, to which the pawls 99 are pivotally attached. On entering the justifier the assembled type-line is received on the upper horizontal edge of a vertically-movable plate 116, Figs. 11, 12, and 13, that is arranged im-

mediately behind the front wall of the justifier and in front of a rearwardly and forwardly swinging plate 117, having a pivotal support 118, Figs. 1, 8, 11, and 12, at its lower end. On the front of the swinging plate 117, at the end next to the assembling-box, there is a forwardly-projecting lug 119, Figs. 9 and 13, to provide a bearing for one end of the type-line in justifying the same. In order to admit the type-line onto the upper edge of the vertically-movable plate 116 at the proper time, the pivotally-supported plate 117 is swung rearward sufficiently by any suitable means, as by a spring 120, bearing against a pin 121 on a slide 122, that is connected with said plate 117 and may be supported at the back of the justifier, as shown in Fig. 11. The swinging plate 117 carries on its back a horizontal series of stepped projections 123, Figs. 9, 11, and 12, corresponding with similar projections 124 on a horizontally-movable slide 125, that is supported by the back portion of the justifier-frame. This slide 125 is reciprocated through a toggle mechanism 126, Figs. 1, 8, 9, and 13, from a pitman or lever 127, that is loosely connected with the wrist 111 on the crank 112 of the shaft 113, as shown in Fig. 1. At the point where the slide 125 connects with the toggle 126 a portion of said slide is extended forward, as shown in Fig. 9, and has attached to its said forward-extended portion a plate 128, Figs. 9 and 13, that is vertically arranged immediately in rear of the front wall 114 of the justifier and in line with the assembled types. The end of this plate 128 carries a yielding bearing 129, Figs. 9 and 13, to press against one end of the line of types in justifying the same, the other end of said type-line being then in bearing contact with the lug 119, before mentioned. To make the bearing 129 somewhat yielding it is preferably supported by suitable pins that are engaged in recesses in the end of the plate 128 and surrounded by springs 130, as shown in Fig. 13. Now when the type-line is carried from the assembling-box to the justifier by the pawls 99 the vertically-movable plate 116 is in its lowered position, as shown in Figs. 11 and 13, and the plate 117 has been swung sufficiently rearward, as by means of the spring 120, to cause the bearing-lug 119 to clear the path in which the type-line is moved. The slide 125 is then advanced to cause its stepped projections 124 to engage the corresponding stepped projections 123 of the swinging plate 117, so as to move said plate forwardly, thereby carrying the lug 119 into position to afford a bearing for one end of the type-line. At the same time the advancing movement of the slide 125 carries the plate 128 along in such manner as to bring the connected yielding bearing 129 against the other end of the type-line. As this bearing 129 increases the endwise pressure on the type-line, the plate 117 is swung still farther forward by the action of the stepped projections 123 and 124, and thus

the type-line is pressed laterally between the plate 117 and the front wall of the justifier, as well as between the end bearings 119 and 129, and consequently the line is properly justified without any liability to having the types thrown out of alinement or otherwise disarranged. By thus compressing the line side-wise during the justifying operation the types cannot possibly get out of alinement under the endwise pressure to which the line is at the same time subjected. On the return movement of the slide 125 the pressure on the type-line is gradually relaxed, both endwise and laterally, and now the plate 116 rises and carries the justified line of types to a point above the justifier mechanism, as shown in Fig. 12. In order to thus lift the vertically-movable plate 116, it is provided along its lower edge with a bar 131, Fig. 13, that projects beyond one end of said plate and then rearwardly, as indicated by dotted lines in Fig. 9, to connect with a vertical arm 132, Figs. 8, 9, and 13. As shown in Fig. 1, the upper end of this vertical arm 132 connects with the slotted end of a two-armed lever 133, that is pivotally supported at 134 and which is provided at its other end with a roller 135 to be acted on at suitable intervals by a cam 136 on the rotary shaft 113 in such manner as to oscillate the lever 133 in a proper direction to lift the plate 116 with the justified line thereon.

As shown in Fig. 12, the justified line of types is lifted by the vertically-movable plate or support 116 to a point in rear of a sweep-bar 137, that is supported by upwardly and forwardly projecting arms 138, attached to an upper portion of the swinging plate 117, as shown in Figs. 11, 12, and 13. After the justified line of types has been thus lifted to a position in rear of the sweep-bar 137 the pivotally-supported plate 117 will have imparted to it a positive rearward movement by any suitable means, as by a rotary cam 139, Fig. 11, arranged to act at proper intervals against a bearing 140, that may be yieldingly connected with the slide 122, that in turn connects with said swinging plate 117, the stepped slide 125, Figs. 9, 11, and 12, being of course at this time in its retracted position. By thus imparting a positive rearward movement to the swinging plate 117 the connected sweep-bar 137 is caused to push the justified line of types from the top of the elevated plate 116 and deposit said type-line onto an open-ended tray or other suitable receptacle 141, wherein the successive lines of types are set in column suitable for newspaper, book, or other printing.

It is preferable to cast the compressible slugs, blanks, or spacers in some such form as shown in Figs. 15 and 16, each slug *a* being formed with one open side *b* and one open end *c*, so that the slug or blank is practically hollow, and will consequently more easily yield to the pressure applied in justifying a

line. This form of slug is not, however, essential.

A valuable feature of this type casting and setting machine resides in the provisions made for disposing of surplus cast types and blanks without suspending the operation of any part of the machine, thereby contributing to steadiness, uniformity, and efficiency of operation throughout the various parts of the machine. The surplus cast types may be reserved in any suitable quantity for use in correcting proof, as in the setting of type by hand, thus affording some advantage over a solid type line or bar.

What I claim as my invention is—

1. The combination of mechanism for casting a group or set of types and compressible spaces, said casting mechanism comprising separate reservoirs for molten type-metal and molten lead or other soft metal and a mold having a plurality of mold-cavities, a magazine having receptacles to which said types and compressible spaces are automatically delivered from the casting mechanism and in which they are accumulated in assorted columns, type-setting mechanism in operative connection with said magazine-receptacles, mechanism for assembling in line the types and compressible spaces released by said type-setting mechanism, a justifier in which the lines are each brought to a determined length, and mechanism for feeding an assembled line to the justifier, substantially as described.

2. The combination of mechanism for casting a group or set of types and compressible spaces, said casting mechanism comprising separate reservoirs for molten type-metal and molten lead or other soft metal and a mold having a plurality of mold cavities and matrices, a magazine having receptacles in which said types and compressible spaces are accumulated in assorted columns, mechanism for automatically disposing of surplus types and spaces that cannot enter already-filled magazine-receptacles, type-setting mechanism in operative connection with the magazine-receptacles, mechanism for assembling in line the types and compressible spaces released by said type-setting mechanism, a justifier, and mechanism for feeding an assembled line to the justifier, substantially as described.

3. The combination of mechanism for casting a group or set of types and compressible spaces, said mechanism comprising a casting-pot having separate reservoirs for molten type-metal, molten lead or other soft metal and also a mold and its matrices, a magazine having cells or receptacles in which the said types are accumulated in assorted columns, mechanism for releasing the types and compressible spaces in the order required to compose a line, assembling mechanism, a justifier, and mechanism for feeding an assembled line of types and compressible spaces to the justifier, substantially as described.

4. The combination of mechanism for cast-

ing a group or set of types and compressible spaces, said casting mechanism comprising a casting-pot having separate reservoirs for molten type-metal and molten lead or other soft metal, a magazine provided with cells or receptacles in which the cast types and compressible spaces are accumulated in assorted columns, mechanism for releasing the types and compressible spaces in the order required, means for assembling the types and compressible spaces in line, and mechanism for justifying a line to a determined length, and mechanism for removing the justified line from the justifier, substantially as described.

5. The combination of a casting-pot having separate receptacles or reservoirs for molten type-metal and molten lead or other soft metal, a mold for casting a group or set of types and compressible spaces, mechanism for ejecting the cast types and spaces from the mold, a magazine having receptacles in which the types and compressible spaces are accumulated, type-setting mechanism in operative connection with the said magazine-receptacles, an assembling-box, mechanism for assembling types and compressible spaces in a line within said box, a justifier, means for feeding an assembled line into the justifier, and mechanism for removing the justified line from the justifier, substantially as described.

6. The combination of a casting-pot having separate receptacles or reservoirs for molten type-metal and molten lead or other soft metal, a mold having a plurality of mold-cavities, a plurality of matrices for simultaneously casting a group or set of types bearing different characters, together with compressible spaces, means for ejecting the cast types and compressible spaces from the mold-cavities, a magazine having receptacles arranged to receive the types and compressible spaces and in which said types and spaces are accumulated in assorted columns or piles, type-setting mechanism in operative connection with the said magazine-receptacles, mechanism for assembling the types and compressible spaces in line, a justifier, and mechanism for lifting the justified line from the justifier and collecting successively justified lines in columns, substantially as described.

7. The combination of a casting-pot having separate receptacles for molten type-metal for casting types and molten soft metal for casting compressible blanks or spaces, a mold having a plurality of mold-cavities, a plurality of matrices for simultaneously casting a group or set of types bearing different characters, means for introducing molten metal into the mold-cavities, means for ejecting the cast types and spaces from the mold-cavities, a reversing-bar provided with pockets to receive the cast types and spaces, a magazine having type-receptacles in which the cast types and spaces are accumulated in assorted columns or piles, a shifting transfer-bar intermediate said reversing-bar and magazine and provided

with passages through which cast types and spaces may pass from the reversing-bar into the magazine-receptacles, type-setting mechanism in operative connection with the magazine-receptacles, means for assembling the types and spaces in line, and justifier mechanism, substantially as described.

8. The combination of a mold having a plurality of mold-cavities for casting types and compressible blanks or spaces, a plurality of matrices for simultaneously casting a group or set of types bearing different characters, a casting-pot having separate receptacles for molten type-metal and molten lead or soft metal and provided with means for introducing molten metal into the mold-cavities, means for ejecting the cast types and compressible spaces from the mold-cavities, a reversing-bar provided with pockets to receive the cast types and spaces from said mold-cavities, a magazine provided with cells or receptacles to receive the cast types and spaces and in which said types and spaces are accumulated in assorted columns or piles, a shifting transfer-bar intermediate said reversing-bar and magazine and provided with passages through which the cast types and spaces may pass from the reversing-bar to the magazine, and type-setting mechanism in operative connection with the magazine cells or receptacles, substantially as described.

9. The combination of a plurality of matrices, a mold having a plurality of cavities for simultaneously casting compressible spaces and a group or set of types bearing different characters, a casting-pot movable to and from the mold and provided with separate receptacles for molten type-metal and molten soft metal, means for ejecting the cast types and spaces from the mold-cavities, an oscillatory reversing-bar provided with pockets to receive the cast types and spaces from the mold-cavities, a magazine provided with cells or receptacles in which the cast types and spaces are accumulated in assorted columns or piles, a shifting transfer-bar intermediate said reversing-bar and the magazine and provided with passages through which the cast types and spaces may pass from the pockets of the reversing-bar to the cells of the magazine, and type-setting mechanism in operative connection with the magazine cells or receptacles, substantially as described.

10. The combination of a rocking mold having a plurality of cells for casting compressible spaces and a group or set of types bearing different characters, a plurality of matrices, a casting-pot having separate receptacles for molten type-metal and molten soft metal, ejectors for pushing the cast types and spaces from the mold-cavities, a reversing-bar provided with pockets to receive the cast types and spaces from the mold-cavities, a shifting transfer-bar provided with passages, a magazine provided with a series of cells or receptacles in which the types and spaces are accumulated in assorted columns or piles, and

type-setting mechanism in operative connection with the magazine-cells to release the types and compressible spaces therefrom as required, substantially as described.

5 11. The combination of a plurality of matrices, a mold having a plurality of cavities for casting compressible spaces and a series of types, a casting-pot movable to and from the mold and having separate receptacles for
10 molten type-metal and molten soft metal, reciprocating ejectors for removing the cast types and spaces from the mold-cavities, a reversing-bar having a series of pockets for receiving the cast types and spaces from the
15 mold-cavities, a shifting transfer-bar provided with passages, a magazine provided with a series of cells or receptacles in which the cast types and spaces are accumulated in assorted columns or piles, type-setting mechanism,
20 means for assembling the types in line, and justifier mechanism, substantially as described.

12. The combination of a plurality of matrices, a mold having a plurality of cavities for
25 casting a series of types, a casting-pot movable to and from the mold and having separate receptacles for molten type-metal and molten soft metal, reciprocating ejectors adapted to enter and leave the mold-cavities
30 and push the cast types and spaces therefrom, a reversing-bar provided with pockets to receive cast types and spaces from the mold-cavities, a magazine with cells or receptacles in which the cast types and spaces are accu-
35 mulated in assorted columns or piles, and type-setting mechanism in operative connection with said cells or receptacles, substantially as described.

13. The combination of a plurality of matrices, a rocking mold having a plurality of
40 cavities, a casting-pot movable to and from the mold for introducing molten metal into the mold-cavities, ejectors for removing the cast types from the mold-cavities, a reversing-
45 ing-bar having pockets to receive the cast types from the mold-cavities, a transfer-bar provided with type-passages, and magazine cells or receptacles in which the cast types are accumulated in assorted columns or piles,
50 substantially as described.

14. The combination with a mold, and matrices for casting a series of types, and means for removing the cast types from the mold, of
55 a reversing-bar provided with pockets to receive the cast types from the mold, a shifting transfer-bar provided with type-passages, and a magazine having cells or receptacles in which the types of the same kind are respectively accumulated in assorted columns or
60 piles, substantially as described.

15. The combination with a plurality of matrices, a mold having a plurality of cavities for casting a series of types, a magazine provided with cells or receptacles for accu-
65 mulating the types in assorted columns or piles, and ejectors for removing the cast types from the mold-cavities, of a reversing-bar

provided with pockets to receive the cast types from the mold-cavities, a shifting transfer-bar intermediate said reversing-bar and mag- 70
azine and provided with type-passages, and conveyer mechanism adapted to receive surplus types from said transfer-bar when said bar is shifted from between the transfer-bar and the magazine, substantially as described. 75

16. The combination of a casting-pot having separate receptacles for molten type-metal and molten soft metal, a mold having a series of cavities for casting a series of types and compressible spaces, a series of ejectors for
80 removing cast types and spaces from said mold, a magazine provided with cells or receptacles in which the cast types are to be accumulated in assorted columns or piles, a reversing-bar provided with pockets to directly
85 receive the cast types and spaces from the mold-cavities, a shifting transfer-bar intermediate said reversing-bar and magazine and provided with passages, conveyer mechanism to receive surplus types from said transfer- 90
bar when the same is shifted from between the reversing-bar and magazine, and type-setting mechanism in operative connection with the magazine cells or receptacles, substantially as described. 95

17. The combination of a mold having a plurality of cavities for casting a series of types, a series of ejectors for removing cast types from the mold, an oscillatory reversing-bar provided with a series of pockets to
100 receive the cast types from the mold-cavities, a magazine provided with cells or receptacles in which the cast types are to be accumulated in assorted columns or piles, a shifting transfer-bar provided with type-passages and
105 adapted to be brought into coincidence with the pockets of the reversing-bar and with the cells or receptacles of the magazine and to be removed therefrom, and mechanism for operating said reversing-bar and transfer-bar in
110 time movements, substantially as described.

18. The combination of a casting-pot having separate receptacles for molten type-metal and molten soft metal, a plurality of matrices, a mold having a plurality of cavities for cast- 115
ing a series of types and compressible spaces, a series of ejectors to remove cast types and spaces from the mold-cavities, an oscillatory reversing-bar provided with pockets to receive cast types and spaces from the mold- 120
cavities, a guard for said pockets, a shifting transfer-bar provided with passages, a magazine provided with cells or receptacles in which the cast types and spaces are accumulated in assorted columns or piles, and type- 125
setting mechanism in operative connection with the magazine cells or receptacles, substantially as described.

19. The combination with a plurality of matrices, a rocking mold having a plurality
130 of cavities for casting a series of types, a casting-pot movable to and from the mold, a series of ejectors for removing the cast types from the mold, and a magazine provided with

cells or receptacles in which the cast types are to be accumulated in assorted columns or piles, of a reversing-bar having a series of pockets to receive the cast types from the mold-cavities, a shifting transfer-bar having a series of type-passages and adapted to be moved into coincidence with the pockets of the reversing-bar and the cells or receptacles of the magazine and to be removed therefrom, conveyer mechanism to receive surplus types from said transfer-bar, and means for actuating said transfer-bar and reversing-bar from the casting-pot, substantially as described.

20. The combination of a plurality of matrices, a movable mold, a casting-pot having separate receptacles for molten type-metal and molten soft metal, reciprocating ejectors, a magazine having a plurality of cells or receptacles in which the cast types and compressible spaces are to be accumulated, a reversing-bar provided with a series of pockets to receive cast types and spaces from the mold, a shifting transfer-bar provided with passages, mechanism for moving the mold and casting-pot and for actuating said reversing-bar and shifting-bar, and type-setting mechanism in operative connection with the magazine cells or receptacles, substantially as described.

21. The combination of a series of matrices, a movable mold having a plurality of mold-cavities, a casting-pot movable to and from the mold and provided with separate receptacles for molten type-metal and molten soft metal for forming cast types and compressible spaces in appropriate mold-cavities, reciprocating ejectors, mechanism for moving the mold and casting-pot and for operating the ejectors, a reversing-bar provided with pockets to receive cast types and spaces from the mold-cavities, a magazine provided with cells or receptacles in which the cast types and spaces are to be accumulated in assorted columns or piles, a shifting transfer-bar provided with passages and adapted to be moved to bring said passages into coincidence with the pockets of the reversing-bar and with the magazine-cells, means for actuating said transfer-bar and reversing-bar from the casting-pot, and type-setting mechanism in operative connection with the magazine cells or receptacles, substantially as described.

22. The combination of a series of matrices, a rocking mold, a tilting casting-pot having separate receptacles for molten type-metal and molten soft metal, means for ejecting cast types and spaces from the mold-cavities, a reversing-bar provided with pockets to receive the cast types and spaces from the mold-cavities, a shifting transfer-bar provided with type-passages, a magazine provided with cells or receptacles in which the cast types and spaces are to be accumulated in assorted columns, conveyer mechanism to receive surplus types and spaces from the transfer-bar, means for operating said transfer-bar and reversing-bar from the casting-pot, and type-setting

mechanism in operative connection with the magazine cells or receptacles, substantially as described.

23. The combination of a series of matrices, a rocking mold having a plurality of cavities, a casting-pot having separate receptacles for molten type-metal and molten soft metal, reciprocating ejectors, a reversing-bar provided with a plurality of pockets, a transfer-bar provided with a plurality of passages, a magazine having a plurality of cells or receptacles in which the cast types and compressible spaces are to be accumulated in assorted columns, type-setting mechanism in operative connection with the magazine cells or receptacles, means for assembling the types in line, and justifier mechanism, substantially as described.

24. The combination of a plurality of matrices, a rocking mold provided with a plurality of mold-cavities, a casting-pot movable to and from said mold and having separate receptacles for molten type-metal and molten soft metal, a plurality of ejectors for removing cast types and spaces from the mold, mechanism for operating said mold, casting-pot and ejectors, an oscillatory reversing-bar provided with pockets to receive cast types and spaces from the mold-cavities, a shifting transfer-bar provided with passages, means for gearing said reversing-bar and transfer-bar, mechanism for actuating the reversing-bar and transfer-bar from the casting-pot, a magazine provided with cells or receptacles in which the cast types and spaces are accumulated in assorted columns, conveyer mechanism for receiving surplus types and spaces from the transfer-bar, type-setting mechanism in operative connection with the magazine cells or receptacles, means for assembling the types in line, justifier mechanism, and means for lifting the justified lines of types from the justifier and collecting successive lines in a column, substantially as described.

25. The combination of a plurality of matrices, a rocking mold provided with a plurality of mold-cavities, a casting-pot movable to and from the mold-cavities and having separate receptacles for molten type-metal and molten soft metal, mechanism for trimming the butt-ends of the cast types and spaces while in the mold, ejectors for removing cast types and spaces from the mold, mechanism for moving said casting-pot, mold, trimming mechanism and ejectors in time movements, a magazine provided with cells or receptacles in which the cast types and spaces are to be accumulated in assorted columns, an oscillatory reversing-bar provided with pockets to receive the cast types and spaces directly from the mold-cavities, a guard for the pockets in said reversing-bar, a shifting transfer-bar provided with passages, means for actuating said reversing-bar and transfer-bar from the casting-pot and to shift the transfer-bar to bring its passages into coincidence with said pockets and with

the magazine-cells and move the said bar away from the magazine, conveyer mechanism to receive surplus types and spaces from the transfer-bar when shifted away from the magazine, and type-setting mechanism in operative connection with the magazine cells or receptacles, substantially as described.

26. The combination of a plurality of matrices, a rocking mold provided with a plurality of mold-cavities, a casting-pot movable to and from the mold-cavities and having separate receptacles for molten type-metal and molten soft metal for casting types and spaces, respectively, a plurality of ejectors for removing cast types and spaces from the mold-cavities, a reversing-bar provided with a plurality of pockets to receive cast types and spaces from the mold-cavities, gears on the ends of said reversing-bar, racks meshing with said gears, a transfer-bar supported by said racks and provided with a plurality of type-passages, means for actuating said racks from the casting-pot, a magazine provided with a plurality of cells or receptacles in which the cast types and spaces are to be accumulated in assorted columns, and conveyer mechanism to receive surplus types and spaces from the passages of said transfer-bar when said bar is shifted away from the magazine, substantially as described.

27. The combination of a plurality of matrices, a mold having a plurality of mold-cavities for simultaneously casting a group or set of types and compressible blanks or slugs, a casting-pot movable to and from the mold and provided with a receptacle for molten type-metal to cast a group of types and a receptacle for molten lead or other soft metal for casting compressible slugs or blanks, mechanism for trimming butt-ends of the cast types and slugs or spaces while in the mold, ejectors for removing cast types and slugs or spaces from the mold, a reversing-bar provided with pockets to receive cast types and slugs or spaces from the mold, a magazine provided with cells or receptacles for cast types and slugs in assorted columns, a shifting transfer-bar provided with passages adapted to be brought into coincidence with the pockets of the reversing-bar and with the magazine cells or receptacles, a guard for the pockets of the reversing-bar, mechanism for operating said reversing-bar and transfer-bar from the casting-pot, and type-setting mechanism in operative connection with the magazine cells or receptacles, substantially as described.

28. The combination with mechanism for simultaneously casting compressible spaces or slugs and a group or set of types bearing different characters, a magazine provided with cells or receptacles in which the cast types and slugs are accumulated in assorted columns or piles, and mechanism for releasing the types and slugs in the order required, of an assembling-box, a pusher for feeding the type-line in the assembling-box, means

for applying pressure to one side of the line of type in the assembling-box, a justifier, mechanism for feeding an assembled line of types and slugs into the justifier, means for applying pressure to the ends and sides of the line of type in the justifier, means for lifting the justified line, a receptacle for successive justified lines of type, and a sweep for pushing the successive lines of justified types into said receptacle, substantially as described.

29. The combination with mechanism for simultaneously casting compressible slugs or spaces and a group or set of types bearing different characters, a magazine provided with cells or receptacles for accumulating the cast types and slugs or spaces in assorted columns, and means for releasing the types and spaces in the order required, of an assembling-box, a vibratory pusher for feeding the line of types and spaces in the assembling-box, a justifier comprising means for applying pressure to the ends and sides of a line of types, mechanism for conveying a line of types from the assembling-box to the justifier mechanism, means for lifting a justified line from the justifier, and a receptacle to receive successive justified lines of types in columns, substantially as described.

30. The combination with mechanism for simultaneously casting a group or set of types and compressible spaces or blanks, a magazine provided with cells or receptacles for accumulating the cast types and compressible spaces in assorted columns, and means for releasing the types and spaces in the order required, of an assembling-box, means for assembling a line of types and spaces in said box, a device for preserving alinement of the type-line in the assembling-box, a justifier provided with means for applying pressure to the ends and sides of the line of type, mechanism for conveying a line of types from the assembling-box, justifying mechanism, and means for lifting a justified line from the justifier, substantially as described.

31. The combination with mechanism for simultaneously casting compressible blanks or spaces and a group or set of types bearing different characters and accumulating the same in assorted columns or piles, and means for releasing the individual types and spaces in the order required, of an assembling-box, a pusher for acting on individual types and spaces to feed the type-line along in the assembling-box, a pressure device for preserving alinement of the type-line in the assembling-box, a justifier comprising means for automatically applying pressure to the ends and sides of a type-line, mechanism for feeding type-lines from the assembling-box, justifying mechanism, and means for automatically lifting a justified line from the justifier, substantially as described.

32. The combination with mechanism for accumulating cast types and compressible spaces in assorted columns or piles, and means

for releasing individual types and spaces in the order required, of an assembling-box, a vibratory pusher to feed a line of types and spaces along in said assembling-box, a bar 5 mounted on one side of the box to apply a yielding pressure to one side of the line of types in said box, a justifier, and reciprocating-pawl mechanism to convey assembled lines of types from the box to the justifier, 10 substantially as described.

33. The combination of mechanism for casting compressible blanks or spaces and a group or set of types bearing different characters, a magazine provided with cells or receptacles 15 for accumulating the cast types and spaces in assorted columns, mechanism for releasing

the types and spaces in the order required, means for assembling the types and spaces in line, and justifier mechanism comprising a vertically-movable plate to support a line of 20 types and spaces, and means for simultaneously applying pressure to the ends and opposite sides of said line, substantially as described.

In testimony whereof I have hereunto set 25 my hand in presence of two subscribing witnesses.

JOSEPH C. FOWLER.

Witnesses:

JAMES L. NORRIS,
F. B. KEEFER.