

No. 768,565.

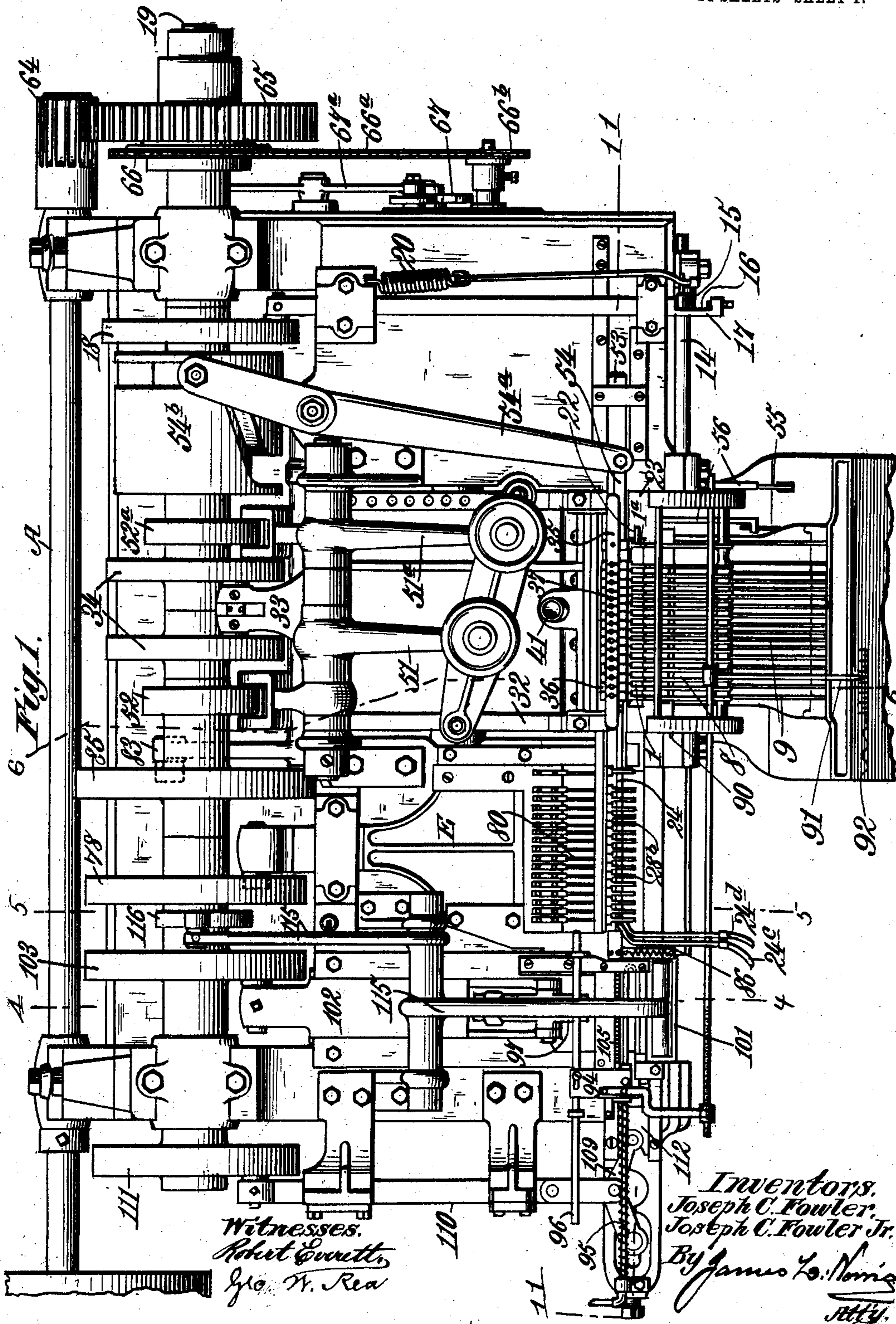
PATENTED AUG. 23, 1904.

J. C. FOWLER & J. C. FOWLER, JR.
TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED JUNE 8, 1903.

NO MODEL.

14 SHEETS—SHEET 1.



No. 768,565.

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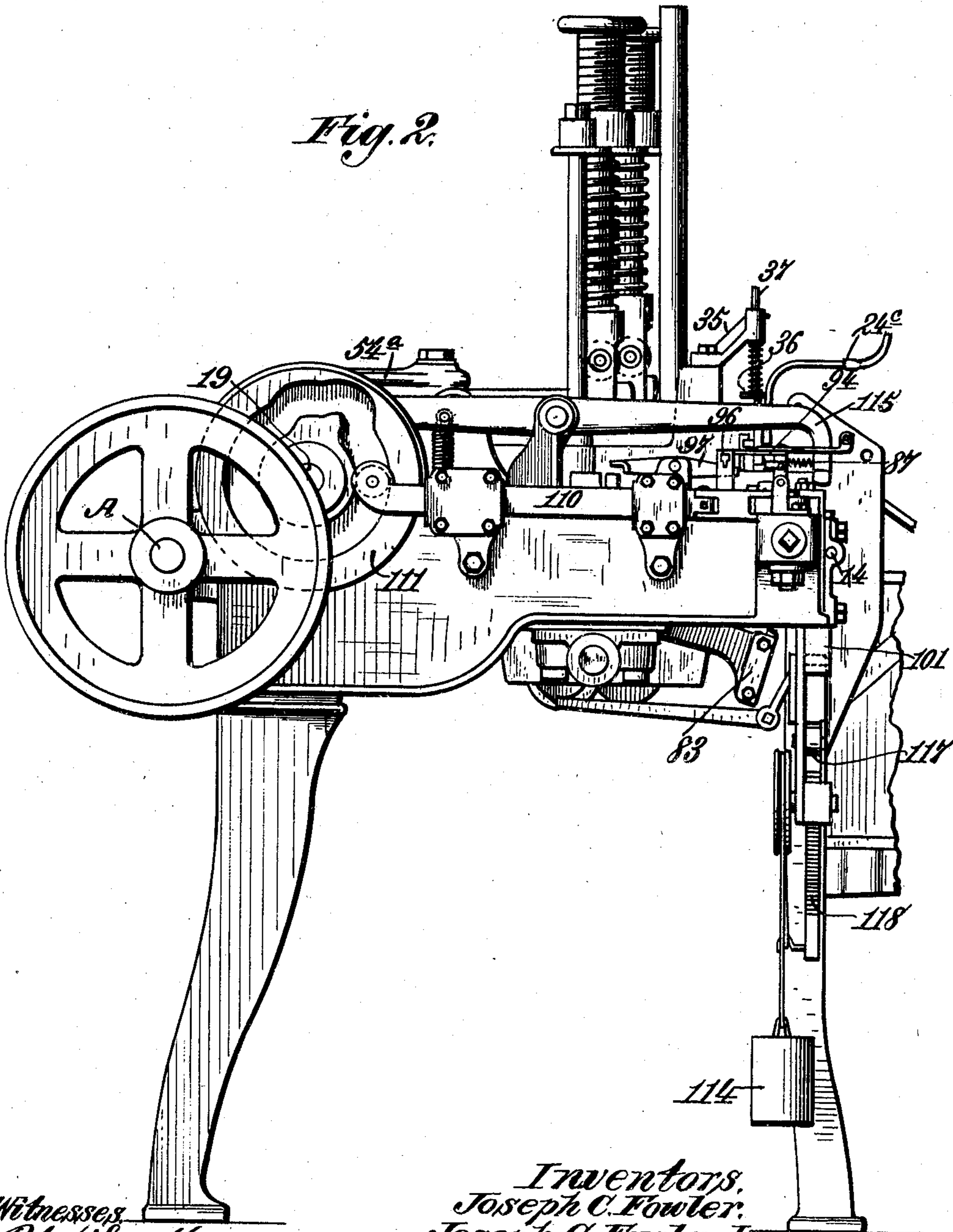
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TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED JUNE 8, 1903.

NO MODEL.

14 SHEETS—SHEET 2.

Fig. 2.



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Geo. W. Rea

Inventors,
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Joseph C. Fowler Jr.
By James L. Norris
Att'y.

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14 SHEETS—SHEET 3.

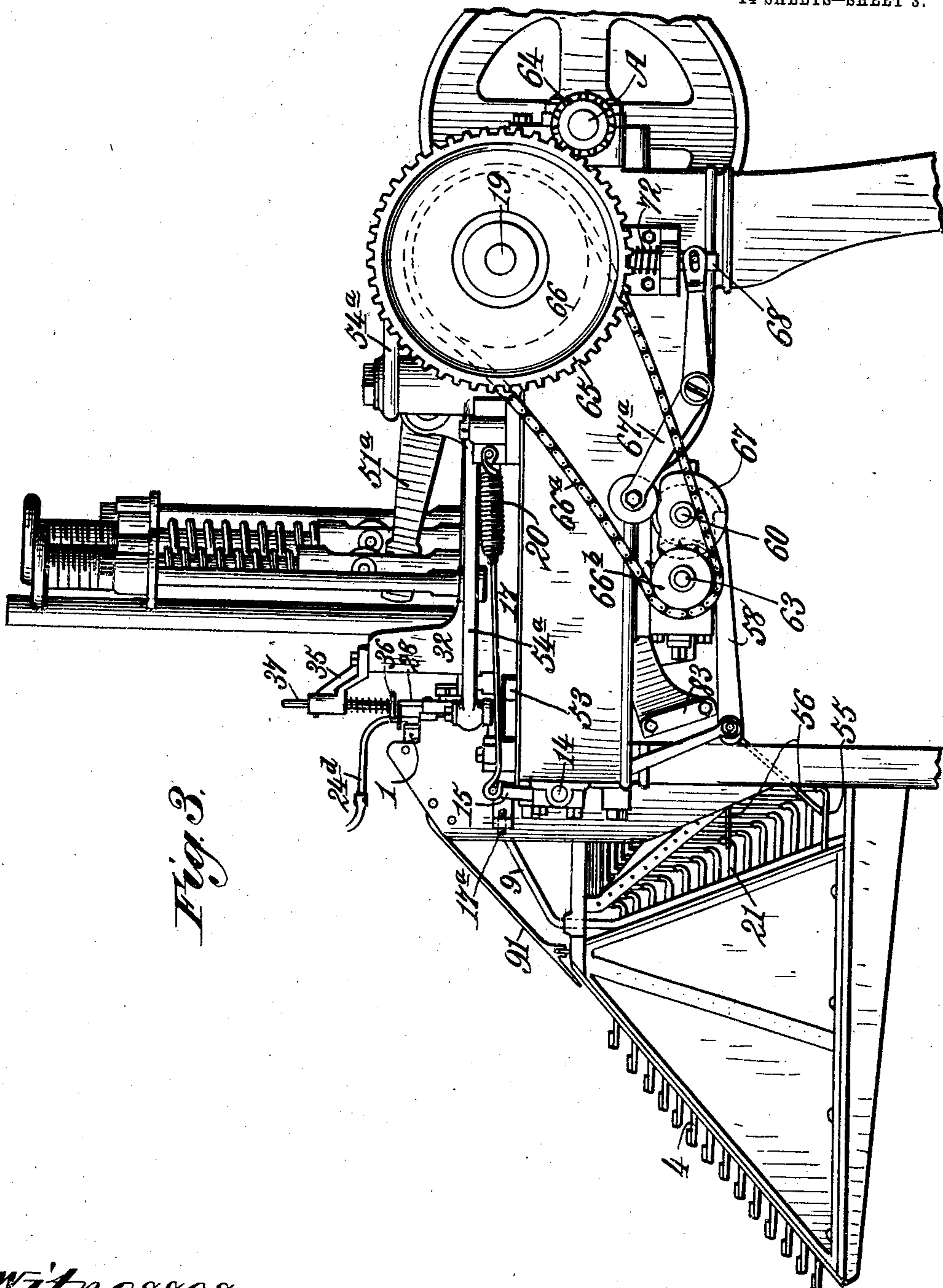


Fig. 3.

Witnesses:
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By James L. Norrie,
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No. 768,565.

PATENTED AUG. 23, 1904.

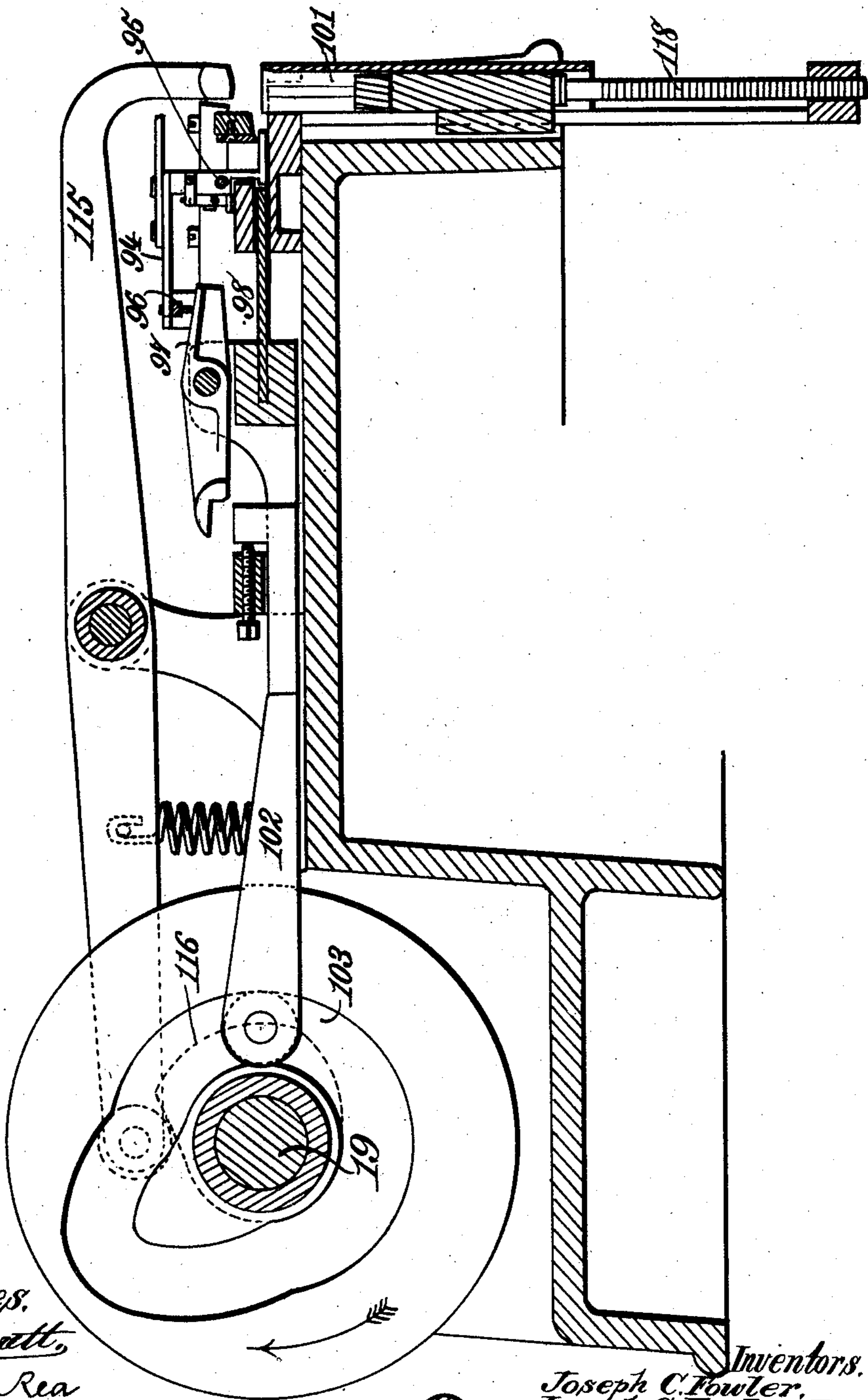
J. C. FOWLER & J. C. FOWLER, JR.
TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED JUNE 8, 1903.

NO MODEL.

14 SHEETS—SHEET 4.

Fig. 4.



Witnesses.
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By James L. Morris, att'y.

No. 768,565.

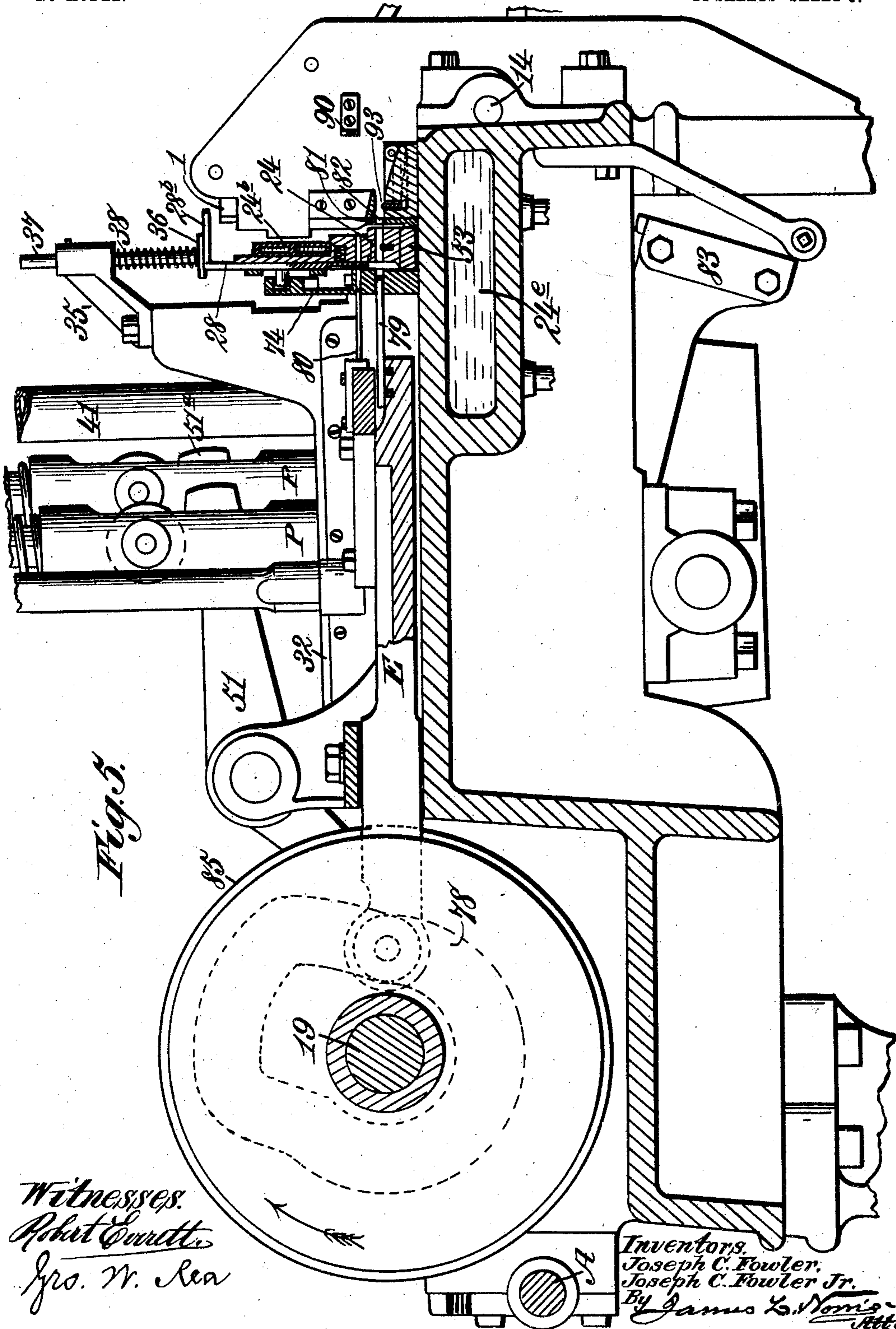
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14 SHEETS—SHEET 5.



No. 768,565.

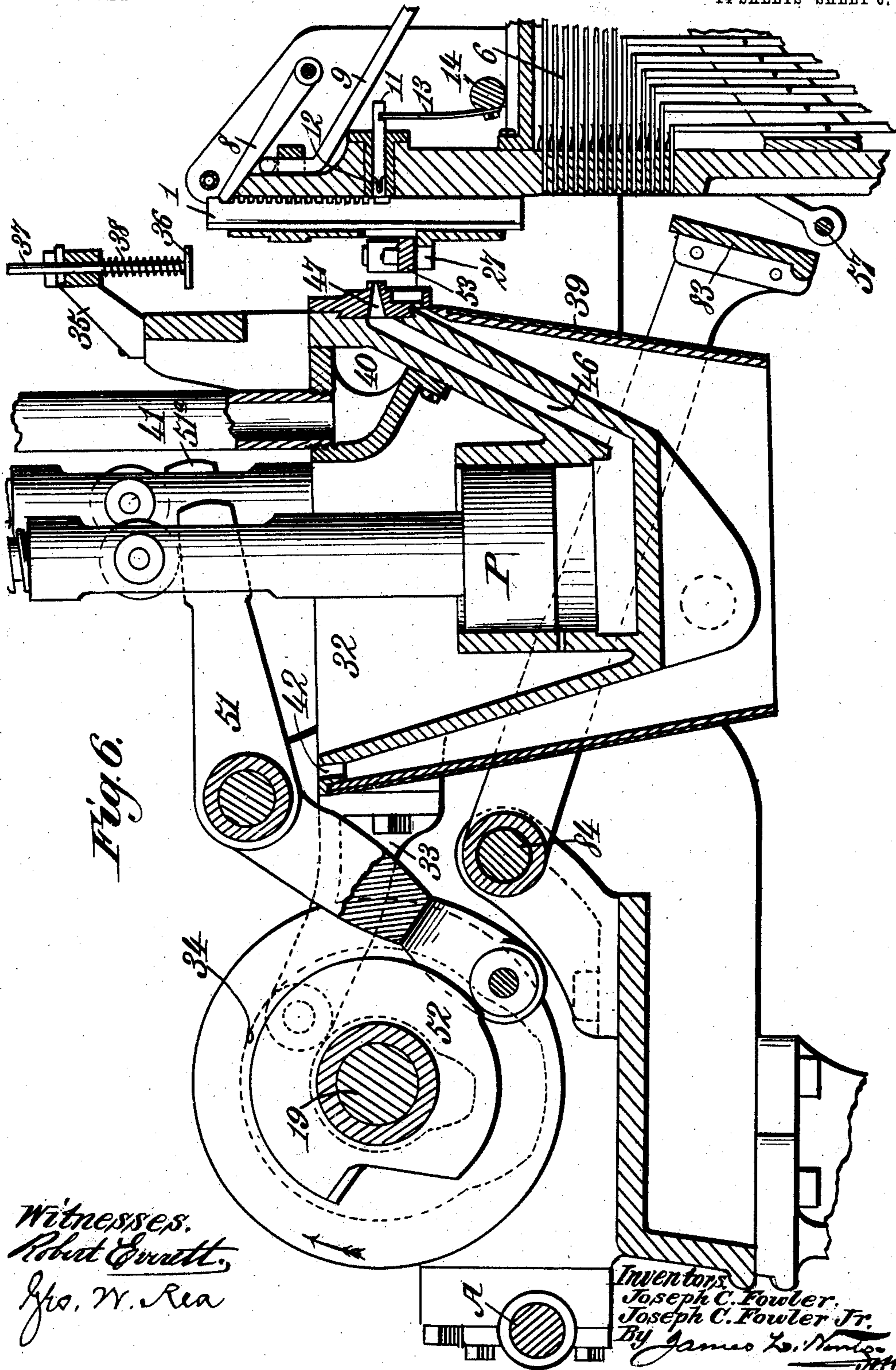
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NO MODEL.

14 SHEETS—SHEET 6.



No. 768,565.

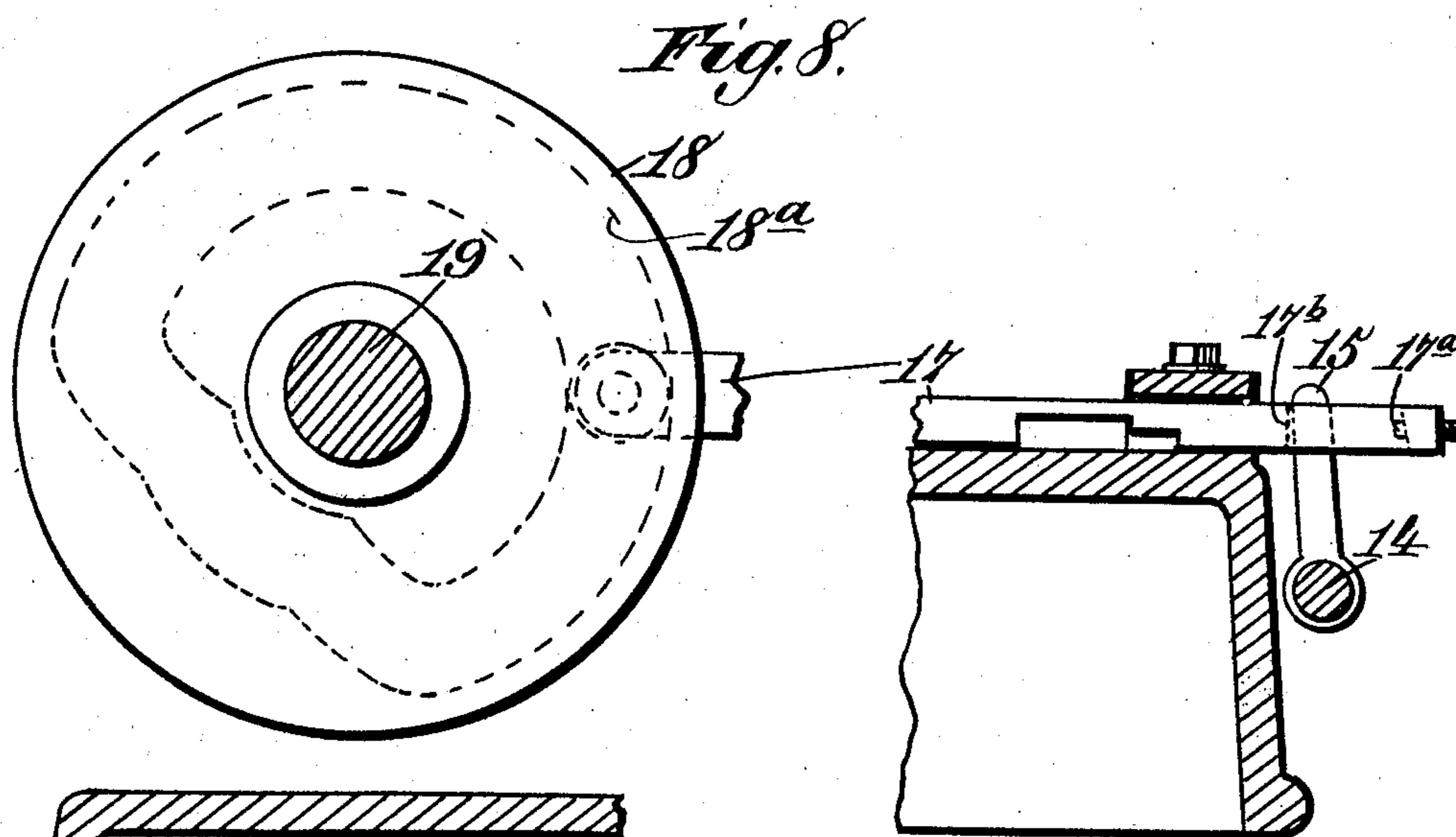
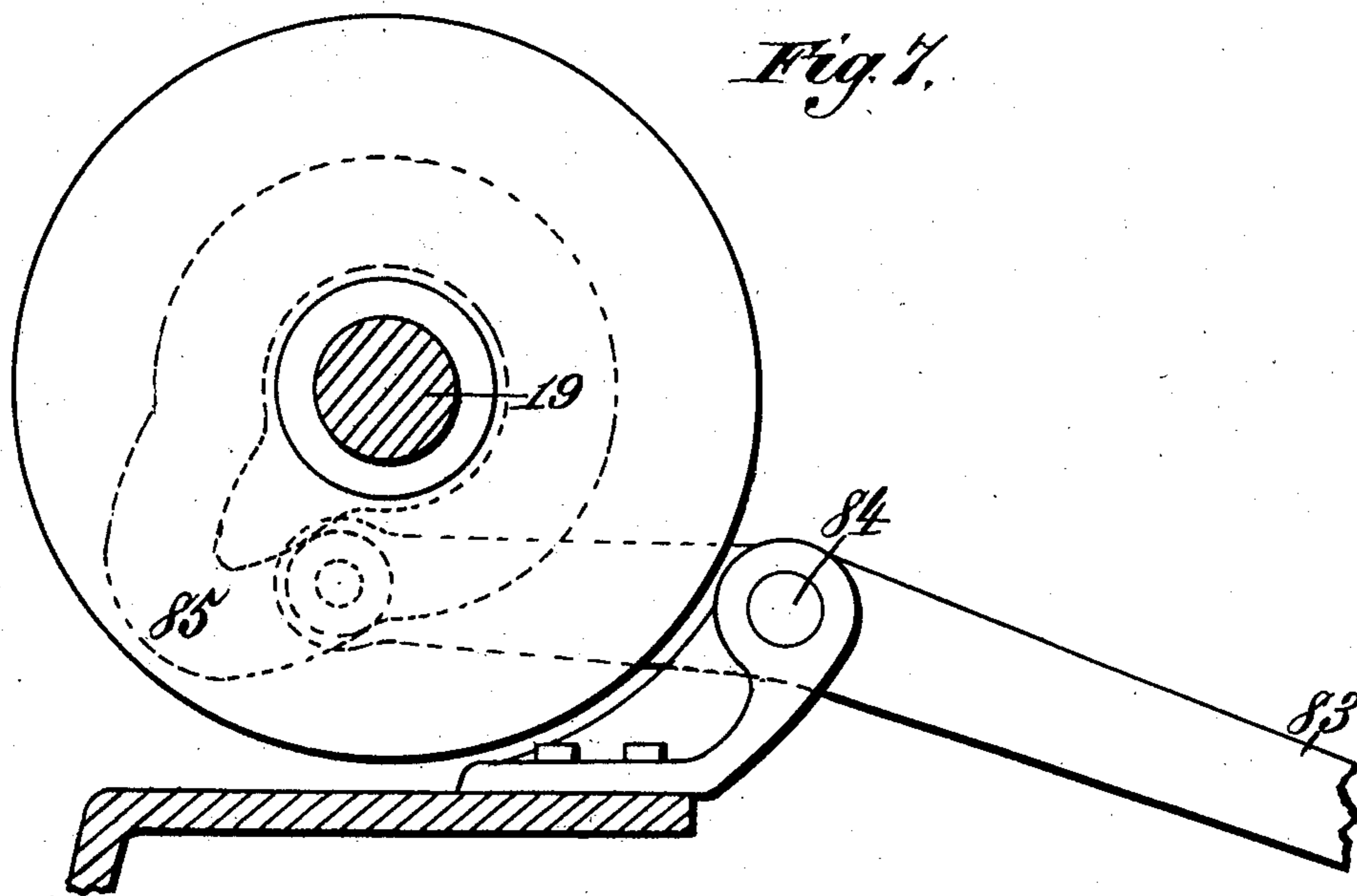
PATENTED AUG. 23, 1904.

J. C. FOWLER & J. C. FOWLER, JR.
TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED JUNE 8, 1903.

NO MODEL.

14 SHEETS—SHEET 7.



Witnesses.
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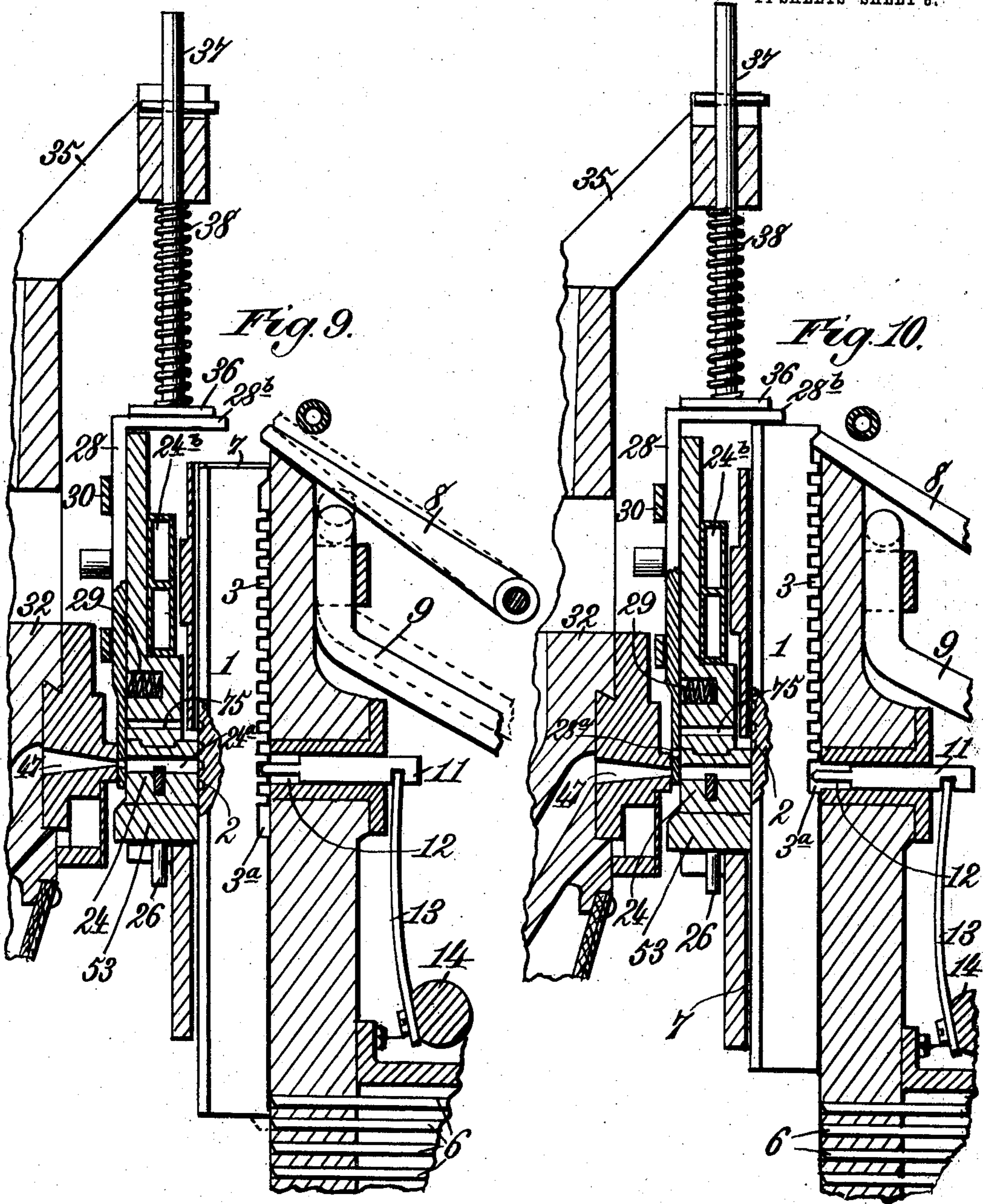
PATENTED AUG. 23, 1904.

J. C. FOWLER & J. C. FOWLER, JR.
TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED JUNE 8, 1903.

NO MODEL.

14 SHEETS—SHEET 8.



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TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED JUNE 8, 1903.

NO MODEL.

14 SHEETS—SHEET 9.

Fig. 11.

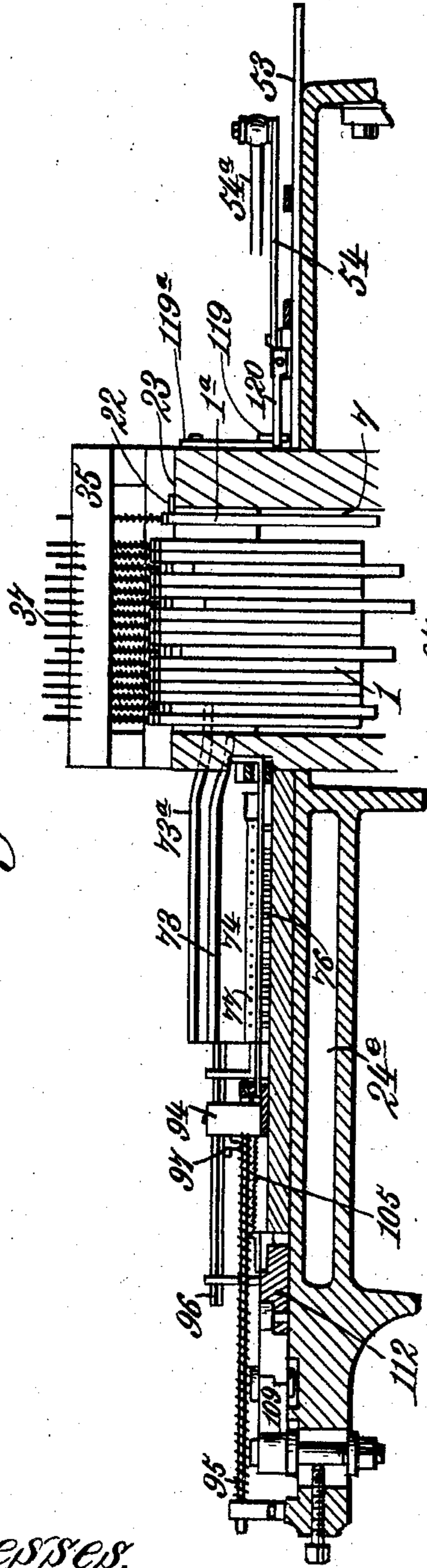
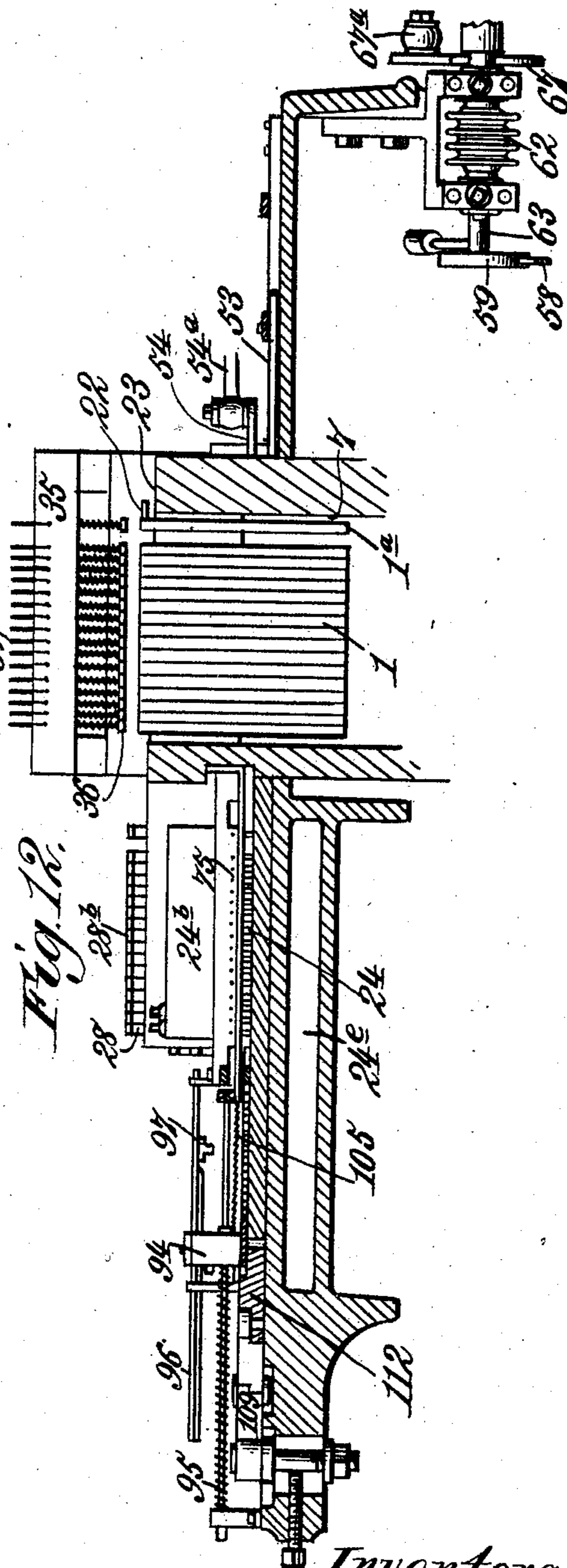


Fig. 12.



Witnesses,
Robert Corbett,
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Inventors,
Joseph C. Fowler,
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NO MODEL.

14 SHEETS—SHEET 10.

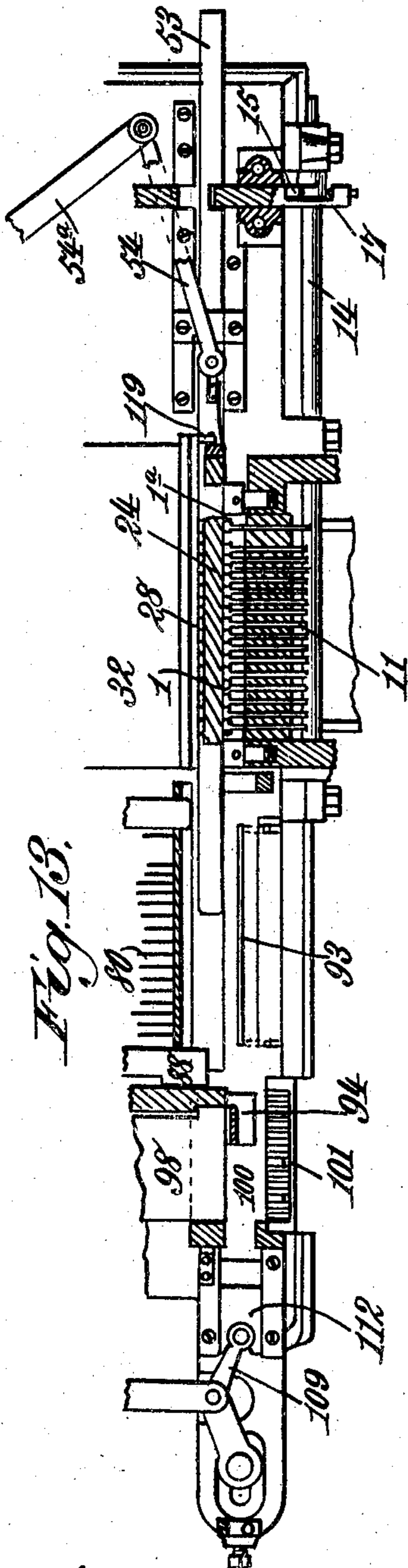


Fig. 13.

Witnesses.
Robert G. Smith,
Geo. W. Rea.

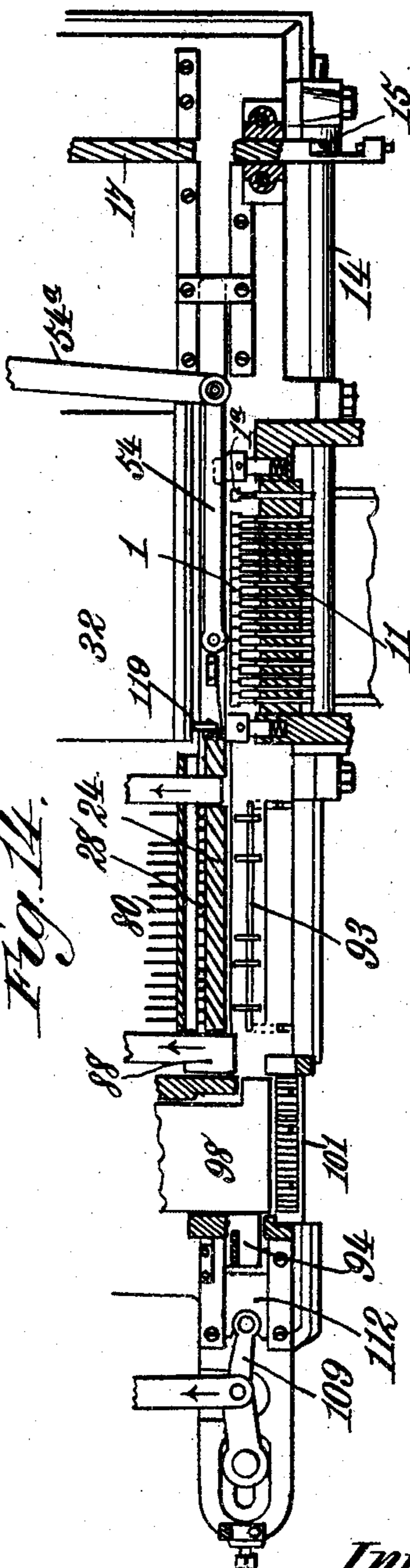


Fig. 14.

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TYPE CASTING AND SETTING MACHINE.

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NO MODEL.

14 SHEETS—SHEET 11.

Fig. 15.

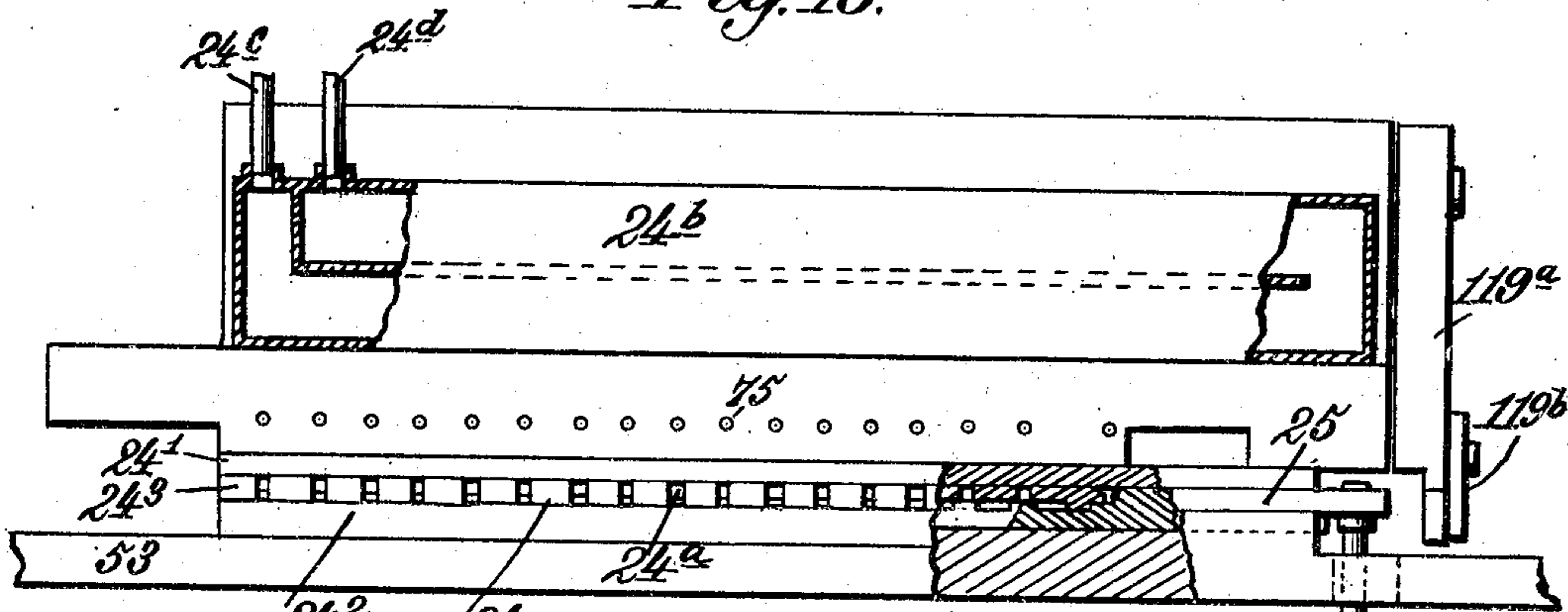


Fig. 16.

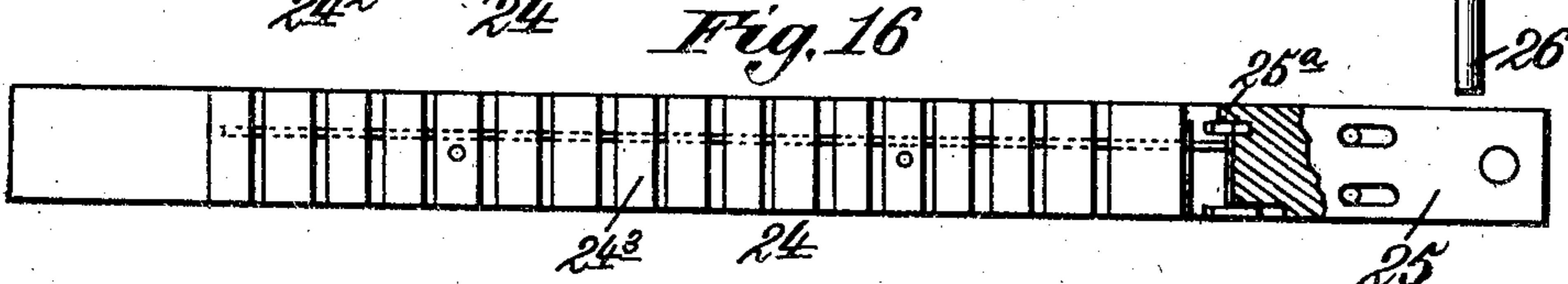


Fig. 17.

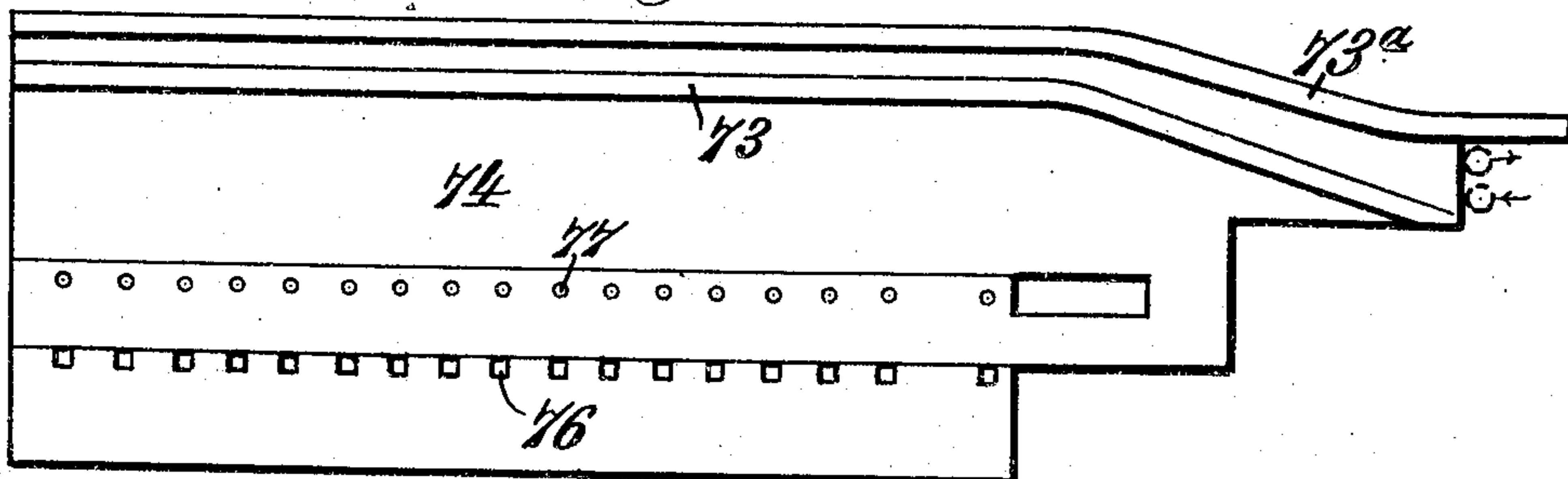


Fig. 18.

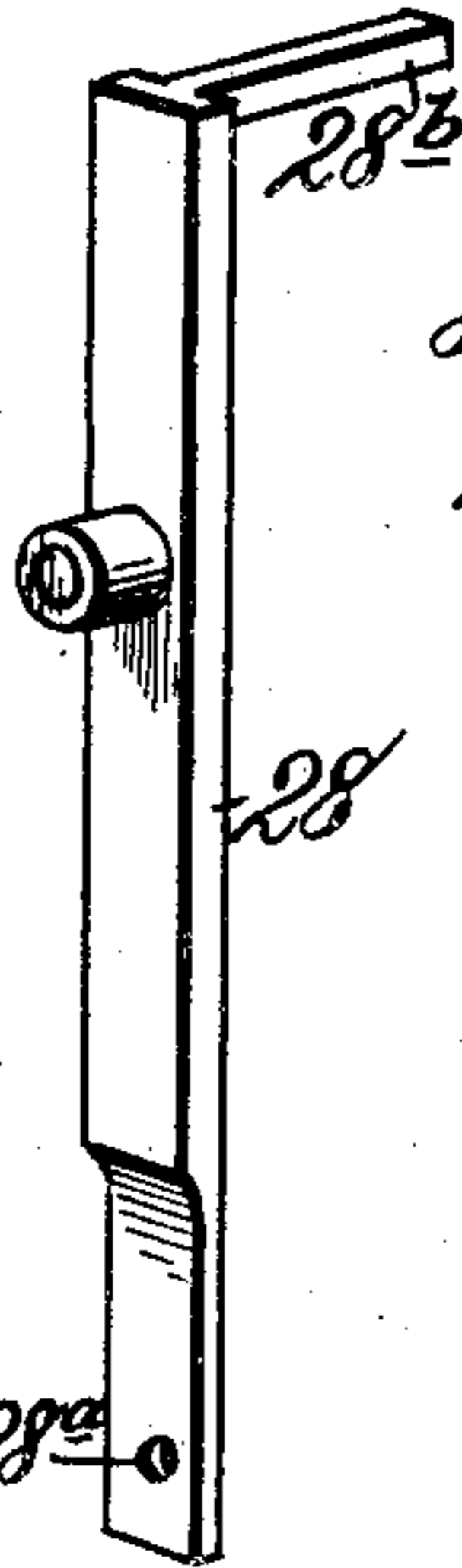


Fig. 20.

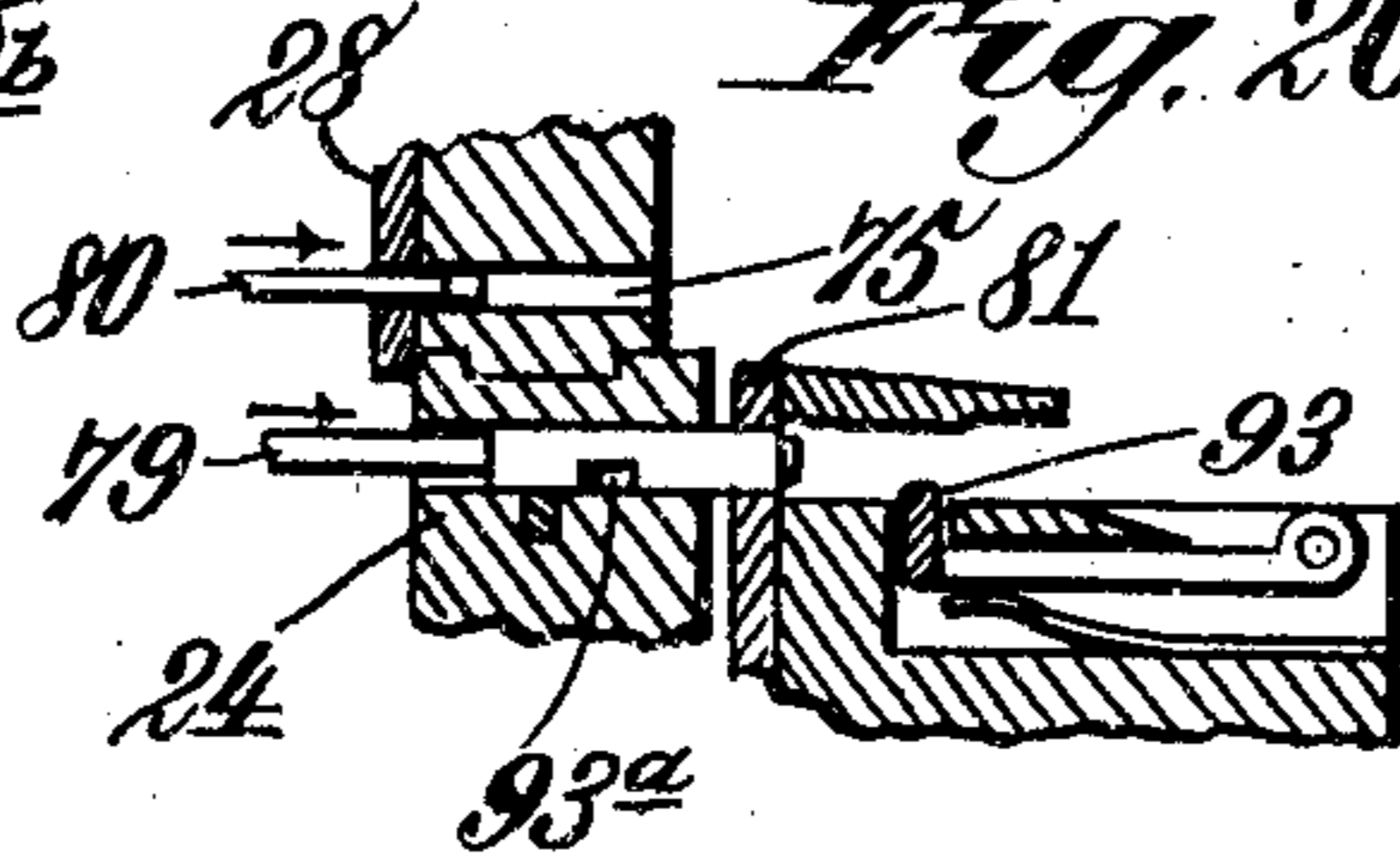


Fig. 19.



Witnesses.
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TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED JUNE 8, 1903.

NO MODEL.

14 SHEETS—SHEET 12.

Fig. 21.

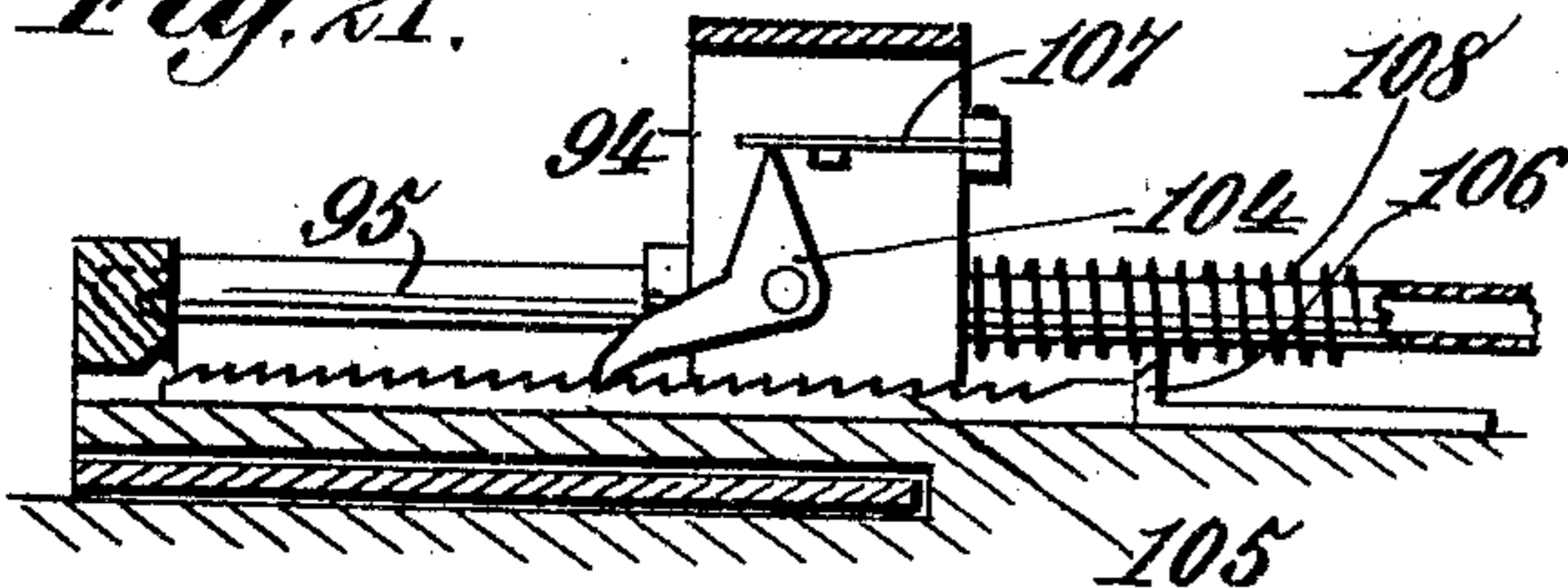


Fig. 22.

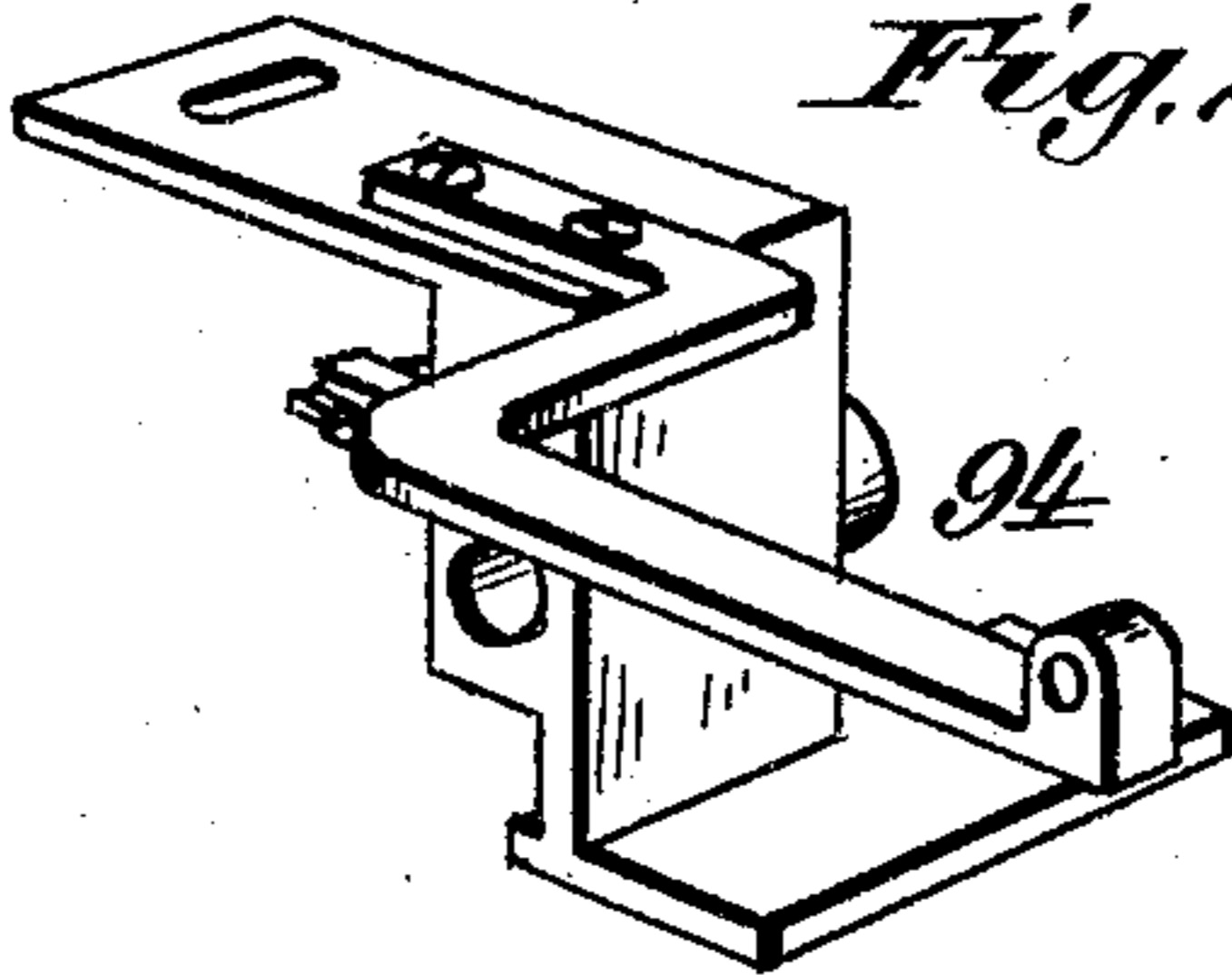


Fig. 23.

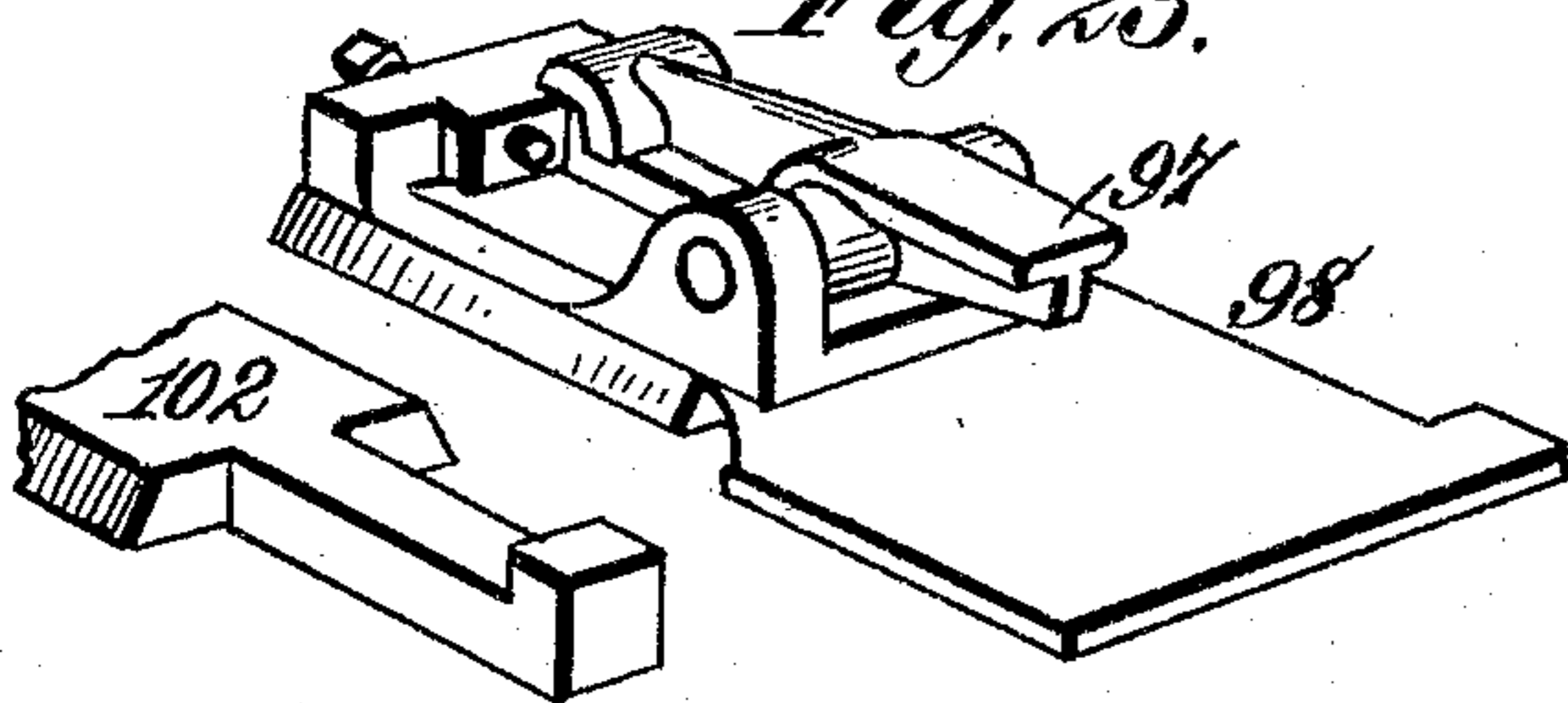


Fig. 24.

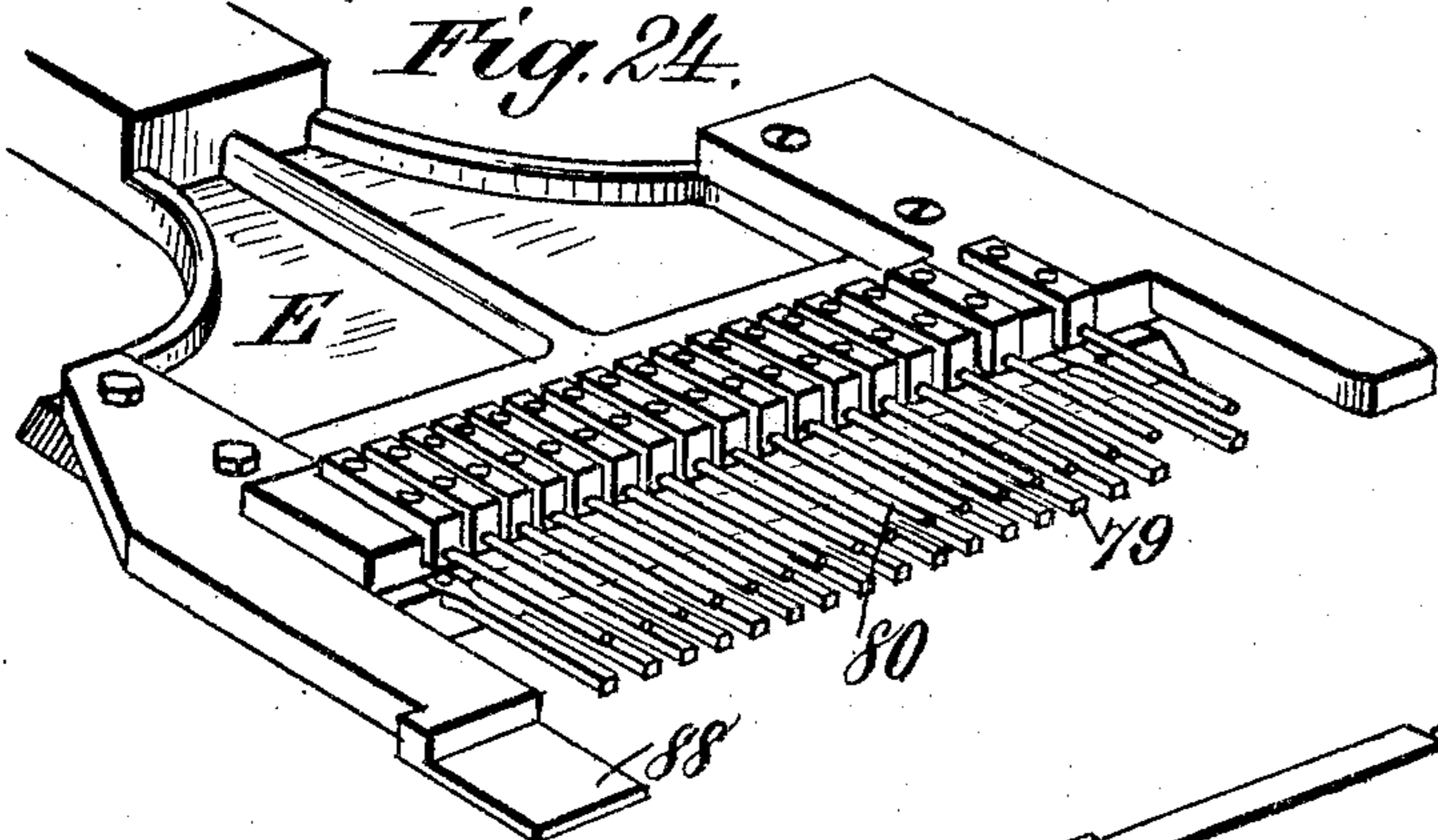


Fig. 26.

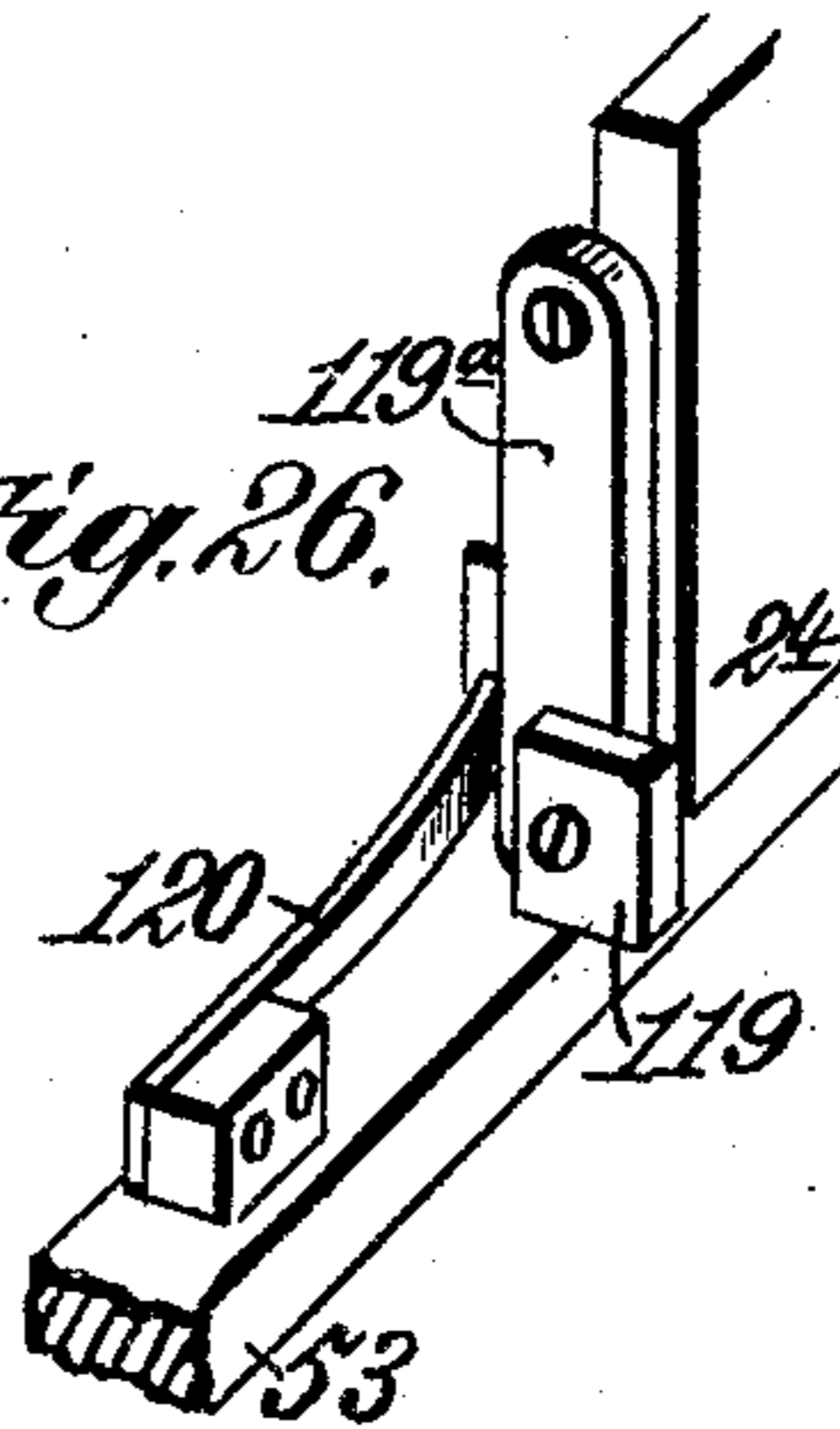


Fig. 25.

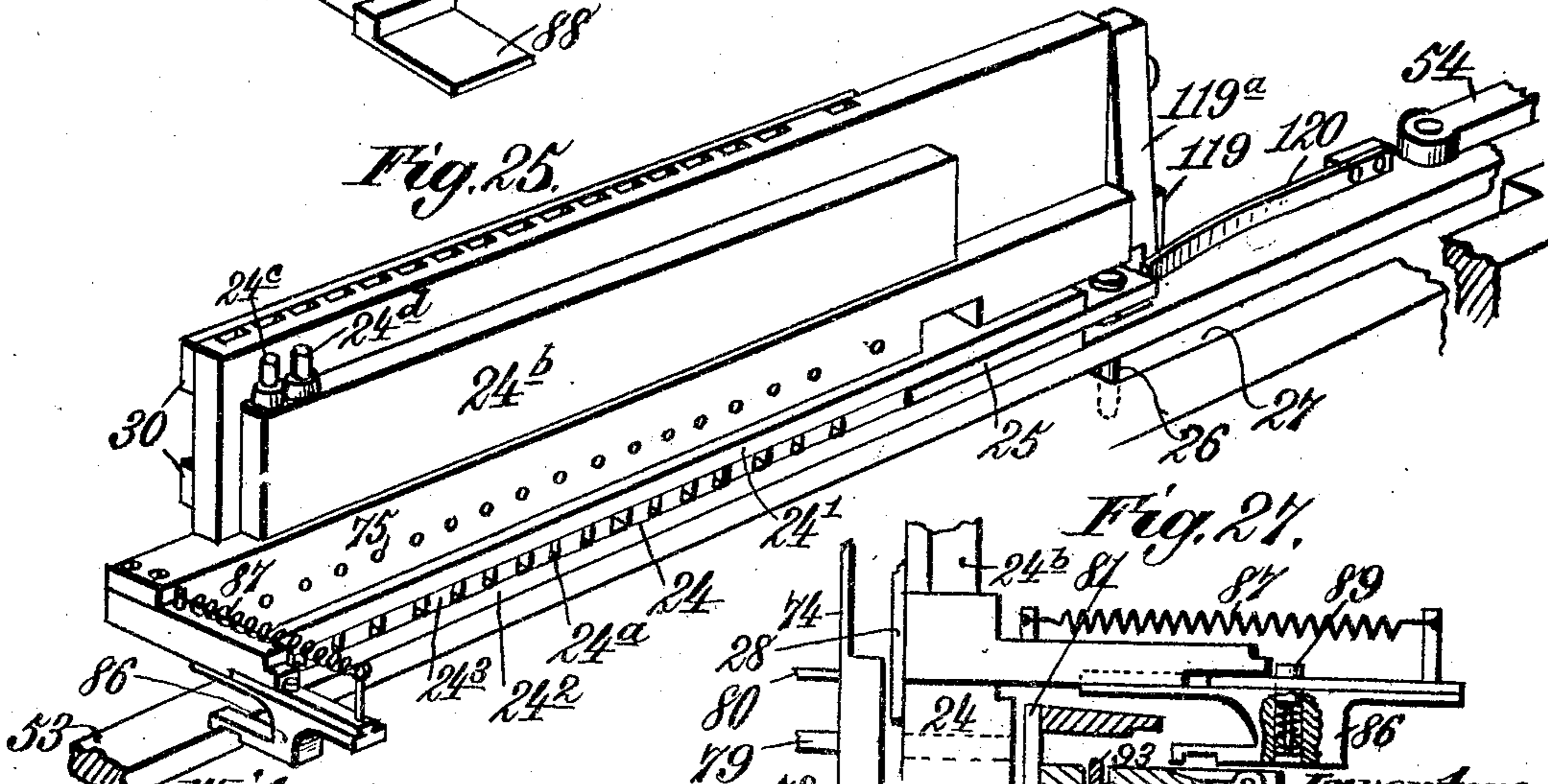
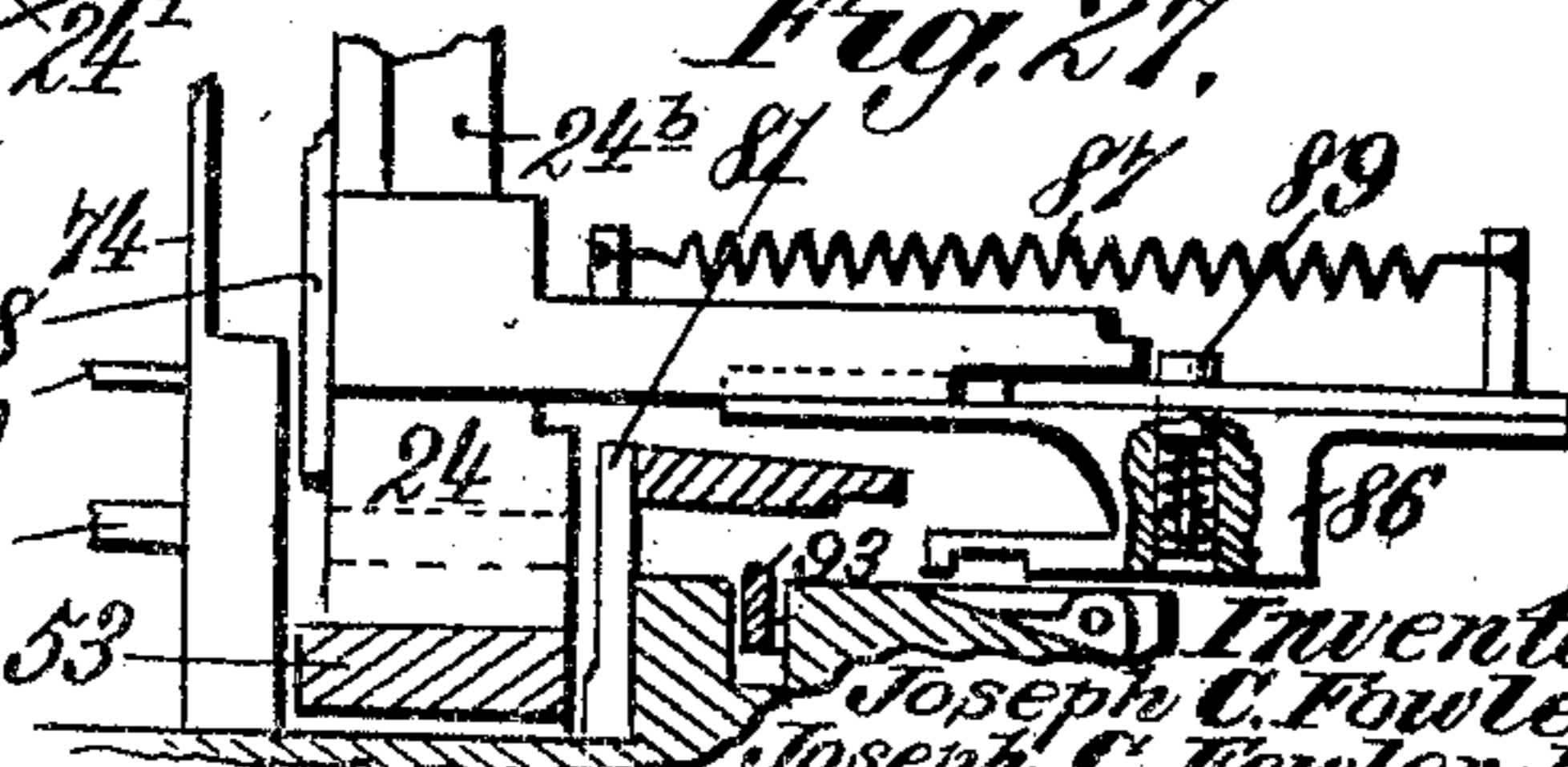


Fig. 27.



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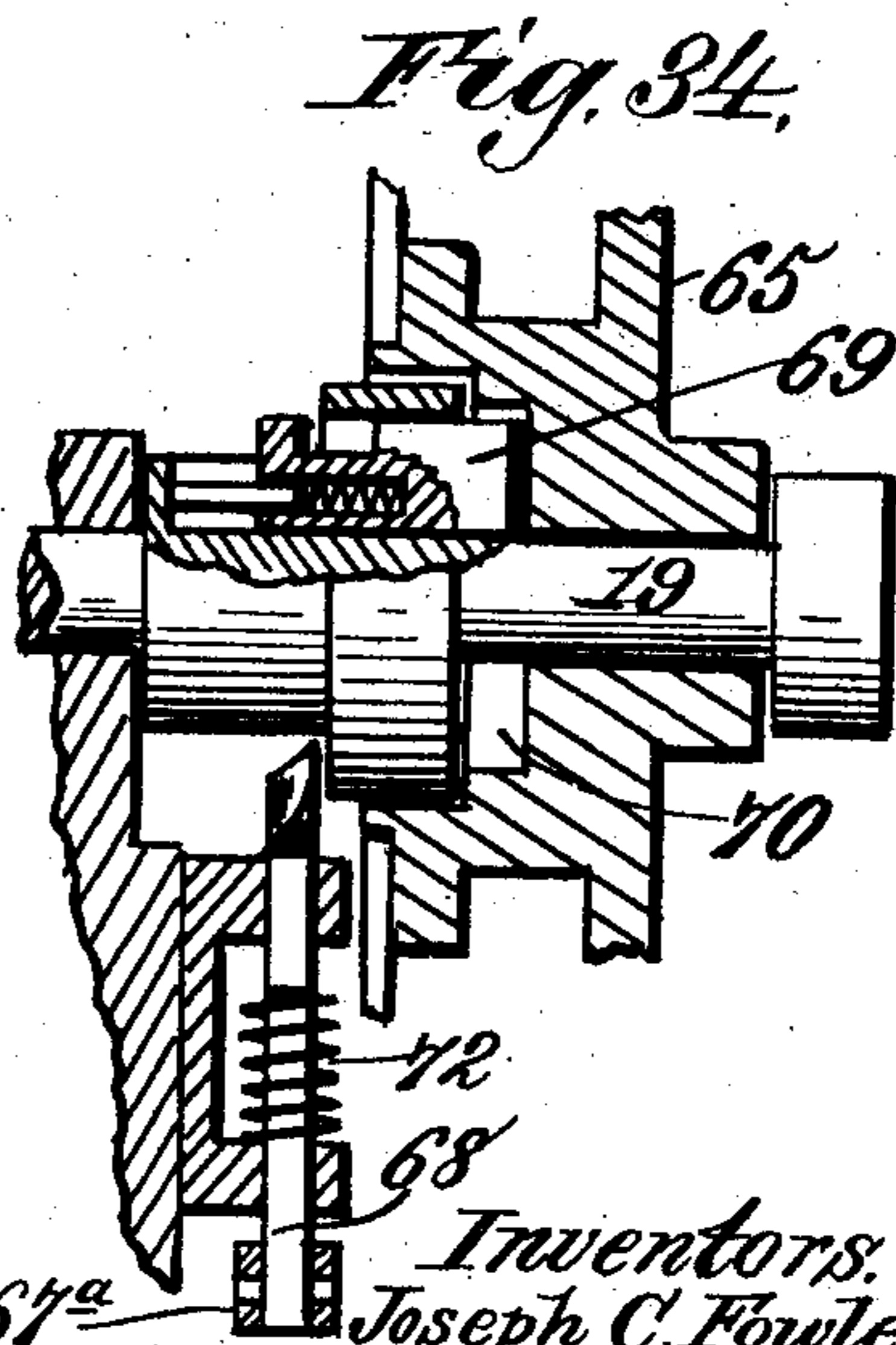
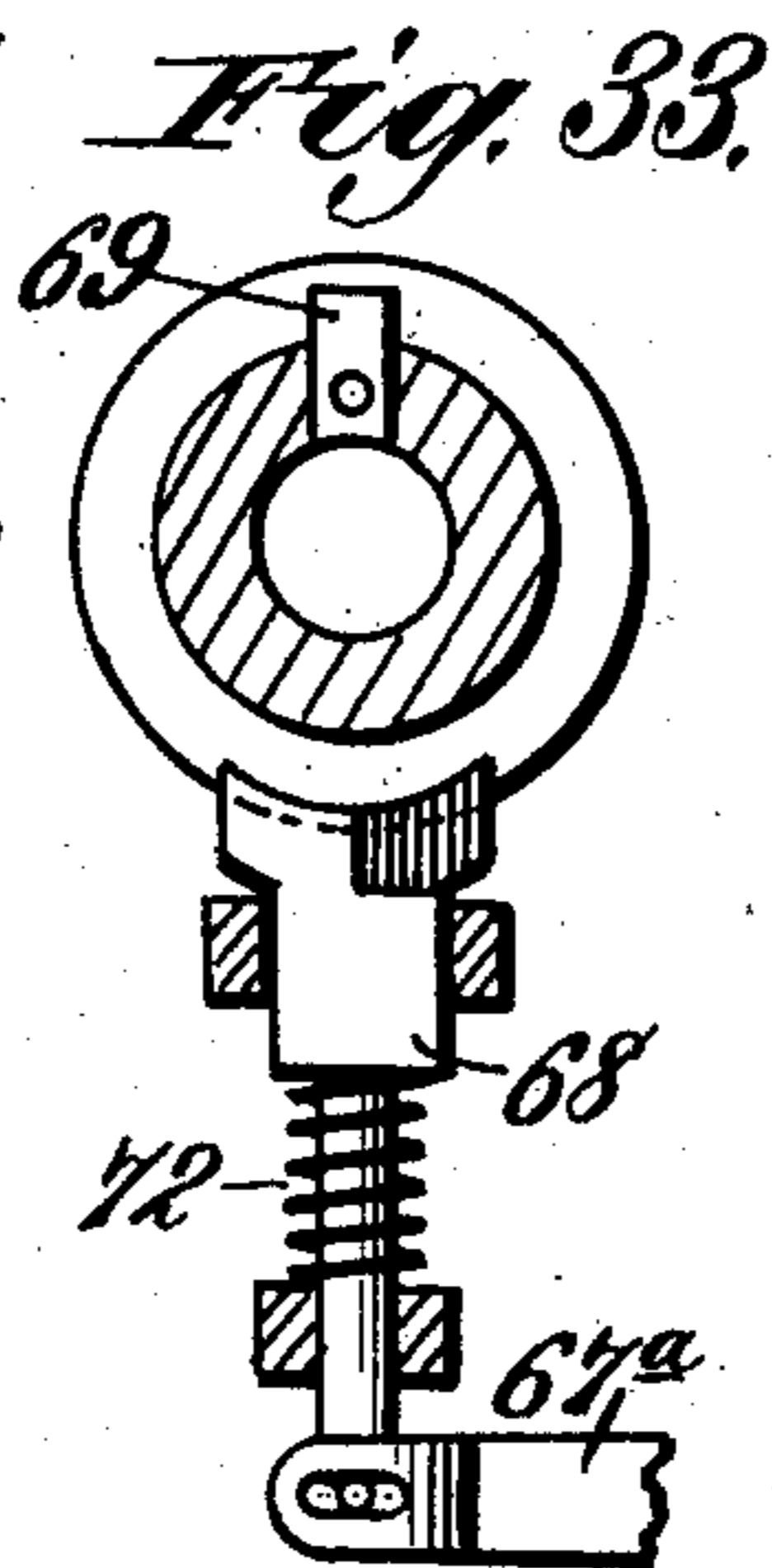
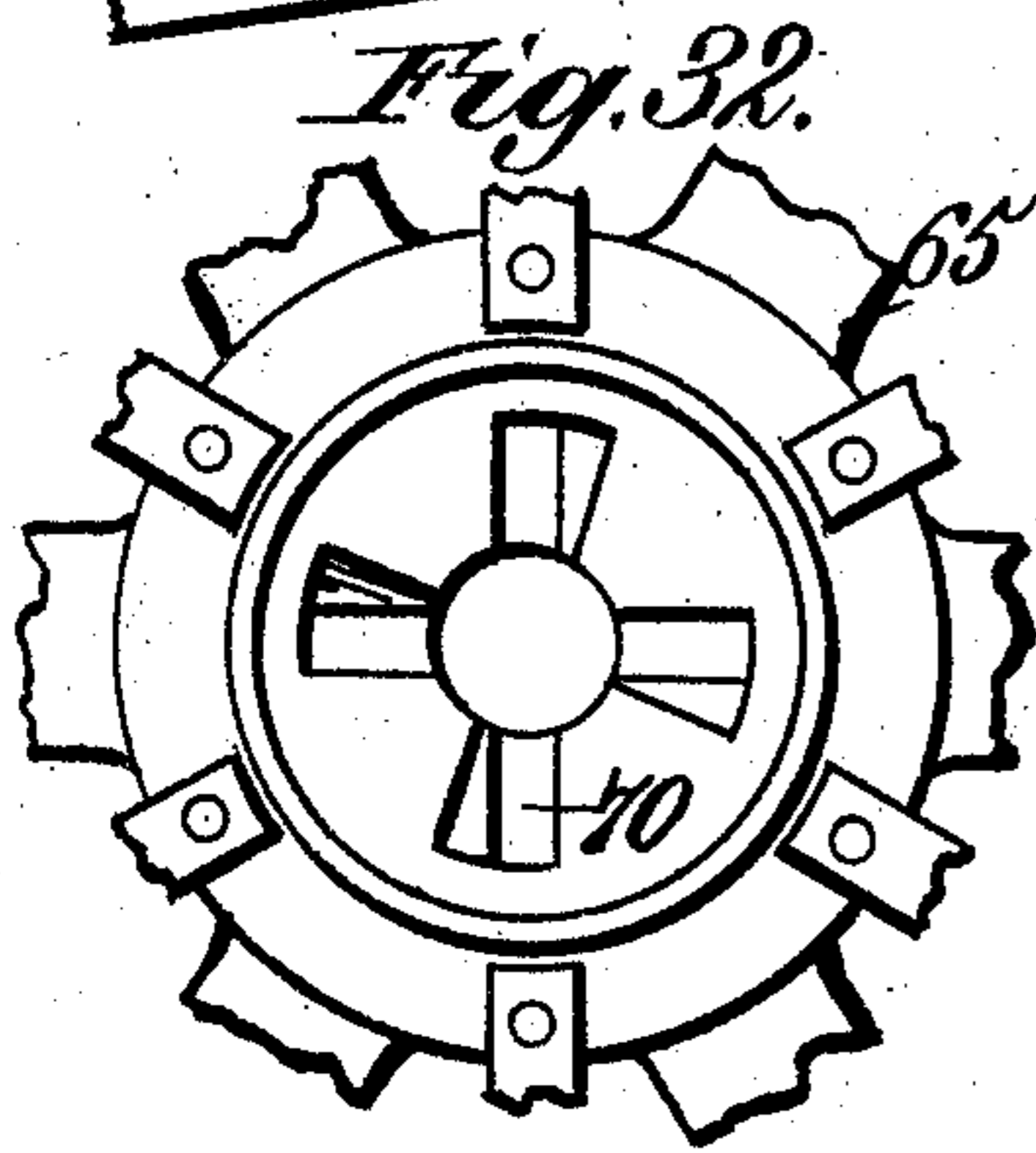
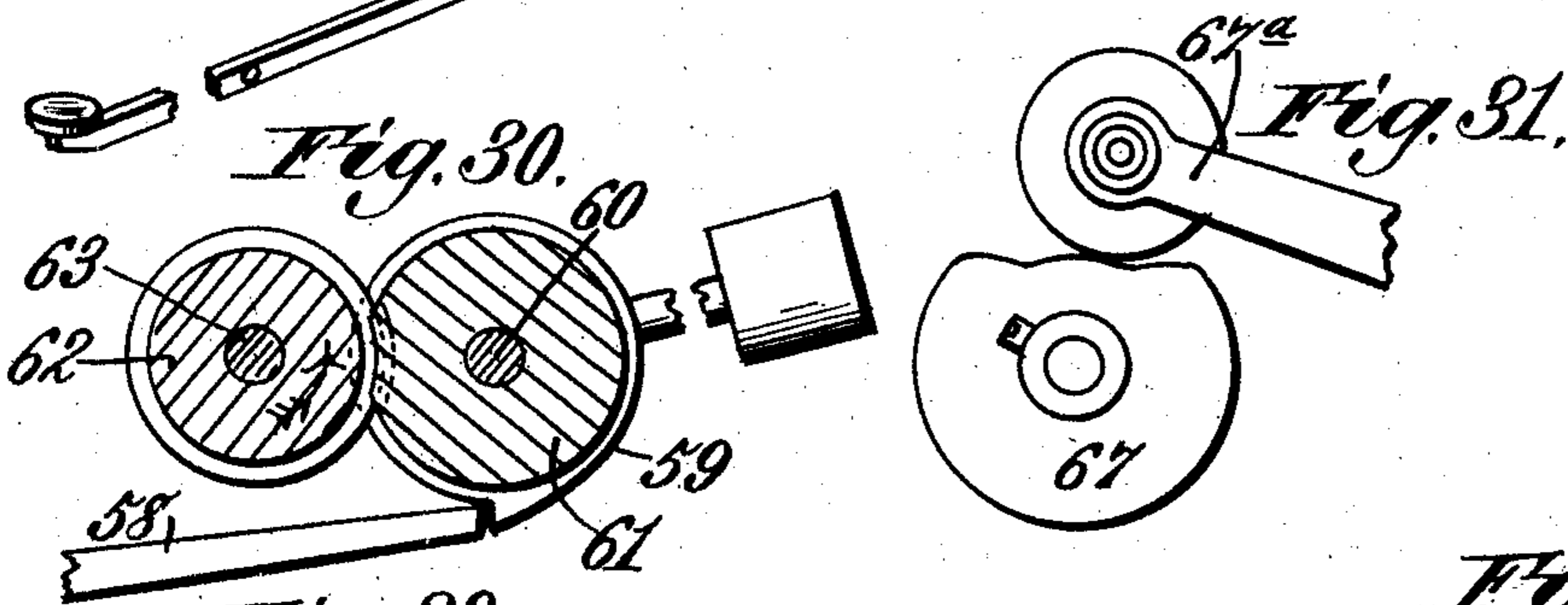
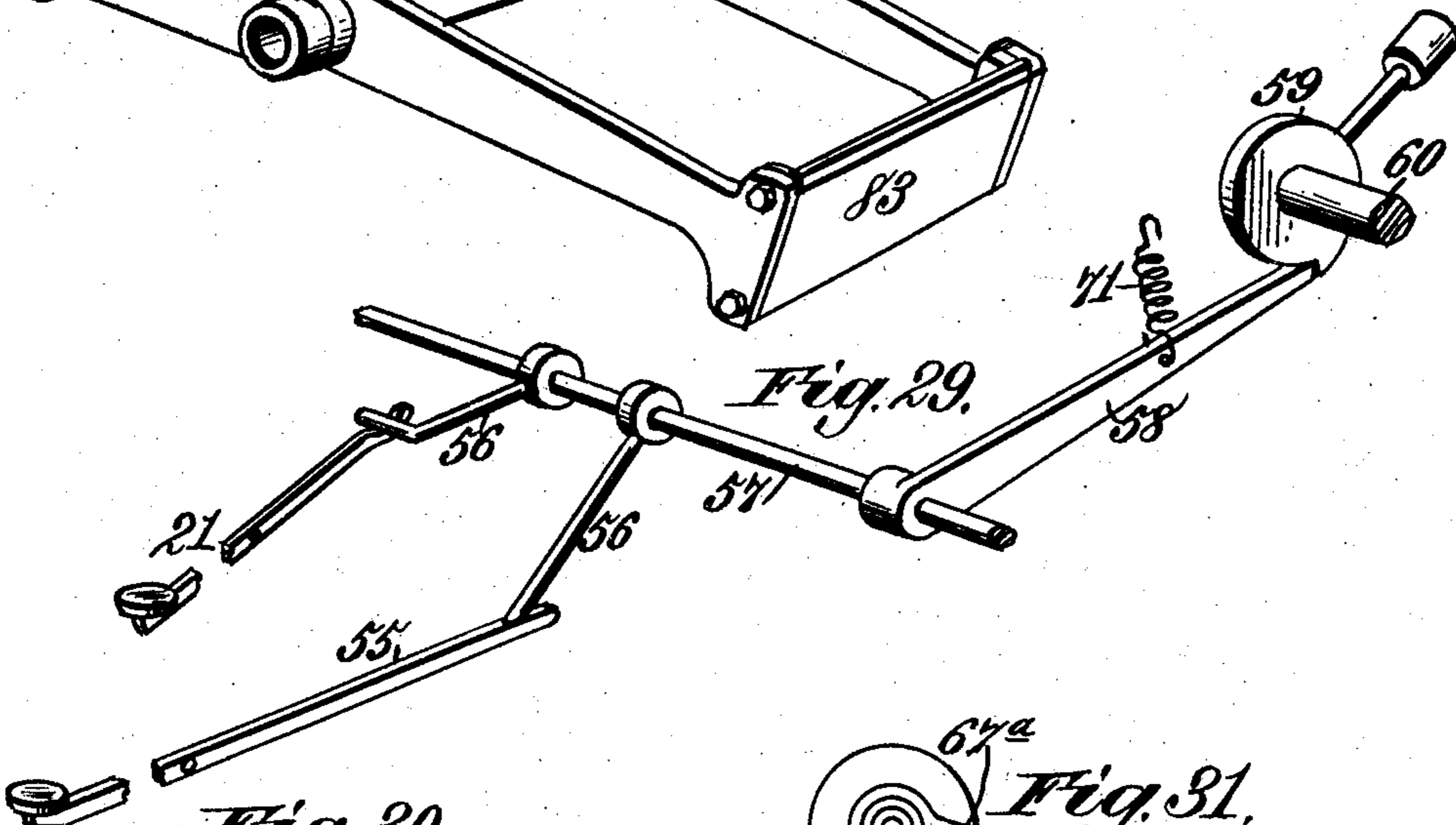
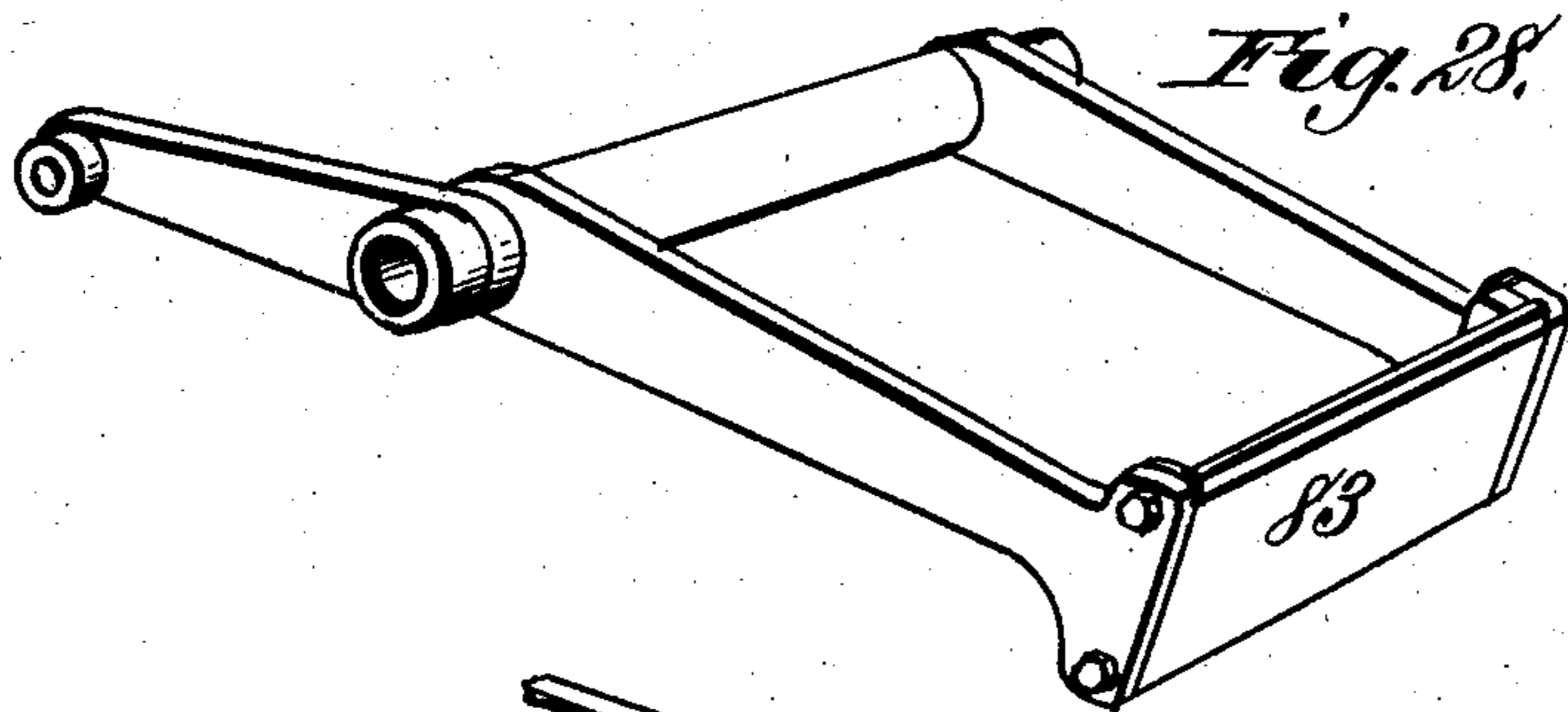
PATENTED AUG. 23, 1904.

J. C. FOWLER & J. C. FOWLER, JR.
TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED JUNE 8, 1903.

NO MODEL.

14 SHEETS—SHEET 13.



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No. 768,565.

PATENTED AUG. 23, 1904.

J. C. FOWLER & J. C. FOWLER, JR.
TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED JUNE 8, 1903.

NO MODEL.

14 SHEETS—SHEET 14.

Fig. 35.

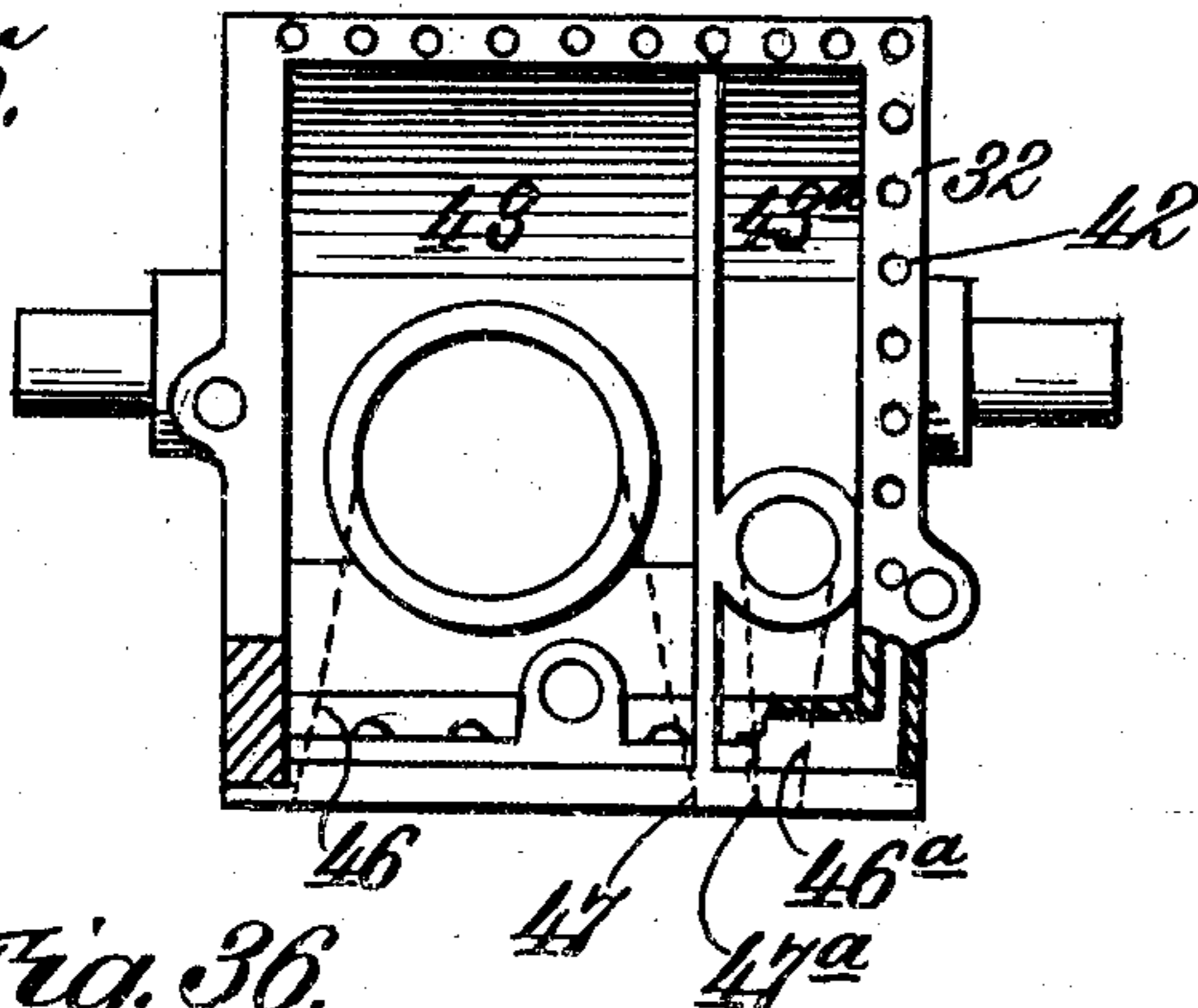


Fig. 36.

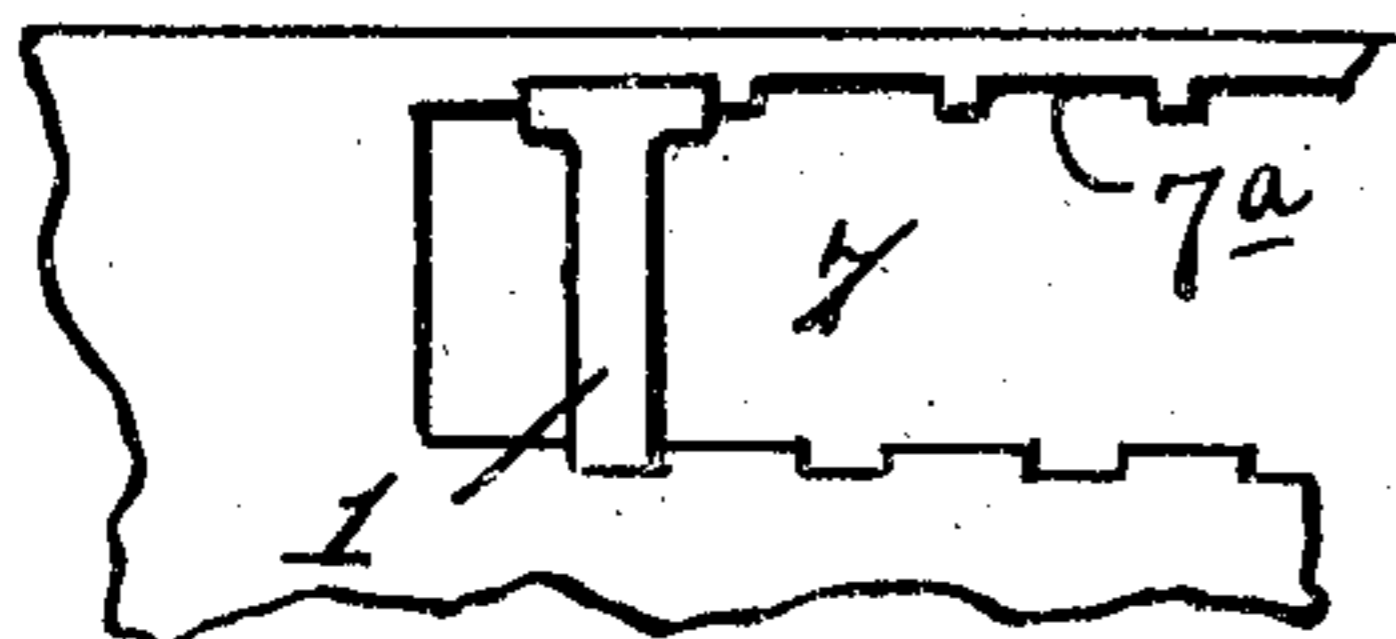


Fig. 37.

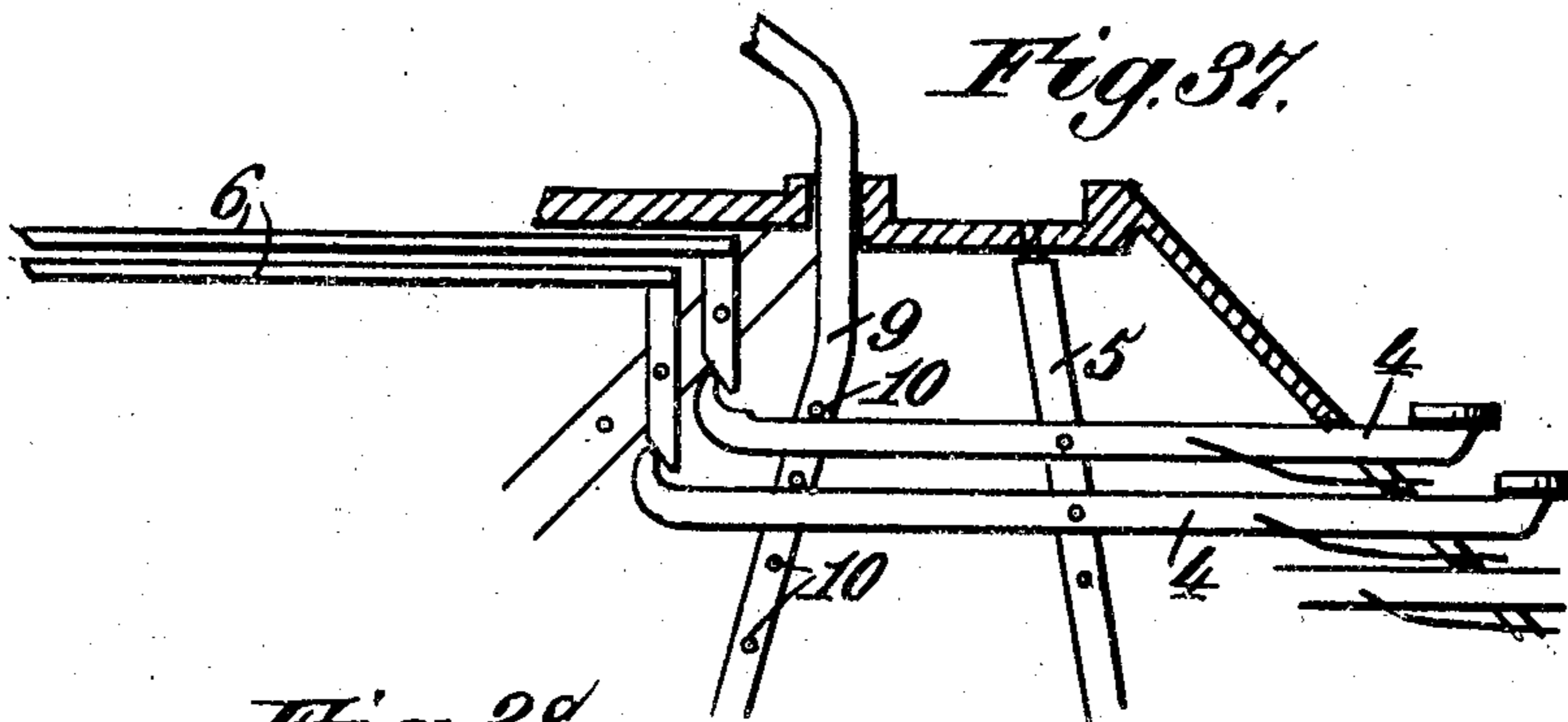
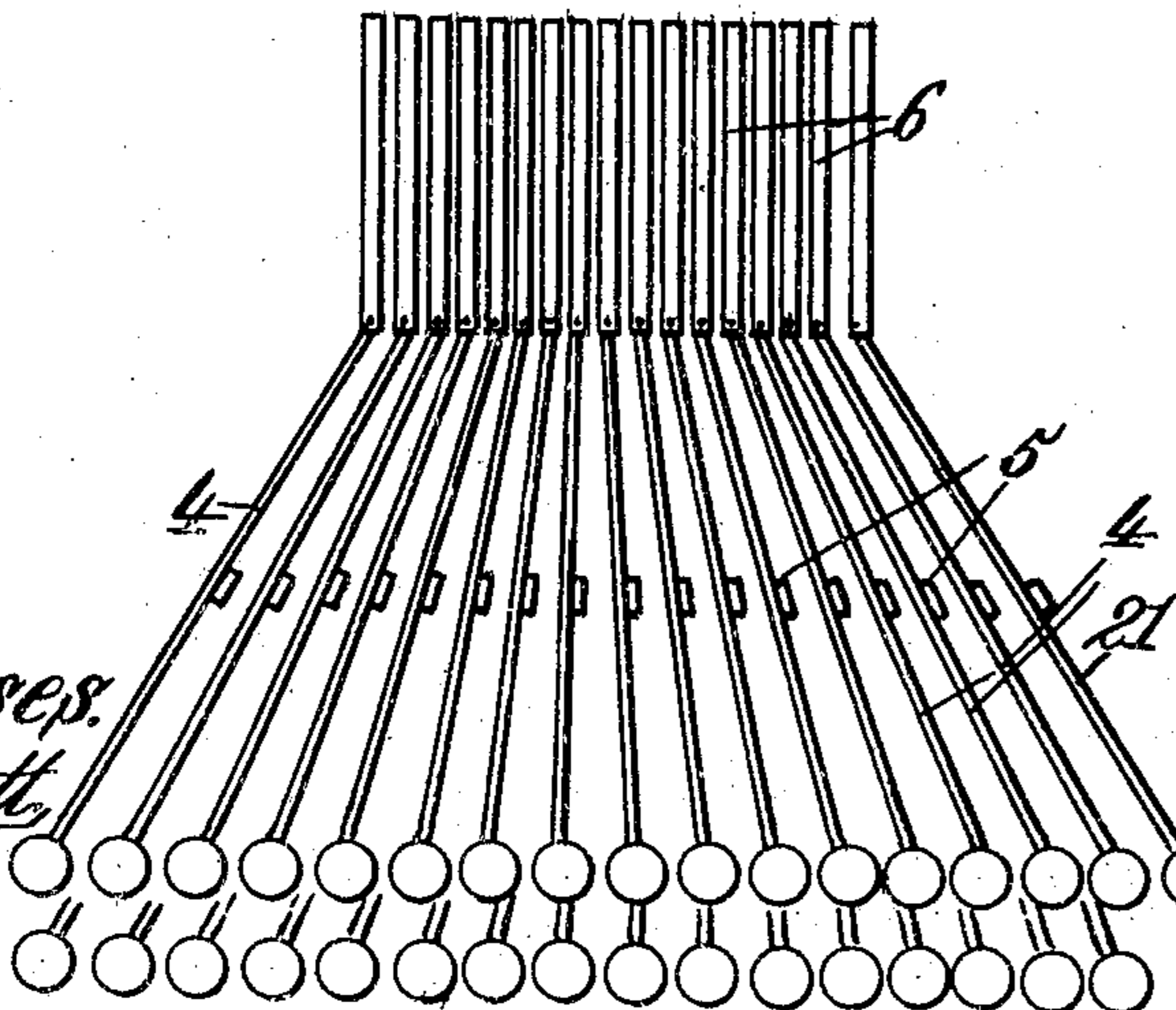


Fig. 38.



Witnesses.

Robert Smith,

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Atty.

UNITED STATES PATENT OFFICE.

JOSEPH C. FOWLER AND JOSEPH C. FOWLER, JR., OF BALTIMORE, MARYLAND, ASSIGNORS TO CASTOTYPE MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

TYPE CASTING AND SETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 768,565, dated August 23, 1904.

Application filed June 8, 1903. Serial No. 160,651. (No model.)

To all whom it may concern:

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

Our invention relates to improvements in type casting and setting machines, and has for its object to provide an efficient machine of improved construction and operation adapted to cast single or independent types, assemble them in composed lines, justify such lines, and transfer them to a galley or printing-form.

The invention has also for its object to improve the construction, arrangement, and mode of operation of the elements performing each of the stated operations.

To the end stated the invention consists in the machine hereinafter described and illustrated, in the several combinations of elements recited in the appended clauses of claim, in the mode of operation of the machine as an entirety, in the mode of operation of the several mechanisms embodied in the machine, and in the novel elements and arrangement of elements of the machine.

That which is regarded as new in respect of the elements and their arrangement, combination, and mode of operation will be set forth in the appended clauses of claim.

In the accompanying drawings we have illustrated a machine embodying our invention, in which drawings—

Figure 1 is a top plan view of the machine. Fig. 2 is an elevation of one end of the machine. Fig. 3 is an elevation of the other end of the machine. Fig. 4 is a sectional view taken on the line 4 4 of Fig. 1 and illustrating the line-ejecting mechanism and correlated parts. Fig. 5 is a sectional view taken on the line 5 5 of Fig. 1 and illustrating the type-ejecting mechanism and correlated parts. Fig. 6 is a sectional view taken on line 6 6 of Fig. 1 and illustrating the mold and adjacent mechanism. Fig. 7 is a detail view illustrating the cam for operating the matrix-returning

element. Fig. 8 is a broken detail view illustrating the cam for operating the matrix-aligning blade. Fig. 9 is a sectional view showing the mold and matrices and adjacent mechanism. Fig. 10 is a similar view showing the said parts in a different position. Fig. 11 is a detail view, partly in elevation and partly in section, on the line 11 11 of Fig. 1, illustrating several of the matrices dropped for casting purposes, the mold being in casting position. Fig. 12 is a similar view in which the matrices are shown restored and the mold shifted to the type-ejecting position. Fig. 13 is a sectional plan view taken on a line just above the type-race. Fig. 14 is a similar view illustrating the parts shown in Fig. 13 in a different position. Fig. 15 is a detail elevation, partly broken away, of the mold. Fig. 16 is a plan view of the assembled blocks of which the mold is built up and showing the sliding section for opening and closing the space-cell of the mold. Fig. 17 is an elevation showing the guide-plate for the type-ejecting and mold-gate-cleaning fingers and the rails for moving said gates to position to be cleaned and returning them again. Fig. 18 is a perspective view of a mold-cell gate. Fig. 19 is a perspective view of a spacer of preferable form. Fig. 20 is a detail section illustrating the movable track for guiding the type to the composing and justifying box. Figs. 21 is a detail sectional view of the progressively-movable line-abutment and adjacent coöperative parts. Fig. 22 is a perspective view of said line-abutment. Fig. 23 is a detail perspective view showing the line-ejector and the active end of the means for operating the same. Fig. 24 is a perspective view of the type-ejector. Fig. 25 is a detail perspective view of the mold and slide by which it is carried and the type-composing finger. Fig. 26 is a detail view showing a device for cleaning the face of the mold. Fig. 27 is a view, partly in elevation and partly in section, showing the type-composing finger. Fig. 28 is a detail perspective view of the matrix-returning element. Fig. 29 is a detail perspective view of the space-key and the starting-

key and adjacent parts of the connected mechanism by which the machine is started for a cycle of operation. Fig. 30 is a detail view of elements comprised in the machine-starting mechanism. Fig. 31 is a detail view of other elements comprised in said mechanism. Figs. 32, 33, and 34 are detail views in elevation and section of a suitable form of clutch. Fig. 35 is a top plan view of the metal-pot. Fig. 36 is a fractional plan view illustrating the construction of the matrix-well and the method of mounting the matrix-bars therein. Fig. 37 is an enlarged detail showing part of the finger-key mechanism, matrix-releasers, and matrix-arresters. Fig. 38 is a plan view of a preferred manner of arranging or banking the finger-key mechanism.

The casting of the type is controlled by finger-key mechanism, which serves to release and properly position a selected matrix character or characters of a selected matrix bar or bars in front of and close to an appropriate normally closed cell or cells of the mold, after which by depression of a proper key the matrices are aligned, a metal-pot is caused to be brought to proper position, a mold-cell or mold-cells are opened, and type-metal is ejected from the pot into the mold cell or cells and against the matrix character or characters.

The matrix-bars which it is preferred to utilize in the machine are of substantially the character shown in Letters Patent of the United States, granted us the 22d day of July, 1902, No. 705,525. Each matrix-bar consists of a body 1, of metal or other suitable material, having formed in one face thereof a series of intaglio characters 2, arranged in a vertical line and having in lines coincident with said characters in the opposite face a series of recesses or sockets 3. It is contemplated, preferably, that a series of seventeen of such character matrix-bars shall be employed, each of which will be provided with a series of fourteen characters in or on its face, providing a font, as it were, of two hundred and thirty-eight characters—a number adequate to permit the casting of all the characters in ordinary use in the art of printing and in addition thereto a blank bar 1^a for casting spaces. It will be understood, however, that our invention is not limited to this character of matrix-bar nor the number thereof, this being preferential only. The series of matrix-bars are arranged in suitable ways 7^a, with which the matrix-well is provided, so that they may have distinct paths of movement in order that they may perfectly register in respect of a horizontal line passing through the mold with the several mold-cells.

The finger-key mechanism of the present machine, the means by which the matrix-bars are released, and the means by which they are arrested and properly positioned with respect to the mold are generically the same as shown in the said Letters Patent, but differ

therefrom in details of construction and arrangement of parts. Referring to Figs. 3, 37, and 38, where this mechanism is shown, the numerals 4 indicate the key-levers, which are pivotally connected in vertical series to pivoted supports 5, and their free ends have operative engagement with appropriate matrix-arresters 6, of which there is one for each key of the character-keys of the keyboard. Each vertical series of keys is provided with characters corresponding in kind and relative arrangement with the series of characters of a given matrix-bar, and the cooperative relation of the key mechanism, matrix-releasing devices, and matrix-arresters is such, as in the Letters Patent No. 705,525 before mentioned, that upon the depression of any character-key a corresponding matrix-arrester will be projected into the hereinafter-referred-to matrix-well 7 and arrest the fall of the released matrix, with its selected character corresponding to the depressed key in proper position in front of the mold. The numerals 8 designate the matrix-keepers and the numerals 9 the matrix-releasers. The matrix-keepers consist of a series of pivoted fingers corresponding in number to the number of matrices employed, including the space-matrix, and they engage suitable ledges, with which the matrix-bars are provided, and normally support the latter in an elevated position in the matrix-well just in front of the mold, as shown in Fig. 10 of the drawings. The matrix-releasers correspond in number to and cooperate with the matrix-keepers and consist of vertically-movable bars each appropriate to the keys of a vertical row of keys. A series of studs or pins 10 project laterally from the releaser-bars and rest on the key-levers, as clearly shown in Fig. 37. The upper ends of these releaser-bars are in position when lifted by the actuation of a cooperative key to engage and trip the matrix-keepers, as best shown in Figs. 9 and 10 of the drawings.

In use a single individual type may be cast in one cycle of operation of the machine, or where a sequence of type which it is desired to cast may be found on the keyboard running in any direction from left to right as many individual types may be cast as may be within the sequence. This being understood, the machine will be hereinafter described without reference to whether a single individual type or sequence of individual types are selected and cast during a given cycle of operation of the machine.

The matrices are selectively released by actuating the appropriate key of the finger-key mechanism, which lifts a corresponding matrix-releaser to trip the proper keeper and release the matrix-bar. This operation is clearly shown in Fig. 9. The key mechanism simultaneously with the performance of its matrix-releasing function operates to project a matrix-arrester into the matrix-well to ar-

rest the fall of the matrix and support it in a position with the selected character in front of a mold-cell.

Alining-blades 11, are fitted in guideways 12, formed in the machine-frame communicating with the matrix-well and corresponding in number and alinement with the several matrix-bars. These alining-blades are connected, respectively, by relatively stiff springs 13 to a rock-shaft 14, (see Figs. 9 and 10,) the idea being that on the rotation of said rock-shaft the alining-blades will be forced into the proper recesses or sockets 3 of a released matrix, as shown particularly in Fig. 9 of the drawings, and those alining-blades corresponding to matrix-bars which have not been released will enter supplemental recesses or sockets 3^a, provided therefor, as shown in Fig. 10. The alining-blades not only serve to accurately bring the selected matrix character in front of the appropriate mold-cell and maintain it there during the casting operation, but also to force the matrix-bar closely against the face of the mold, so that the mold-cell is closed with nicety.

The spring or yielding connection of the alining-blades with the rock-shaft is of value in that thereby individuality in the action of the alining-blades to compensate for any possible irregularity is afforded—as, for instance, should it ever occur that the sockets or recesses 3 of any of the matrix-bars be slightly deeper by reason of wear or otherwise than the sockets of other matrix-bars the alining-blade corresponding thereto will have a throw sufficient to push said bar closely against the face of the mold, while the springs of the alining-blades of other matrices which do not need so great a throw will yield. Again, by reason of this yielding connection of the alining-blades with the actuating rock-shaft it is possible that the shaft may to insure a close fit of the matrix against the mold be rotated a maximum degree—a little more than necessary ordinarily to cause the alining-blades to perform their proper functions. In this event by reason of the yielding spring connection the alining-blades will yield to compensate for the overdegree of rotation of the rock-shaft. Thus variations and difficulties which might occur by reason of wear if the alining-blades were thrown by an unyielding fixed positive movement are obviated.

The alining-blades are intended to come into operation, as is obvious, when the matrix-bars have been released, have fallen, and are properly positioned against the mold. They are in the illustrated example of our invention actuated by the movement of the rock-shaft in the following manner: Said rock-shaft 14 is provided with a finger 15, projecting into a recess 16 in an arm 17, operatively engaged in a cam-race 18^a, formed on a disk 18, mounted on the cam-shaft 19. (See Fig. 8.) A pulling-spring 20 is connected with the arm 17, as

best shown in Figs. 1 and 3. When, as hereinafter described, the space-key or starting-key is operated, the cam-shaft 19 is placed in clutch engagement with the main or driving shaft of the machine, whereupon the cam-race 18^a causes the arm 17 to retreat. The pulling-spring 20 causes the finger 15 to follow the retreating movement of said arm, and thus the alining-blades are caused to enter the recesses or sockets 3 or 3^a of the matrix-bars. When the arm 17 under the action of the cam 18^a has nearly finished its retreating stroke, the abutment 17^a thereof, which is shown as adjustable, engages the finger 15 and acting positively thereagainst forcefully pushes the alining-blades into the sockets or recesses of the matrix-bars referred to, causing the latter to be pushed hard against the face of the mold to accurately close the mold-cells thereof.

When it is desired to cast a space, the space-key 21 (see Fig. 29) is actuated, releasing the space-matrix bar, which falls in the well until arrested by the engagement of a pin 22, projecting laterally therefrom, with a part of the machine-frame 23, that constitutes a suitable stop. (See Figs. 11 and 12.)

In the preferred arrangement shown the space-matrix and the space-key are at the extreme right, and consequently terminate any sequence possible for a single cycle of operations of the machine. The space-key is therefore so connected as to effect the clutching of the cam-shaft 19 with the main shaft, whereupon the series of operations performed by the machine is commenced and carried out to completion.

The numeral 24 designates the mold, which, as well shown in Figs. 15 and 16, is provided with a series of separate or independent cells 24^a equal in number to the number of the matrix-bars, including the spacer-matrix bar. This mold is preferably made up of plates 24¹ and 24² and an intermediate series of blocks 24³ (see Fig. 15) bolted together—a convenient manner of manufacturing.

The spaces *s*, the preferred form of which is illustrated in Fig. 19 of the drawings, must obviously be of less height than the character types. To effect this, it is arranged that the mold-cell for casting spaces shall be shorter than those in which the type characters are cast. This is accomplished in the manner shown in Figs. 15 and 16 of the drawings by means of a sliding mold-section 25, which has a projecting lip 25^a, that constitutes an end wall of the space-casting cell when the parts are in casting position, and when a cast is made in order to permit the ejection of the space the sliding section is moved in a reverse direction to open the cell. Said sliding section is operated by means of a pin 26, depending therefrom and fitting into a recess in the machine-frame and which when the mold is moved to ejecting position abuts against one wall of the recess 27, Fig. 25, and

stops the movement of the sliding section, whereby the space-cell of the mold is opened. When the mold is returned to casting position said pin 26 abuts against the opposite wall of said recess, and the lip 25^a closes the end of the cell and constitutes an end wall thereof, and in this way the length of the casting-space of the cell is shorter than the casting-space of the type-character cells of the mold.

The mold may be provided with a suitable cooling-chamber 24^b to prevent heating thereof, and thus facilitate or expedite the hardening of the type cast therein.

A series of gates 28, one of which is shown in perspective in Fig. 18, are arranged to open and close the entrance ends of the mold-cells. These gates, as best shown in Figs. 9 and 10, movably fit against the face of the superstructure of the mold and are normally maintained in position to close the mold-cells against the entrance of metal from the metal-pot by means of springs 29 and confining-strips 30. The gates are provided with openings 28^a, which are caused to register with the mold-cells when a cast is to be made and with arms 28^b, that overhang and normally rest on the matrix-bars.

The metal-pot 32, which is of the tilting type and the preferred details of construction of which will be hereinafter described, is suitably pivoted, as shown in Fig. 6, and is provided with an arm 33, engaging a cam 34, arranged on the cam-shaft of the machine, whereby it is caused at the proper time to be tilted to bring its discharge-orifice into register with the mold-cells. The pot is provided with a bracket 35, in which are arranged a series of gate-openers 36, one for each gate, consisting of spindles 37, yieldingly fitted in said bracket by means of suitable springs 38. The operative arrangement is such that if no key of the key mechanism is actuated and no matrix-bar is released then no gate will be opened and no cast taken, because the arms 28^b thereof rest upon the unreleased matrix-bars, which prevent operation thereof, and the mold-cells therefore remain closed against the entrance of metal, the gate-openers yielding against the springs 38 in such event. When, however, a matrix-bar is released, it drops from beneath the arm 28^b of the corresponding gate, and the latter is then caused to be moved by the appropriate gate-opener to bring the opening therein into register with the appropriate mold-cell, so that the metal may enter such cell. The remaining gates, however, which they govern are maintained in normal position to keep closed the cells which they govern by means of the unreleased matrix-bars, and no metal is allowed to enter the mold cells closed by such gates.

It is intended that the metal in the pot shall be kept in a molten state by means of a suitable heater arranged below the pot, well known and not shown herein. To secure the greatest

benefit of the heat thus supplied upon all parts of the pot, a surrounding jacket 39 is provided, in the space between which and the body of the pot the heat readily ascends and by which it is confined to the area of the pot. In order to supply the heat in close proximity to the discharge-orifice of the metal-pot, where it is needed by the comparative attenuation of the body of metal at that point, it is conducted to a chamber 40, provided near the top of the pot adjacent to and behind and in front of the discharge-orifice, and then passes off through a suitable flue 41. Openings 42 are provided for the escape of the heat, which passes up through the space between the metal-pot and the surrounding jacket, so that a circulation is maintained.

The metal-pot, as best shown in Fig. 35, is provided with two compartments, one, 43, for containing type-metal and the other, 43^a, for space-metal, the latter metal being of a softer nature in order that the space, preferably of the shape shown in Fig. 19, shall be compressible to secure the justification hereinafter described. The larger type-metal compartment 43 of the pot has a channel 46 leading to a discharge-orifice 47, common to all the cells of the mold except the space-casting cell, and the other compartment, 43^a, has an independent channel 46^a leading to an individual discharge-orifice 47^a. Each compartment is provided with a suitable pump P, as best seen in Figs. 5 and 6, working in a cylinder within the pot and with which the channels to the discharge-orifices communicate. The pumps are actuated by the rocking levers 51 51^a, working against suitable cams 52 and 52^a on the cam-shaft 19. The return stroke is accomplished in two moves, the first being a slight movement by reason of a slight face of the cam, which imparts but a slight suction, so that the metal is withdrawn in a gentle manner, whereby the liability of sucking out metal from the body of the type is avoided, and then by reason of a more acute face of the cam the metal is forcefully and rapidly withdrawn into the pot to avoid danger of becoming cooled in the channel.

The mold is carried by a slide 53, (see Fig. 25,) arranged in a guideway provided in the machine-frame, and connected with this slide is a link 54, (see Fig. 13,) the other end of which is connected to a lever-arm 54^a, working in a cam-race formed in a barrel 54^b, mounted on the cam-shaft, as best shown in Fig. 1. When in the casting position, the relative arrangement of the mold, the slide by which it is carried, the link, and the arm, are shown in Figs. 11 and 13 of the drawings. At the proper time when a cast has been made the slide 53, with the mold and its appurtenances, is shifted to the ejecting position, (shown in Figs. 12 and 14,) where the relative position of the parts is clearly illustrated, allowing ample opportunity for the cast type to cool.

The operation of mechanism by which the metal-pot is tilted, the mold-gates opened, the metal ejected from the pot into the mold-cells, the shifting of the mold and appurtenances, and the mechanism by which the subsequent operations of the machine are effected is started either by action of the starting-key 55 or by the space-key 21, the tails of both of which keys engage arms 56, carried by a rock-shaft 57, (see Fig. 29,) whereby said shaft is rocked, releasing a trip-arm 58, connected thereto, from engagement with a weighted tumbler 59, mounted on a short shaft 60 and which by the influence of gravity partially rotates said shaft. A mutilated groove-drum 61, Fig. 30, is carried by the shaft 60 in proper relation to continuous-groove drum 62 on a short shaft 63, which shaft 63 is constantly driven from the main shaft A by means of a gear 64 on the main shaft meshing with the teeth of a clutch-wheel or element 65 on the counter-shaft, which carries a sprocket-wheel 66, connected by a chain 66^a with a sprocket-wheel on the short shaft 63. A cam 67, Fig. 31, on the shaft 60 is thus caused to operate a crank-arm 67^a to withdraw the bolt 68, Fig. 34, and allow a spring-impelled coupler 69 to enter one of the sockets 70 in the clutch member 65, mounted on the cam-shaft 19, whereby said counter-shaft 19 is caused to operate to effect one cycle of operations of the machine, whereupon the mutilated or inactive part of the drum 61 comes opposite the drum 62 and rotation of the counter-shaft stops. The trip-arm is returned to normal position to engage the tumbler 59 by a spring 71, and the bolt 68 is operated by a spring 72 to withdraw the coupler 69 from the socket 70 to unclutch. The details and operative arrangement of this clutch and operating mechanism are shown in Figs. 30 to 34 and Fig. 3 of the drawings. It is generically similar to the corresponding mechanism in our before-mentioned Letters Patent and is preferential only, and our invention is not restricted thereto.

During the shifting of the mold to the ejecting position the gates are lifted by means of a rail 73, provided on a plate 74, hereinafter described, on which rollers carried by said gates travel, as shown in detail in Fig. 17. In this way the openings 28^a in the gates are brought into register with cleaning-channels 75 in the mold, as shown in Fig. 5 of the drawings. When the mold and its appurtenant gates are transferred to the ejecting position, the mold-cells are in register with a series of guide-openings 76 in the plate 74 and the openings 28^a in the gates are in line with another series of guide-openings 77 in said plate, which is shown in detail in Fig. 17.

An ejector E (shown in detail in Fig. 24 of the drawings) is arranged to reciprocate on the machine-frame by means of a cam 78 on the cam-shaft in the relative position shown in

Fig. 1 of the drawings and carries a series of type-ejector fingers 79, which enter the mold-cells and eject the type therefrom. This ejector also carries a set of cleaning-fingers 80, which enter the openings in the gates and force therefrom the small particles of metal which may be contained therein separated by the gates from the body of the type when the said gates are elevated by the rail 73, before referred to. The ejector ejects the cast type from the mold into a type-race, and preferably, though not necessarily, through a die 81, Figs. 5 and 20, having openings 82 of the configuration and dimensions of the body of the type, and in the passage through which any burs, if by any possibility such may have been formed in the casting of the type, are removed. This die is not essential to the operation of the machine; but to compensate for possible failure of employees to keep up the adjustment of parts and to keep the machine perfectly clean it is considered desirable to provide it. The cleaning-fingers 80 on the forward movement of the ejector enter the openings in the gates, as before explained, and project any particles of metal that may be contained therein into and through the passages therefor provided in the mold, as best shown in Fig. 5 of the drawings.

The type ejected from the mold, whether a single individual type or a series of individual type, depending upon whether the operator can cast a sequence of type at one cycle of operation of the machine, are allowed to remain in the type-race, and the mold and its appurtenances are returned to the casting position by means of the link 54 and arm 54^a, connected with the slide 53, that carries the the mold, said arm passing upon an appropriate surface of the barrel-cam 54^b.

On the return movement of the mold the mold-closing gates are restored to normal position by means of the inclined part of the rail 73^a, arranged on the plate 74, before referred to. In the meantime the matrix bar or bars and the matrix-bar arrester or arresters previously put into operation will have been returned to initial or normal position by a shoe 83, arranged to swing on an axis 84 and operated by a high-pitch cam 85, mounted on the cam-shaft, immediately preceding which return of the matrix bar or bars and arrester or arresters the alining blade or blades 11 will have been withdrawn from engagement with the matrix-bars by the rotation of the rock-shaft 14, caused by the action of an abutment 17^b of the arm 17 in the forward movement of said arm. The elements are now in proper relative position therefor, and another cast, either of a single individual type or sequence of individual types, is now made, as before, the mold shifted to ejecting position, as before, and the type ejected therefrom and the openings in the gates cleaned, as before.

The type or sequence of type left in the type-race by the previous operation of the machine is now pushed along the type-race into the composing and justifying box 100 (see Figs. 25 and 27) by a composing-finger 86, supported by and in the van of the mold. This composing-finger is slidably connected with the mold and normally held to its position of work by a spring 87. On the return of the mold to casting position, however, this composing-finger is shifted to a path clear of the type-race by means of an extension 88 of the ejector, which engages the composing-finger and moves it to the position shown in Fig. 27, whereupon a spring-actuated bolt 89 is projected from its housing and stands in front of that part of the mold to which the composing-finger is connected, thus holding the composing-finger out of the way on the return movement of the mold. When the mold reaches casting position again, the spring-bolt engages a nose 90, that forces the bolt 89 within its housing, and the finger is then drawn into operative position by means of its spring 87.

The described operations are repeated until approximately a sufficient number of type or type and spaces to form a justified line have been cast, whereupon the operator is advised of this fact by an indicator 91, moving along a scale 92, preferably arranged on the keyboard-casing. The operator will then in the subsequent operation or operations of casting depress just so many keys to cast just so many type as will approximate a justified line, the intention being that the line shall be slightly overset and justified by compression of the spaces.

In passing along the type-race the type and spaces are accurately guided by a yielding depressible track 93, arranged in a suitable recess of the body of the type-race and projecting above the surface thereof, as best shown in Fig. 20. The type when ejected from the mold ride over this track until guide-recesses 93^a, with which they are provided, take over the track, along which they move in accurate alinement to the composing and justifying box or chamber 100. This composing and justifying box is formed of an extension of the type-race, which constitutes the bottom thereof, and movable rear and end walls, the line-ejector hereinafter referred to constituting the movable rear wall thereof and the extension 88 of the type-ejector and the abutment 94 constituting movable end walls thereof. The box has an open front to permit of the passage of the line therefrom.

The justification of the composed line is effected in the following manner: A movable abutment 94 is provided, the initial position of which is shown in Figs. 11 and 13 and against which the first type cast is moved by the composing-finger 86. This abutment is arranged to move on a guide-rod 95 and re-

cedes under the action of the composing-finger and intervening type progressively as the latter accumulate until the requisite number of type to form a justified line has been assembled, at which time a bar 96, connected to said abutment rides off the tail end of a rocking arm 97, (see detail, Fig. 23,) carried by a line-ejector 98, permitting its other end to drop into the path of said line-ejector-actuating mechanism 99, (see Fig. 4,) by which it is engaged, and the line-ejector advances to push the line from the composing and justifying box 100 to the galley or printing-form 101. The line-ejector is actuated when the tail of the rocking arm drops, as referred to, by a plunger 102, operated by a cam 103, as shown in detail in Fig. 4. This plunger reciprocates at each rotation of the counter-shaft, but becomes active to operate the line-ejector only when the end of the rocking-arm 97 drops into its path of reciprocation. The movable abutment is provided with spring-controlled ratchet 104, (see Fig. 21,) which engages a rack 105 to hold the abutment step by step in the progressive position to which it is advanced by the successive type or spaces coming to the justification-box. On the completion of a line the ratchet is disengaged from the rack by a releaser-cam 106 and is held so out of engagement by the spring 107. When the line has been ejected, the abutment is returned to initial position by a spring 108, mounted on the rod on which the abutment moves. Prior to the ejection of the line, however, the justification of the composed line is effected by means of a toggle-line compressor 109, actuated by an arm 110, engaging a suitable cam 111, carried by the cam-shaft, the operative parts of this cam and that which controls the line-ejector-actuating mechanism being so disposed and timed that the justification by compression takes place in advance of the transfer of the line from the justifying-box to the galley. The abutment 112 for the finishing end of the line, and which constitutes that side of the justification-box in the example of our invention as illustrated in the drawings, consists of that extension 88 of the type-ejector which operates to move the composing-finger out of the way, as before explained. This extension passes across the composing-surface and rests there by reason of the formation of the cam by which it is operated sufficiently long to enable the justification to take place. As the composed and justified lines are moved into the galley 101, which is of any suitable or usual kind, sustained by a counterweight 114, a line-pusher 115, worked by a cam 116, descends and pushes the line accurately to place in the galley and causes the galley to fall a distance equal to the height of a line of type, where it is retained by a suitable dog 117, engaging a rack 118.

The preferred arrangement of cooling-chamber 24' for the mold hereinbefore referred to,

is shown in detail in Fig. 15, where it appears as having the communicating compartments provided, respectively, with flexible fluid inlet and discharge pipes 24^c and 24^d, whereby
 5 a circulation of cooling fluid may be maintained and the mold kept efficiently cooled. A supplemental cooling-chamber 24^e beneath the mold may be provided, if desired.

In order to keep the discharge-orifice of the
 10 melting-pot clean, a wiper is provided. This wiper is shown in detail in Fig. 26 of the drawings and consists, preferably, and as shown, of a block 119, carried by a pivoted arm 119^a, mounted on the slide which carries
 15 the mold. This block is normally held in position to come into close contact with and wipe the discharge-orifice of the pot by a spring 120. The initial position of this wiper is shown in Fig. 11 of the drawings, and its position after it has swept across the discharge-
 20 orifice of the pot and completed its work is shown in Fig. 14 of the drawings.

By our invention we provide a machine of improved and simple construction with elements having a new interrelation, resulting
 25 in a new mode of operation of such elements, whereby the operation of the machine as an entirety is much improved and simplified and whereby it is possible to cast individual types
 30 or a sequence of individual types in one cycle of operation of the machine and without interrupting the operation of casting the types assemble the cast types into composed lines and justify such lines.

35 Except in so far as specifically recited in some of the following clauses of claim for the purposes of those clauses only our invention is not restricted to the details of construction and arrangement of parts shown in the drawings and described in the foregoing specification, as many modifications of such construction and arrangement of parts will readily
 40 suggest themselves to those skilled in the art without departing from the spirit of the invention.
 45

In the following clauses of claim the term "individual" is used to express the idea of a single type or a plurality of independent types.

Having thus described our invention, what
 50 we claim is—

1. In a machine for casting individual type, the combination of a mold having a series of mold-cells, of mold-gates normally closing the cells of the mold, a series of matrices,
 55 means for assembling said matrices in front of the mold, means for moving the mold-gates to open the cells of the mold, and means for introducing metal into the open cells.

2. In a machine for casting individual type,
 60 the combination of a mold having a series of mold-cells, mold-gates normally closing the cells of the mold, a series of matrix-bars, means for supporting said matrix-bars in stored or initial position, finger-key mechanism for selectively releasing said matrix-bars,
 65

matrix-bar arresters coöperatively connected to the keys of the finger-key mechanism and arranged to be projected into the path of the matrix-bars to arrest said bars with their selected characters in operative relation to the
 70 cells of the mold, a metal-pot, means for moving the mold-gates to open the cells of the mold, and means for ejecting metal from the pot into the mold against the selected characters of the matrix-bars.
 75

3. In a machine for casting individual type, the combination of a series of matrix-bars, means for supporting said matrix-bars in stored or initial position, a mold having a series of mold-cells, movable mold-gates engaging said matrix-bars and normally closing the cells of the mold, finger-key mechanism for selectively releasing said matrix-bars, matrix-
 80 bar arresters operatively connected with the keys of the finger-key mechanism and arranged to be projected into the path of the matrix-bars to arrest said bars with their selected characters in operative relation to the cells of the mold, a tilting metal-pot, mold-
 85 gate openers mounted on said metal-pot, and means for ejecting metal from the pot against the selected character of the matrix-bars.
 90

4. In a machine for casting individual type, the combination with a mold having a series of mold-cells, movable mold-gates normally
 95 closing the cells of the mold, a series of matrix-bars, means for supporting said matrix-bars in stored or initial position, a finger-key-operated mechanism for selectively releasing said matrix-bars and arresting them in proper
 100 position with their selected characters in operative relation to the cells of the mold, a tilting metal-pot, means carried thereby for opening the mold-gates corresponding to the released matrix-bars, and means for ejecting
 105 metal from the pot into the mold-cells and against the selected characters of the matrix-bars.

5. In a machine for casting individual type, the combination with a mold having a series
 110 of mold-cells, a series of matrix-bars, means for supporting the said matrix-bars in stored or initial position, a series of movable mold-gates normally engaging the respective, stored matrix-bars whereby they are prevented from
 115 being operated to open the mold-cells, finger-key mechanism, means operated thereby for releasing the matrix-bars and presenting them in operative relation to the cells of the mold, a metal-pot, means carried thereby for oper-
 120 ating the mold-gates corresponding to the released matrix-bars to open their respective mold-cells, and means for ejecting metal from the pot into the mold against the selected characters of the matrix-bars.
 125

6. In a machine for casting individual type, the combination of a mold having a series of mold-cells, normally closed mold-gates, a series of matrix-bars, finger-key-operated means
 130 for selectively releasing the matrix-bars and

presenting them in front of the mold-cells, means for opening said gates, a metal-pot, and means for ejecting metal therefrom into the opened mold-cells.

5 7. In a machine for casting individual type, the combination of a mold having a series of mold-cells, normally closed mold-gates, a series of stored matrix-bars engaging said mold-gates to prevent opening of said gates, finger-
10 key-operated means for selectively releasing the matrix-bars and presenting them in front of the mold-cells, means for opening the gates corresponding to the released matrix-bars, a metal-pot, and means for ejecting metal there-
15 from into the opened mold-cells.

8. In a machine for casting individual type, the combination with a mold having a plurality of mold-cells, mold-gates normally closing said mold-cells, a series of matrix-bars nor-
20 mally constituting locks to prevent opening of said gates, means for supporting said matrix-bars in their normal position, finger-key-operated mechanism for selectively releasing said bars and presenting the selected charac-
25 ters thereof in operative relation to the mold-cells, a metal-pot, means for opening the mold-gates corresponding to the released matrix-bars, and means for ejecting metal from the pot into the mold-cells.

30 9. In a machine for casting individual type, the combination of a mold having a plurality of mold-cells, a series of mold-gates cooperating therewith, matrix-bars normally consti-
35 tuting locks to prevent opening of said gates, means for supporting said matrix-bars in normal or stored position, finger-key-operated mechanism for selectively releasing said matrix-bars and presenting the selected charac-
40 ters thereon in operative relation to the mold-cells, a tilting metal-pot, gate-openers carried by said metal-pot and arranged to engage and operate the mold-gates corresponding to the released matrix-bars to open the correspond-
45 ing mold-cells, and means for ejecting metal from the pot into the opened mold-cells.

10. In a machine for casting individual type, the combination of a mold having a plurality of mold-cells, a series of mold-gates cooperating therewith, matrix-bars normally consti-
50 tuting locks to prevent opening of said gates, means for supporting said matrix-bars in normal or stored position, finger-key-operated mechanism for selectively releasing said matrix-bars and presenting the selected charac-
55 ters thereon in operative relation to the mold-cells, a tilting metal-pot, yieldingly-supported gate-openers carried by said metal-pot and arranged to engage and operate the mold-gates corresponding to the released matrix-bars to open the corresponding mold-cells, and
60 means for ejecting metal from the pot into the opened mold-cells.

11. In a machine for casting individual type, the combination of a mold having a plurality
65 of mold-cells, a series of mold-gates cooperating

ing therewith, matrix-bars normally consti-
tuting locks to prevent opening of said gates, means for supporting said matrix-bars in normal or stored position, finger-key-operated
70 mechanism for selectively releasing said matrix-bars and presenting the selected characters thereon in operative relation to the mold-cells, a tilting metal-pot, yieldingly-supported
75 gate-openers arranged to engage and operate the mold-gates corresponding to the released matrix-bars to open the corresponding mold-cells, and means for ejecting the metal from the pot into the opened mold-cells.

12. In a machine for casting and setting individual type, the combination of a series of
80 matrix-bars, means for supporting said bars in normal, stored position, a shiftable mold having a series of mold-cells, finger-key-operated mechanism for selectively releasing said
85 matrix-bars and presenting the same in operative relation to the respective mold-cells, a metal-pot, means for ejecting metal therefrom into the mold, a type-ejecting mechanism, means for shifting the mold from casting to
90 ejecting position, and type-ejector-operating mechanism.

13. In a machine for casting and setting individual type, the combination of a series of
95 matrix-bars, means for supporting said bars in normal, stored position, a shiftable mold having a series of mold-cells, mold-gates carried by the mold, finger-key-operated mechanism for selectively releasing said matrix-bars and presenting the same in operative re-
100 lation with respect to the mold-cells, means for operating said mold-gates to open the mold-cells, a metal-pot, means for ejecting metal therefrom into the mold, a type-ejecting mechanism, means for shifting the mold
105 from casting to ejecting position, and type-ejector-operating mechanism.

14. In a machine for casting and setting individual type, the combination of a series of
110 matrix-bars, means for supporting said bars in normal, stored position, a shiftable mold having a series of mold-cells, mold-gates, finger-key-operated mechanism for selectively releasing said matrix-bars and presenting the same in operative relation to the mold-cells,
115 means for operating said mold-gates to open the mold-cells, a metal-pot, means for ejecting metal therefrom into the mold, a type-ejecting mechanism, means for shifting the mold from casting to ejecting position, and
120 type-ejector-operating mechanism.

15. In a machine for casting and setting individual type, the combination of a series of
125 matrix-bars, means for supporting said bars in normal or stored position, a shiftable mold having a series of mold-cells, a type-composing finger carried by said mold, finger-key-operated mechanism for selectively releasing said matrix-bars and presenting the same in
130 operative relation to the respective mold-cells, a metal-pot, means for ejecting metal there-

from into the mold, a type-ejecting mechanism, means for shifting the mold from casting to ejecting position, and type-ejector-operating mechanism.

5 16. In a machine for casting individual type, the combination with a shiftable mold having a series of mold-cells, of matrix-bars, finger-key-actuated mechanism for selectively presenting said bars in proper position with relation to the mold, means for introducing
10 metal into the mold, and means for shifting said mold to ejecting position.

17. In a machine for casting individual type, the combination with a shiftable mold having
15 a series of mold-cells, of matrix-bars, finger-key-actuated mechanism for selectively presenting said bars in proper position with relation to the mold, means for introducing metal into the mold, means for shifting said
20 mold to ejecting position, and means for ejecting type from the mold.

18. In a machine for casting individual type, the combination with a series of matrix-bars arranged side by side in vertical ways in a
25 matrix-well, of a shiftable mold having a series of mold-cells, mechanism for positioning said mold with the individual cells aligned respectively with the matrix-bar ways, finger-key mechanism for selectively presenting said
30 bars each in proper position to its individual mold-cell, means for introducing metal into the mold, means for then restoring the bars to normal, inactive position in their respective ways, means for next shifting the mold
5 to ejecting position, and an ejector for discharging the type from the mold in said ejecting position.

19. In a machine for casting and setting individual type, a shiftable mold and a type-
40 composing finger carried thereby.

20. In a machine for casting and setting individual type, a shiftable mold, a movable type-composing finger carried thereby, and means for moving said finger into active and
45 inactive position.

21. In a machine for casting individual type, a mold having a chamber one side wall of which consists of a movable section carrying a lip that constitutes an end wall of the chamber,
50 whereby a space-casting cell is provided, substantially as described.

22. In a machine for casting individual type, a mold having a chamber one side wall of which consists of a movable section carrying
55 a lip that constitutes an end wall of the chamber whereby a space-casting cell is provided, and means for operating said movable section.

23. In a machine for casting individual type, the combination with a mold, a series of matrix-bars, means for selectively presenting
60 said matrix-bars in coöperative relation to the mold, yieldingy-supported individual matrix-bar-alining blades, and means for actuating said blades.

24. In a machine for casting type, the combination with a mold, a metal-pot, a plunger
65 for ejecting metal from the pot, and means for causing the return stroke of the plunger in two distinct movements.

25. In a machine for casting individual type, the combination with a shiftable mold provided with a series of mold-cells, of a series of gates normally closing said mold-cells and provided with openings adapted to be brought
70 in register with the mold-cells when in casting position, means for shifting the mold, and means operative during the shifting of the mold to bring the openings in the gates into register with clean-out passages in the mold, an ejector provided with type-ejecting
75 and gate-cleaning fingers, and means for operating said ejector.

26. In a machine for casting and composing individual type, the combination with a shiftable mold provided with a series of mold-
85 cells, matrix-bars, means for selectively presenting said matrix-bars in coöperative relation to the mold-cells, a metal-pot, means for ejecting metal therefrom, means for shifting the mold from casting to ejecting position,
90 an ejector, a composing-finger carried by the mold, a justifier-box, a toggle-justifier, and means for operating said justifier, substantially as described.

27. In a machine for casting, setting and justifying type, the combination with a shiftable mold, matrix-bars, means for selectively presenting the matrix-bars in coöperative relation to the mold, means for injecting
95 metal into the mold, means for shifting the mold, means for ejecting type therefrom, a type-composing finger carried by the mold, a line-ejector, and means made active by accretion of type in the composing-box to cause the line-ejector to be operated.
100 105

28. In a machine for casting and setting type, the combination with a shiftable mold, matrix-bars, finger-key-actuated means for presenting said matrix-bars selectively in coöperative relation to the mold, means for injecting
110 metal into the mold, means for shifting the mold to ejecting position, means for ejecting the type from the mold, means for removing the cast type to the composing or justifying box, and a depressible track for guiding the type in passing to said composing or justifying box.
115

29. In a machine for casting and setting individual type, the combination with a mold in which the type are cast, means for ejecting
120 the cast type from said mold, and a pusher or composing-finger for setting said type, of a yielding track arranged in a raceway to engage guide-recesses in the body of the type and guide said type in the passage thereof to
125 a composing or justifying box.

30. In a machine for casting and setting type, the combination with a composing and

justifying box and a counterweighted galley arranged in relation thereto, of a line-ejector for moving the lines of justified type to the galley, and a line-pusher operating on the 5 lines of type as the latter are deposited in the galley, to force the galley down line by line.

31. In a machine for casting and setting type, the combination with a composing and 10 justifying box and a counterweighted galley arranged in relation thereto, of a line-ejector for moving the lines of justified type to the galley, a line-pusher operating on the lines of type as the latter are deposited in the galley 15 to force the galley down line by line, and a dog carried by said galley adapted to engage a rack.

32. In a type-casting machine the combination with a melting-pot and a shiftable mold, 20 of a slide carrying said mold and a wiper

mounted on said slide and adapted to clean the discharge-orifice of the melting-pot.

33. In a machine for casting and setting type, the combination with casting mechanism and means for ejecting the cast type from the 25 mold, means for composing said type in line, and a justifying mechanism consisting of an abutment which recedes with the advancing line of type, an abutment for the finishing end of the line, and a line-compressor arranged 30 to act against the first-named abutment, substantially as described.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

JOSEPH C. FOWLER.

JOSEPH C. FOWLER, JR.

Witnesses:

JAMES L. NORRIS,

GEO. W. REA.