No. 883,425. PATENTED MAR. 31, 1908.

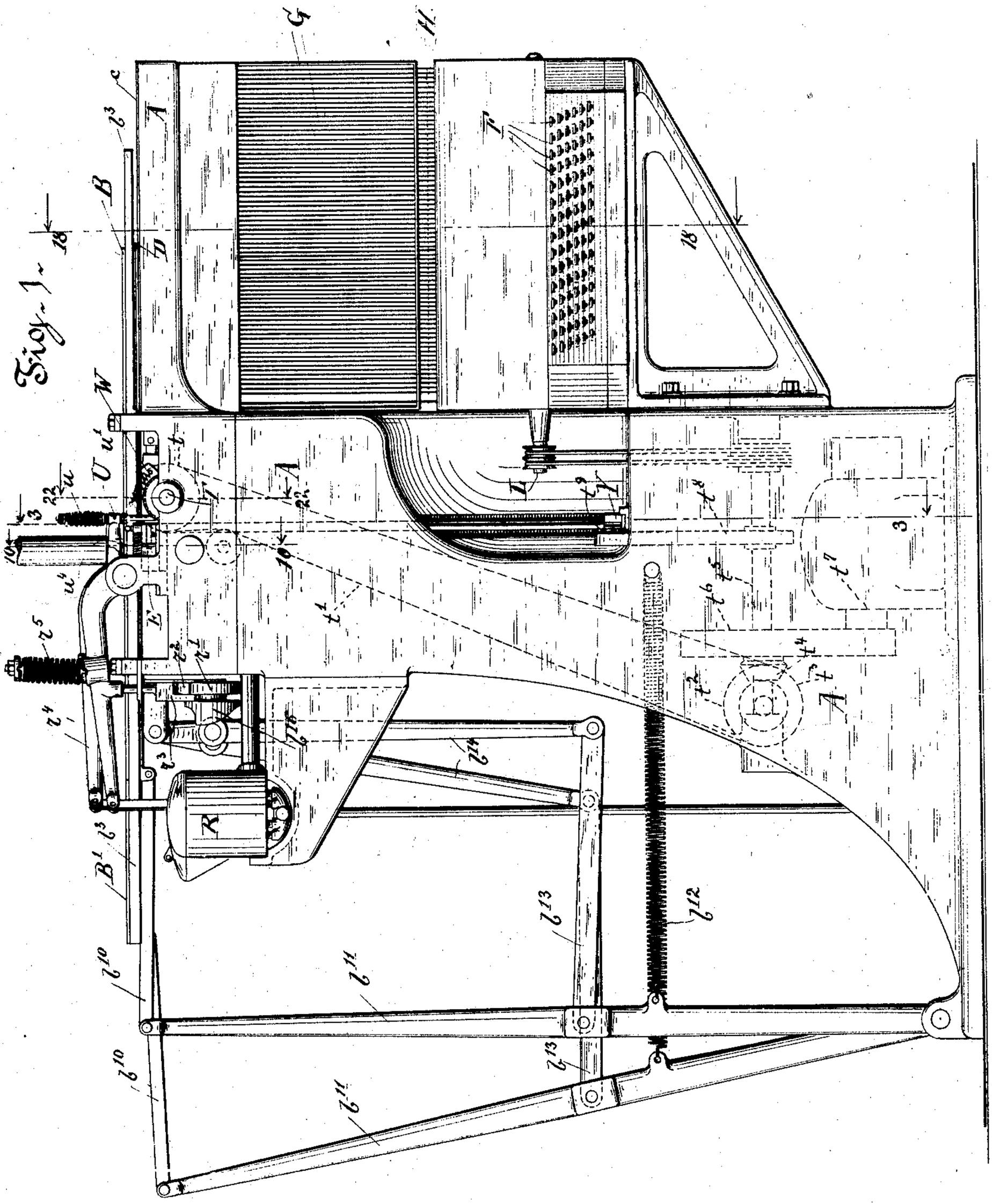
J. R. ROGERS.

TYPE CASTING AND COMPOSING MACHINE.

APPLICATION FILED FEB. 27, 1906.

11 SHEETS—SHEET 1.

Fig. 1.



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11 SHEETS—SHEET 2.

Fig. 4.

Fig. 3.

Fig. 2.

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11 SHEETS—SHEET 3.

Fig. 5.

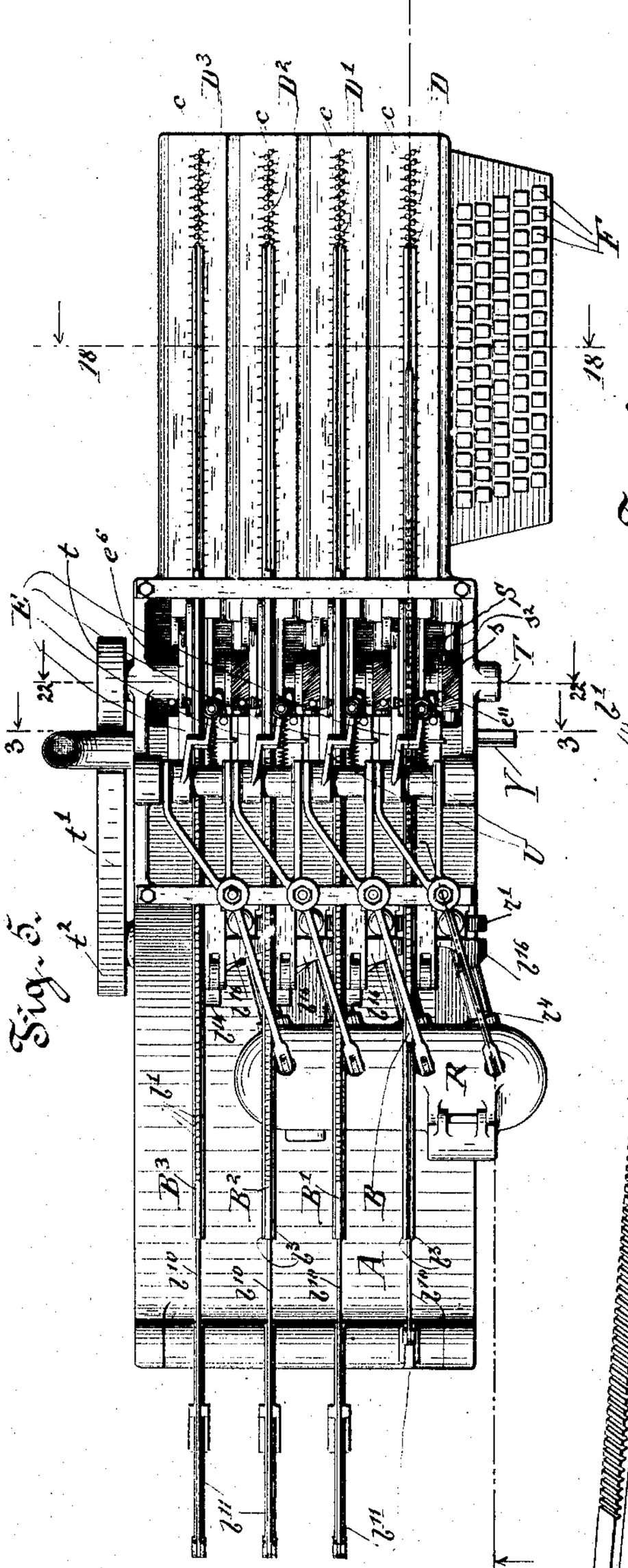

Fig. 6.

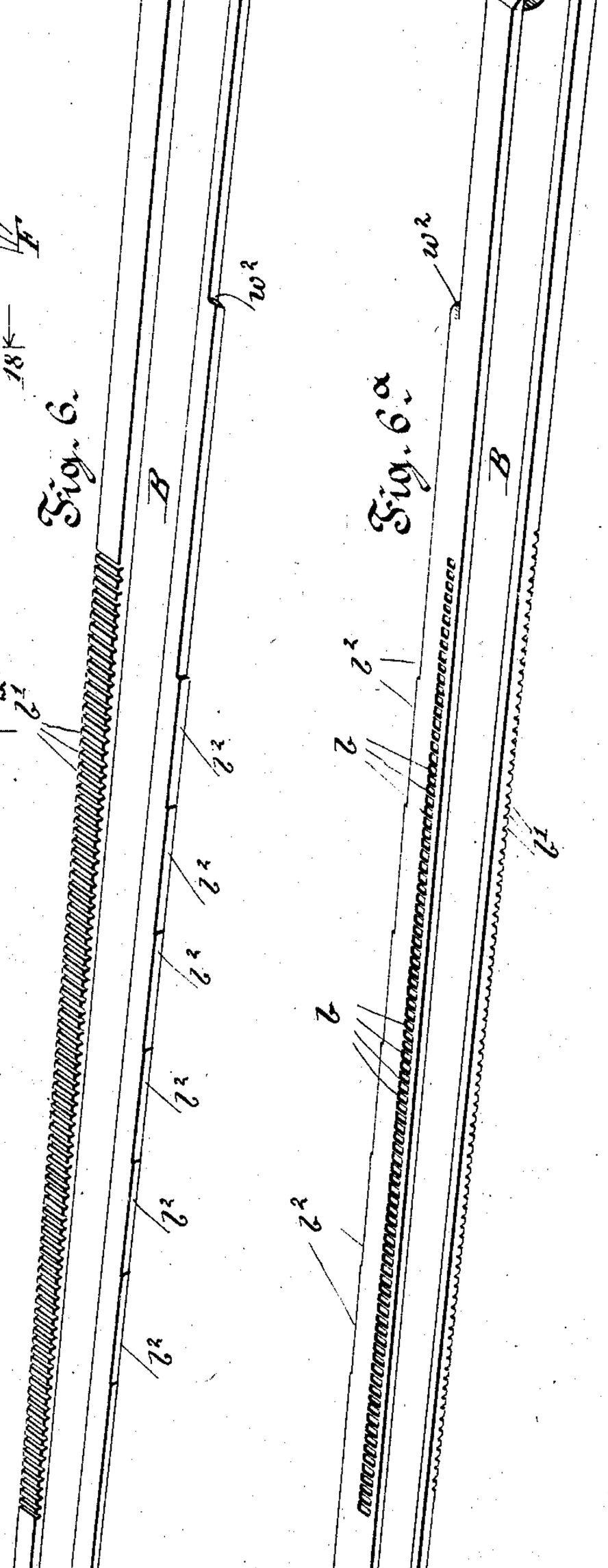

Fig. 6ª.

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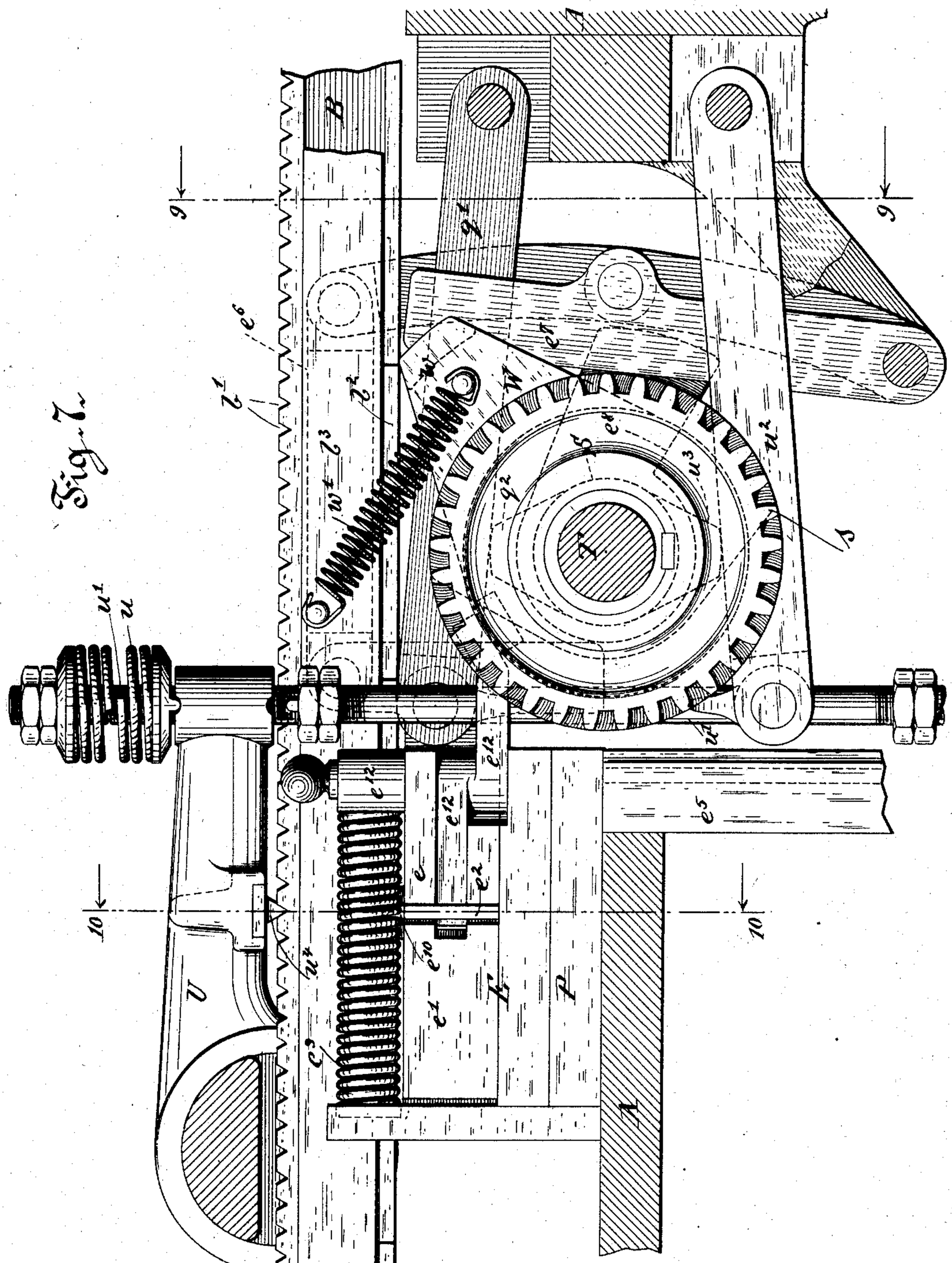
11 SHEETS—SHEET 4.

Fig. 7.



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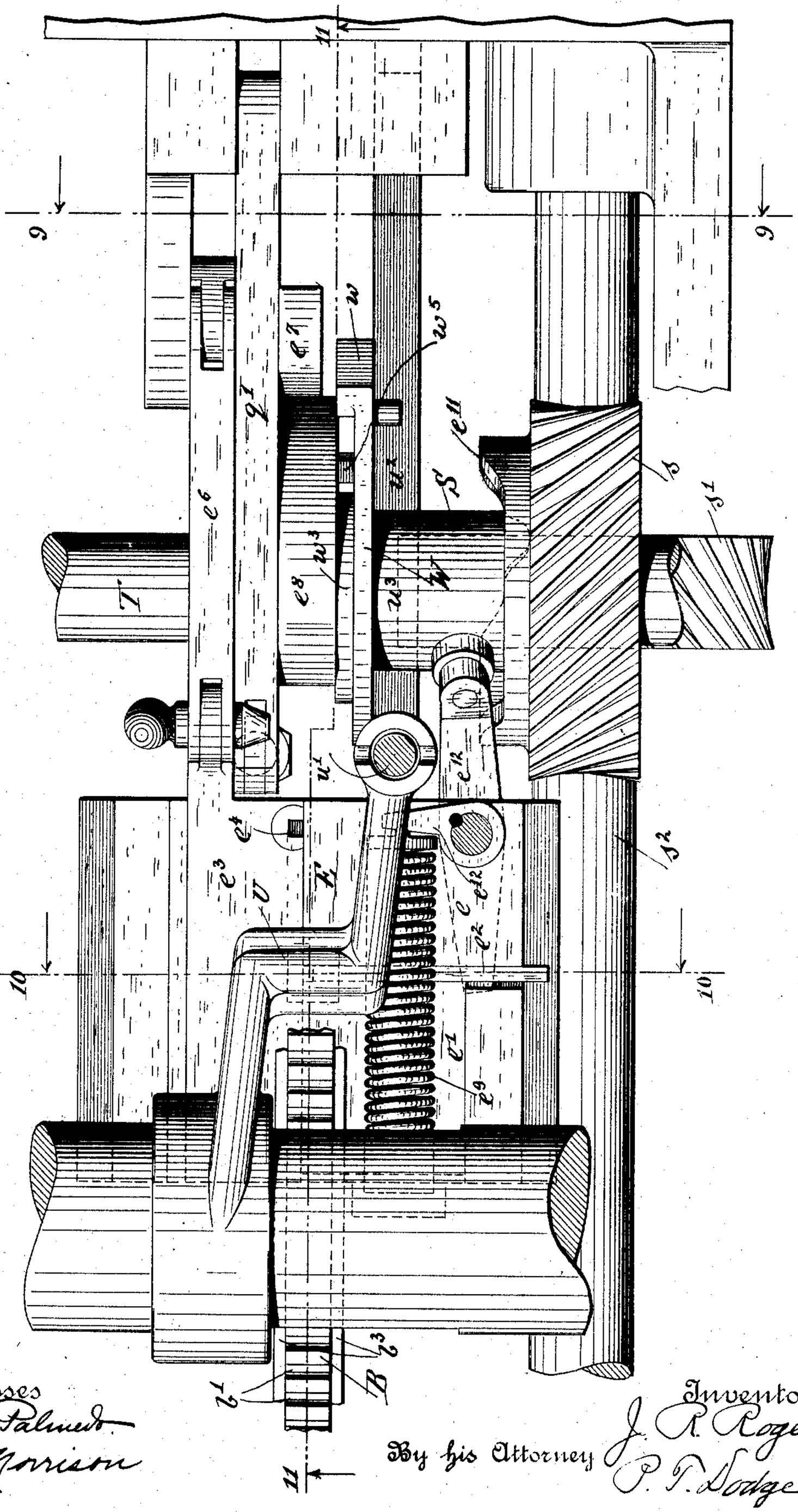
11 SHEETS—SHEET 5.

Fig. 8.



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TYPE CASTING AND COMPOSING MACHINE.

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Fig. 10.

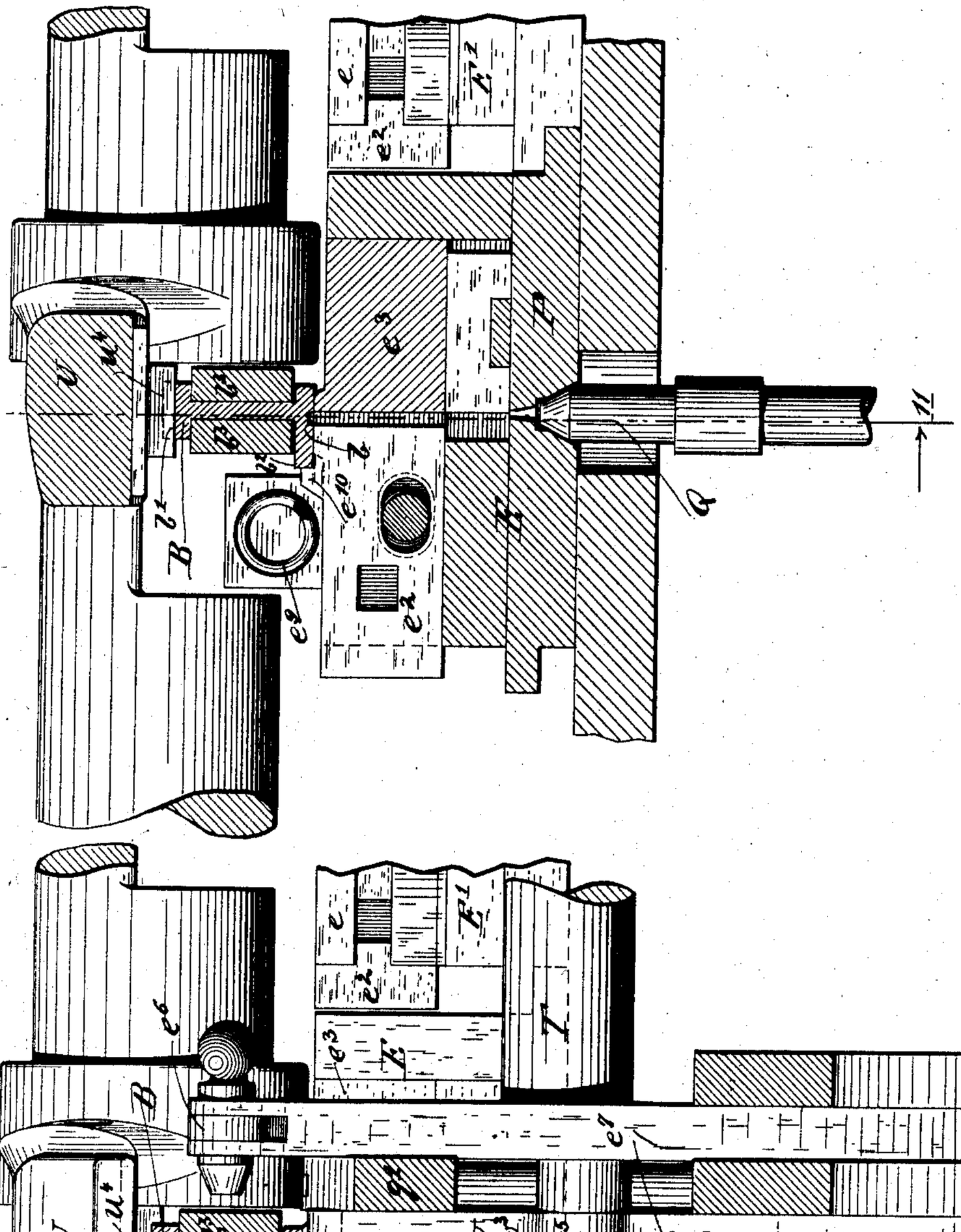

Fig. 9.

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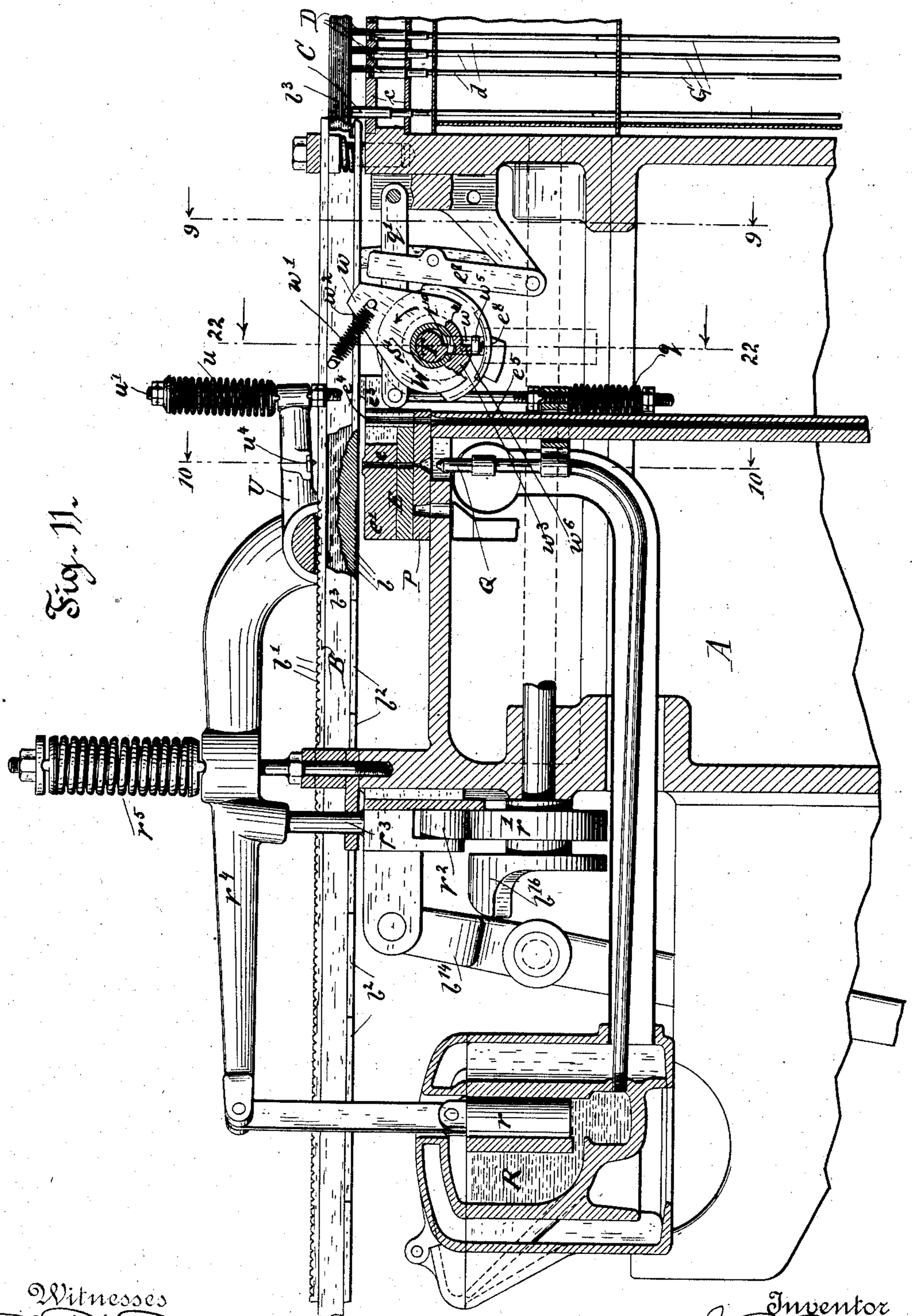
Fig. 11.



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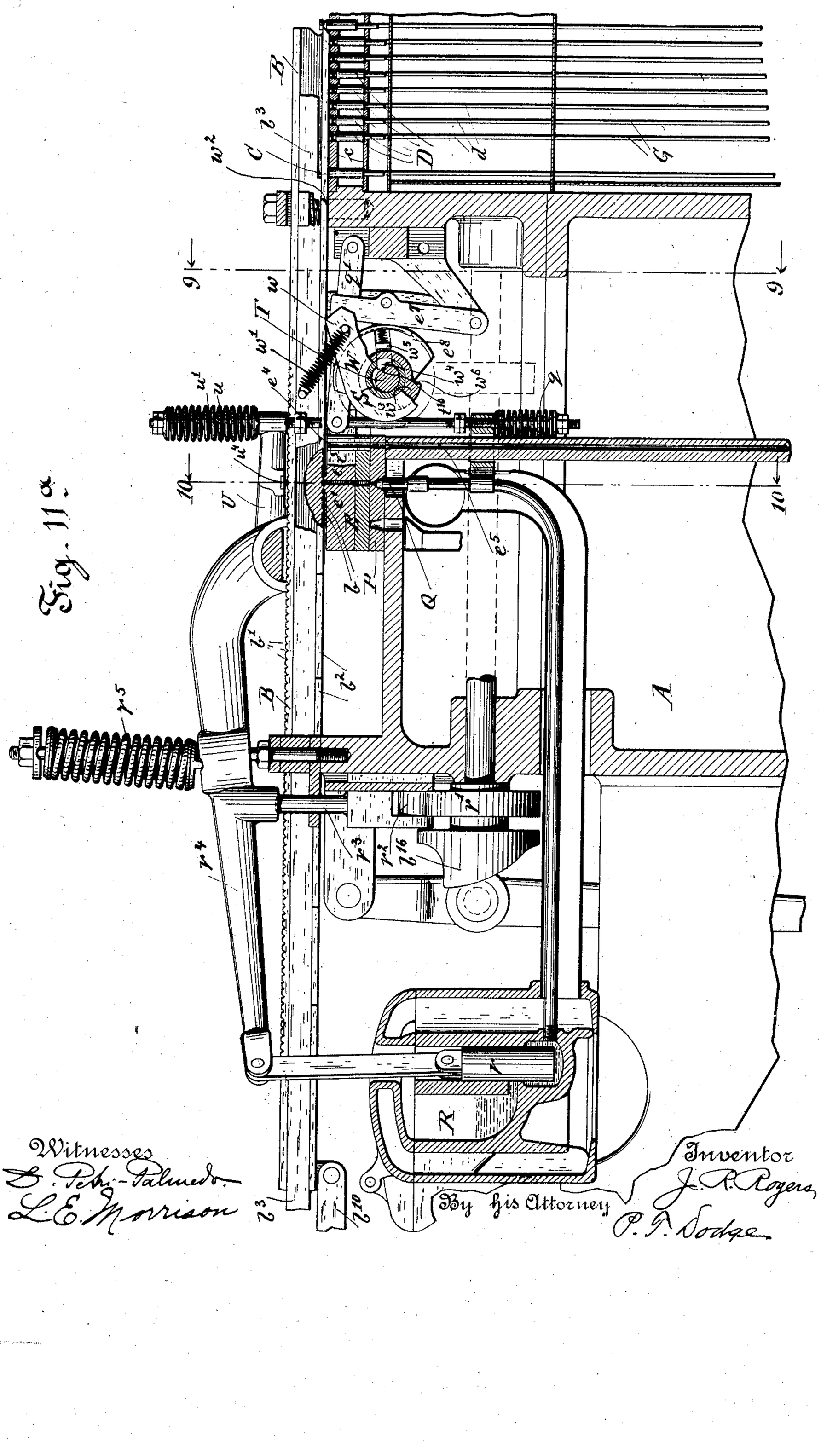
APPLICATION FILED FEB. 27, 1906.

11 SHEETS—SHEET 8.

Fig. 11a.



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TYPE CASTING AND COMPOSING MACHINE.

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Fig. 12.

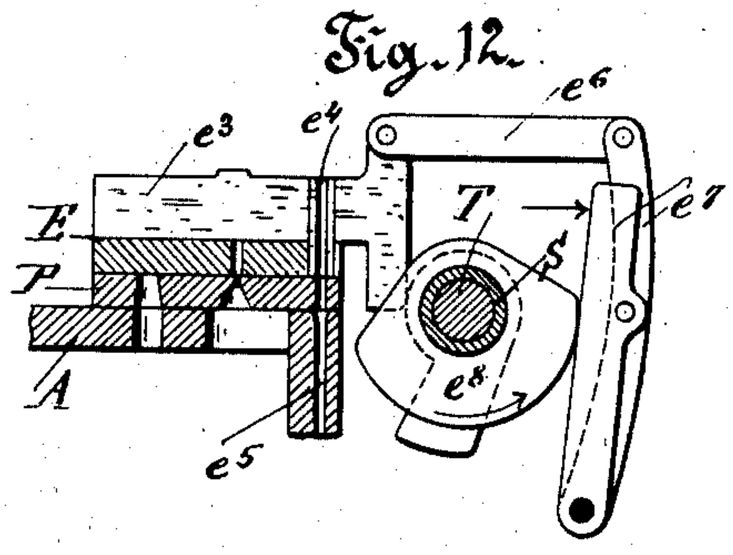


Fig. 13.

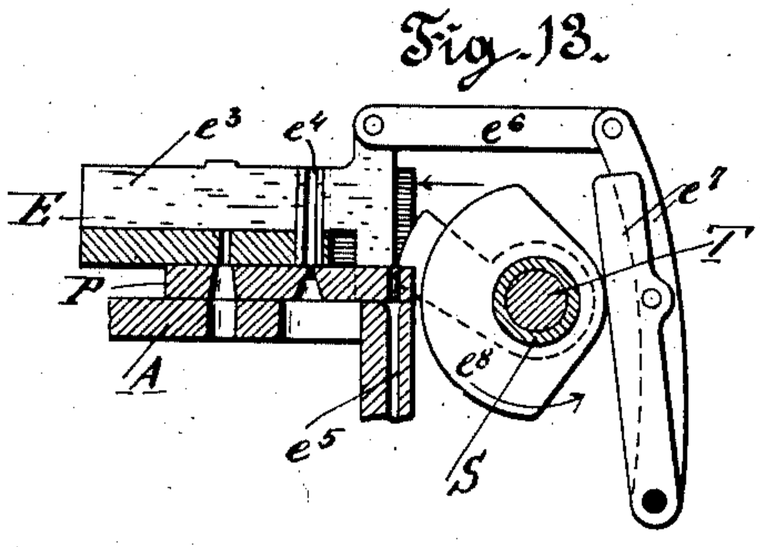


Fig. 14.

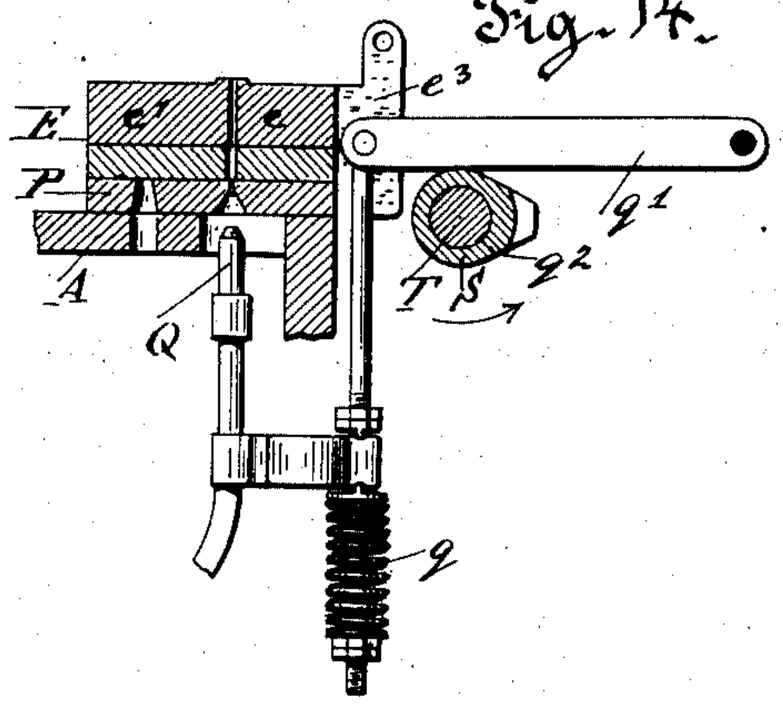


Fig. 15.

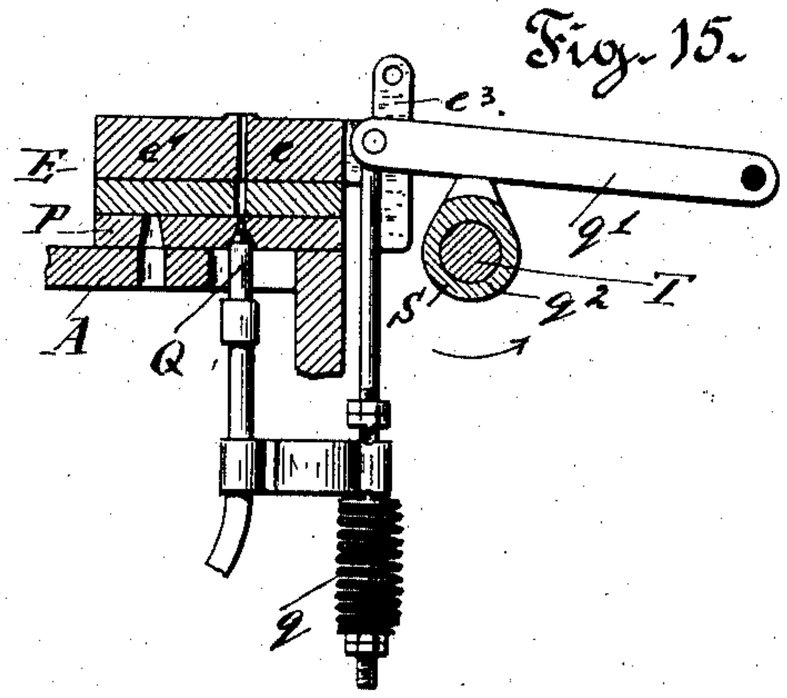


Fig. 16.

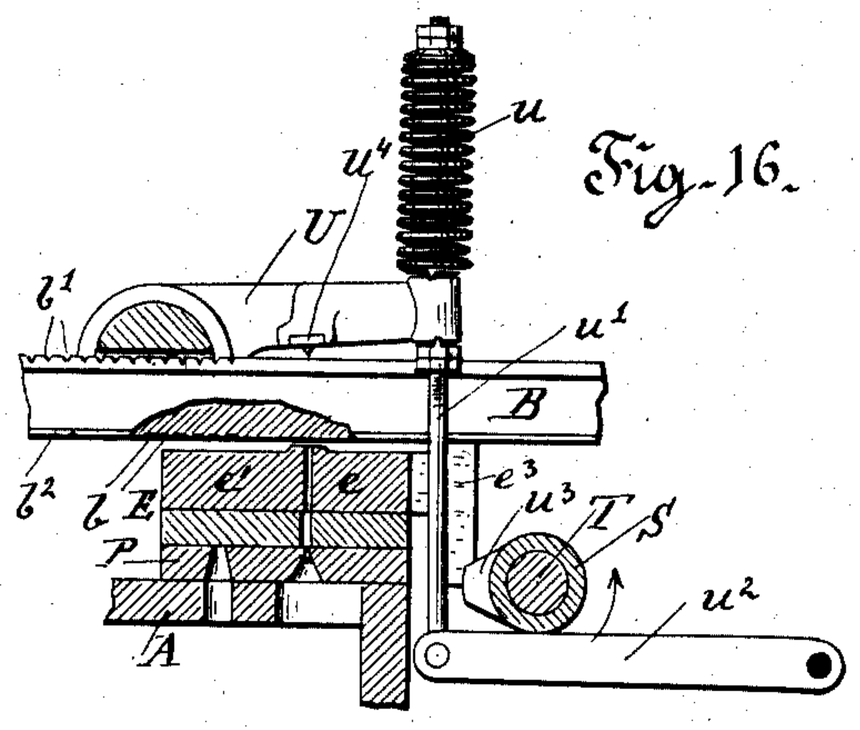


Fig. 17.

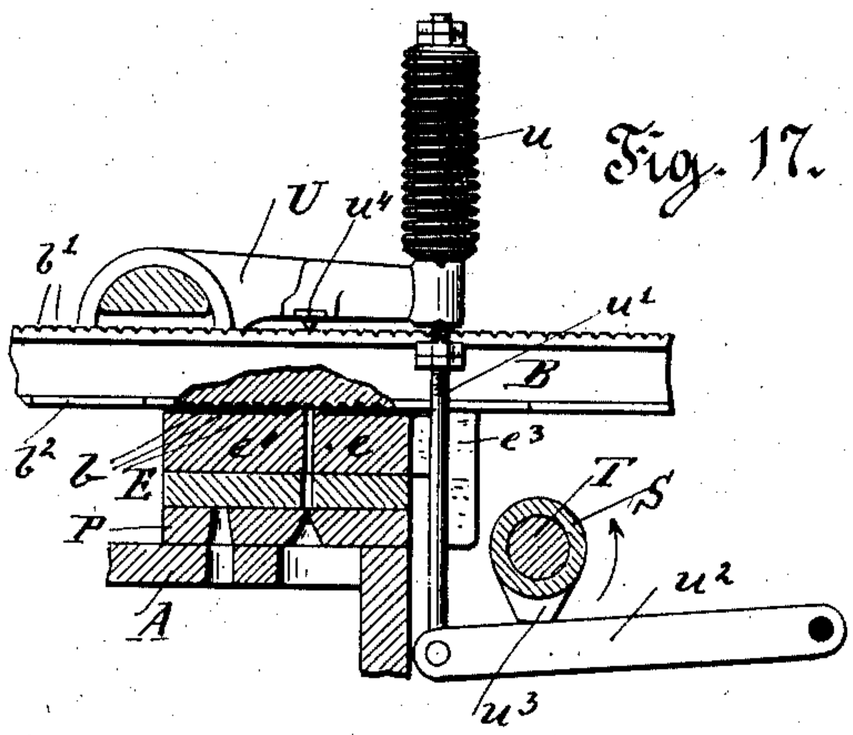
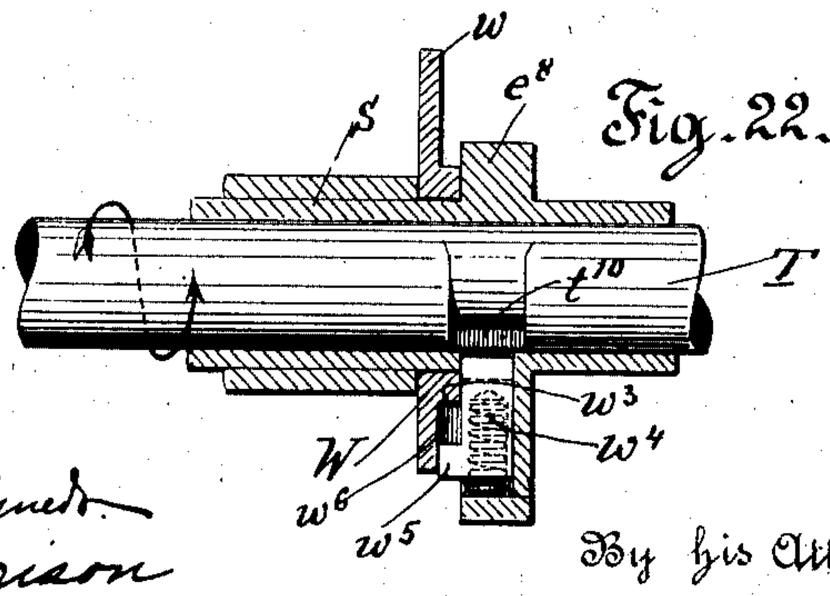


Fig. 22.



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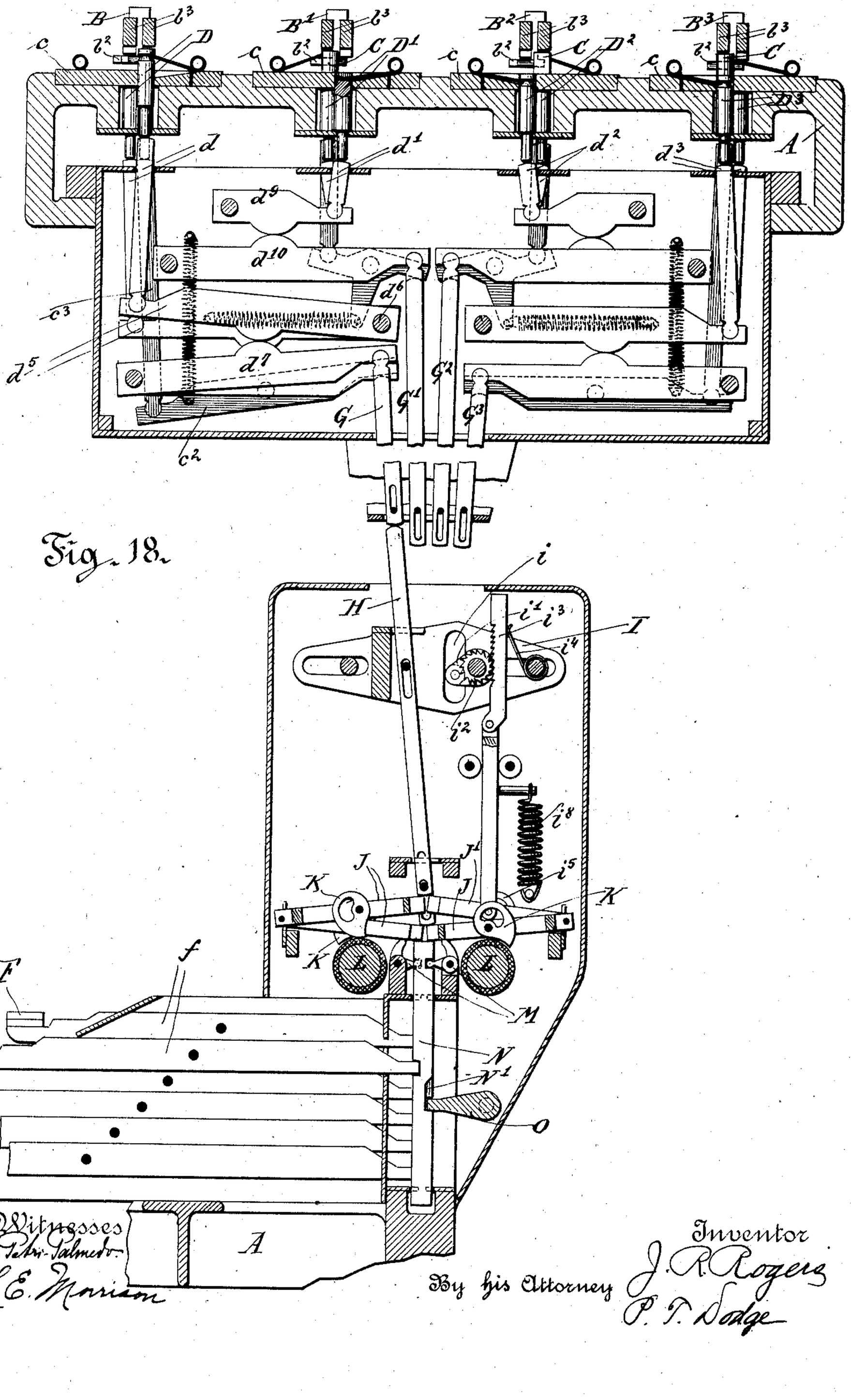
TYPE CASTING AND COMPOSING MACHINE.

APPLICATION FILED FEB. 27, 1906.

11 SHEETS—SHEET 10.

Fig. 18.



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APPLICATION FILED FEB. 27, 1906.

11 SHEETS—SHEET 11.

Fig. 19.

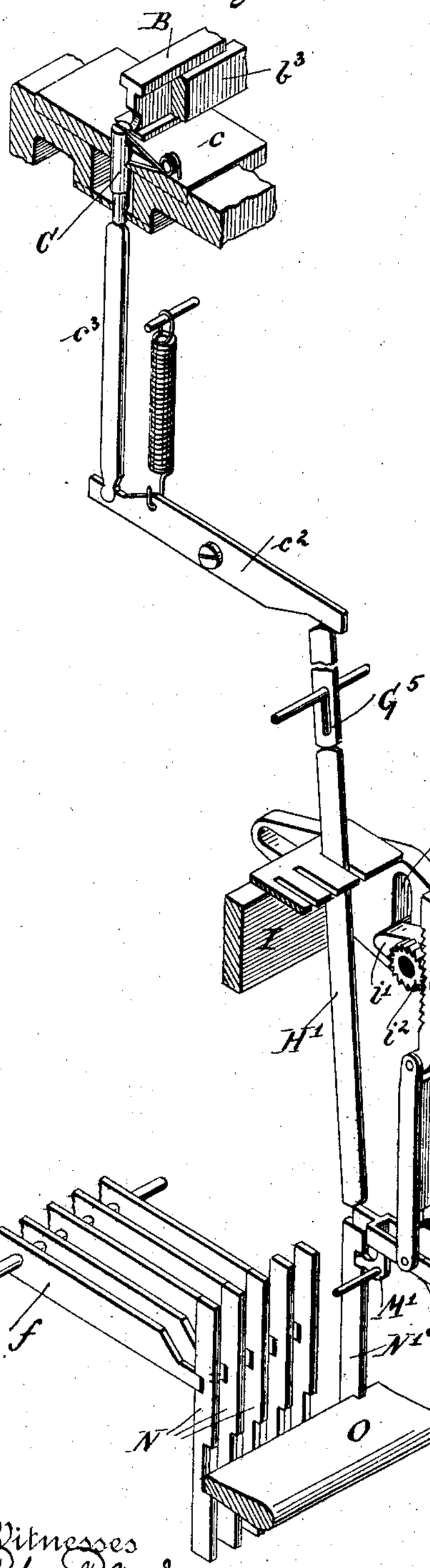


Fig. 21.

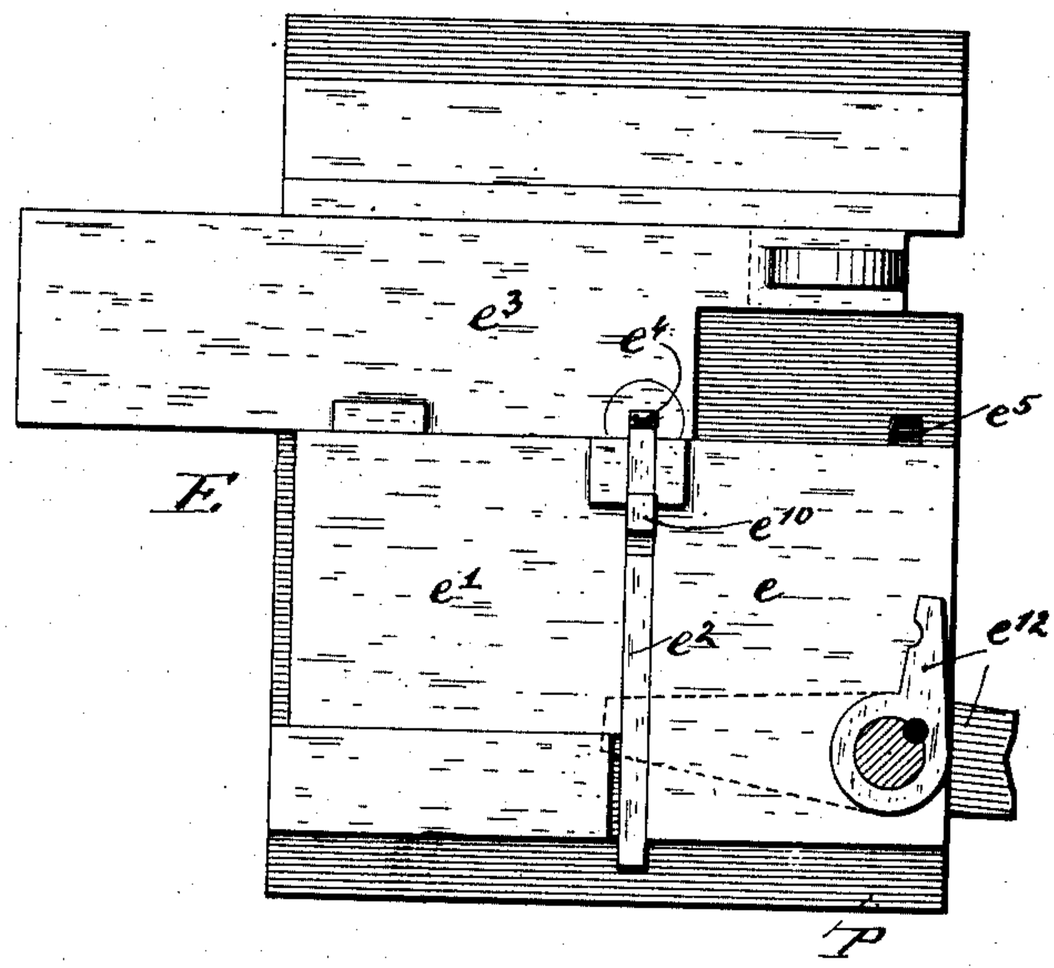
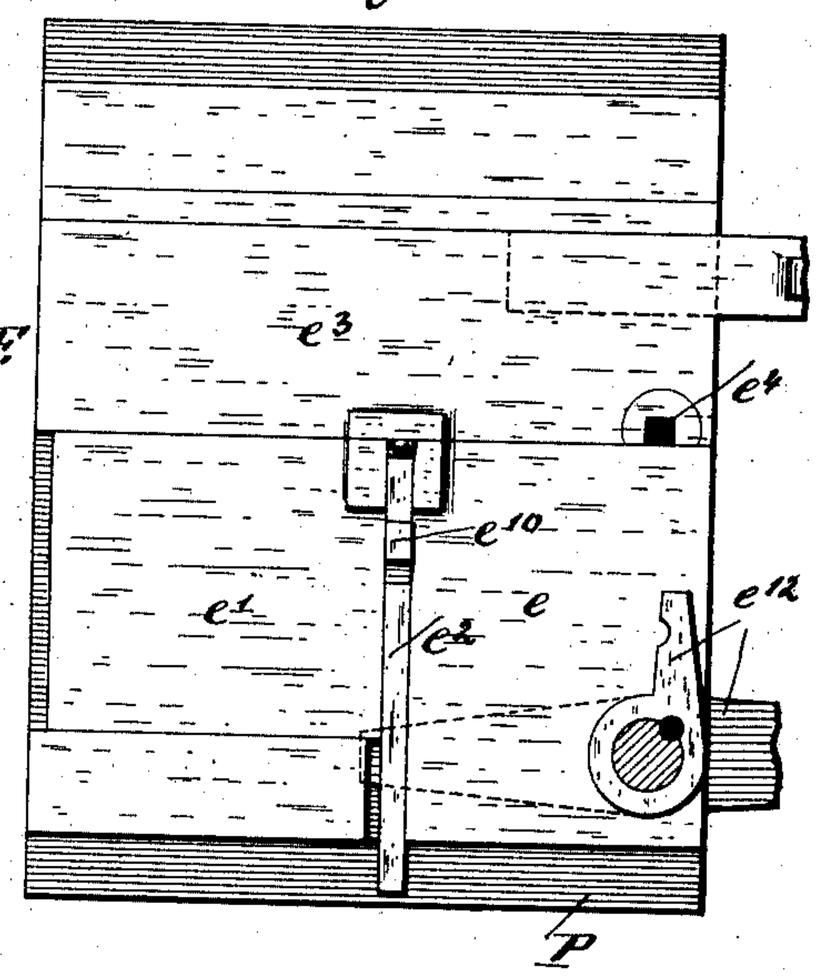


Fig. 20.



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UNITED STATES PATENT OFFICE.

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TYPE CASTING AND COMPOSING MACHINE.

No. 883,425. Specification of Letters Patent. Patented March 31, 1908.

Application filed February 27, 1906. Serial No. 303,316.

To all whom it may concern:

Be it known that I, JOHN R. ROGERS, of Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in Type Casting and Composing Machines, of which the following is a specification.

The aim of this invention is to provide a simple and rapidly operating machine whereby, through the manipulation of a key-board, single type may be cast and composed in the order in which their characters are to appear in print. To this end I employ a series of type molds which are actuated in regular order or succession; and with these molds I combine matrices and a finger-key mechanism by which the selected matrix characters are presented in the order of their selection to the successive molds.

I believe myself to be the first to combine a series of molds which operate successively or in rotation and means for presenting matrices in the order in which their characters are to be printed to the successive molds, so that the various operations of selecting and adjusting the matrices, casting the type and delivering the type may be carried on concurrently and thus a high rate of production secured although each casting mechanism operates at a moderate speed.

In the preferred embodiment of my machine I employ a series of molds each variable in width in connection with means for supplying molten metal to each mold, and a reciprocating matrix bar for each mold, each bar carrying all the characters represented in the key-board and adapted to control the width of the mold according to the character which is for the moment presented thereto. With these mechanisms I combine a single key-board and intermediate connections through which the key-board effects its selection of the matrices in and the adjustment of the several matrix bars in rotation. It is this form of machine which I have represented in the accompanying drawings.

Referring to the drawings, Figure 1 is a front elevation of a machine embodying my invention. Fig. 2 is an end elevation of the same looking from the right. Fig. 3 is a vertical cross section on the line 3—3, Figs. 1 and 5. Fig. 4 is an end elevation of the machine looking from the left. Fig. 5 is a top plan view of the machine. Figs. 6 and 6ª are perspective views of one of the matrix bars. Fig. 7 is a front view of the mold and its actuating cams. Fig. 8 is a plan view of the mold and cams. Fig. 9 is an end view of the mold and coöperating cams. Fig. 10 is a vertical section of the mold through its cellar cavity on line 10—10, Figs. 1, 7 & 8. Fig. 11 is a longitudinal vertical section of the machine on line 11—11, Figs. 5 and 8, with the parts in position of rest. Fig. 11ª is a similar view with the parts in casting position and the driving clutch in action. Figs. 12 and 13 are diagrams illustrating the action of the mold-slide cam. Figs. 14 and 15 are diagrams showing the action of the pot nozzle cam. Figs. 16 and 17 are diagrams illustrating the action of the mold-locking cam. Fig. 18 is a section of the key-board and pin plate on line 18—18, Figs. 1 and 5. Fig. 19 is a perspective view illustrating the mechanism through which the finger-keys withdraw the detaining pins to release the matrix bars. Fig. 20 is a top plan view of one of the molds as it appears immediately after the casting action. Fig. 21 is a similar view showing the mold with the parts in the position they occupy immediately after the ejection of the type therefrom. Fig. 22 is a vertical section through the cam shaft of one of the molds and its operating clutch on line 22—22, Figs. 1, 5, and 11.

Referring to the drawings, A represents a main-frame, the form and construction of which may be modified at will provided it is adapted to sustain the operative parts of the machine.

B, B′, B² and B³, are the horizontal matrix bars, four in number and like in construction. These bars, shown in detail in Figs. 6 and 6ª, are each channeled longitudinally in the two sides and provided in the lower face with a row of intaglio characters or matrices *b*, all of the characters produced by the machine being preferably represented in each bar. In other words, each bar is provided with a complete font or alphabet of type exactly like those on the other bars, including, of course, characters of various widths. Each bar is also provided in the upper side opposite to each matrix with a notch or indentation *b′*, to coöperate with the aligning device for bringing the opposite character, when selected, in proper relation to the mold. Each bar is also varied in width at different points in its length or in

other words, formed as shown in Figs. 6 and 6^a, with steps or surfaces b^2, lying at different distances from the center line for the purpose of controlling the adjustment of the mold in proportion to the width of the characters presented thereto, these characters being divided as shown into groups according to width, those in each group being of equal width.

The matrix bars B, are mounted to slide between the horizontal guides b^3, and over their underlying molds, one for each bar, as hereinafter explained.

Each matrix bar is connected, as shown in Fig. 1, by a controlling link b^{10}, to an upright lever b^{11}, pivoted at its lower end to the main-frame and also connected to the main-frame by a contacting spring b^{12}, which tends constantly to push the matrix bars forward to their operative position over the mold.

The retraction of each bar after being advanced is effected by a link b^{13}, connecting the same with lever b^{14}, pivoted at its upper end to the main frame and carrying a roller acted upon by cam b^{16}. The rotation of this cam moves the matrix bar backward to its normal and inoperative position against the stress of spring b^{12}.

It is to be understood that each matrix bar is combined with its individual set of operating and controlling devices, and all of these parts are alike as to the several bars.

Each bar is held back normally out of action, as shown in Fig. 11, by a vertically sliding detaining pin C, seated in the pin frame *c*, forming part of the main-frame.

Beyond each detaining pin C, in the path of the advancing matrix bar, I arrange a row of vertical stop pins D, D′, etc., equal in number to the characters in the bar, for the purpose of arresting the bar at the different positions required to bring the selected characters one at a time over the mold.

By a finger-key mechanism hereinafter described one or another of the stop pins is raised according to the letter or character to be produced, and after this pin is in position the detaining pin C, is retracted, permitting the matrix bar to slide forward under the influence of the impelling spring b^{12}, until arrested by the stop pin, the effect being to bring the selected character directly over the mold E, as shown in Fig. 11^a.

The finger-keys F, collectively known as the "key-board", and the intermediate parts for effecting the adjustment of the detent pins and stop pins may be of any suitable construction, provided only that the connections shift automatically to the pins of the respective bars in succession, so that after a key is actuated to set a stop pin for one bar the next action of a key will set a pin for another bar, the following action will set a pin for a third bar, and so on throughout the series. The object of this arrangement is to bring the various matrix bars and molds into action successively or in rotation so that although the finger-keys may be operated rapidly and composition carried on at high speed, there will be a slow action of each casting mechanism, so that ample time will be afforded for adjusting the bars and molds, filling the molds, and delivering the type. This avoids any violence of action and undue wear, permits the parts to be accurately adjusted, and permits the type to chill and complete their contraction before they are discharged. This is a matter of importance as it insures uniformity in the length of the type.

I will now describe the details of the mechanism shown for shifting the key-board connections from one series of pins to another, having reference particularly to Fig. 18.

Under the row of stop pins for each matrix bar I mount a corresponding series of lifting slides *d*, *d′*, etc., a slide for each pin. The row of lifting slides *d*, under the pins of the first matrix bar are each connected at the lower end to one end of the lever d^5, which is mounted at its opposite end on pivot d^6, in the main-frame. The lever d^5, bears at its middle upon and is lifted by the lever d^7, pivoted in the main-frame and lifted in turn by a vertically sliding bar G, guided in the main-frame, so that when the bar G is raised it has the effect of lifting the corresponding stop pin D.

The row of stop pins under the second matrix bar B′, are each connected in like manner through levers d^9 and d^{10}, with the lifting rod G′. The stop pins for the third and fourth matrix bars are connected in like manner with the lifting rods G^2 and G^3.

It will be observed that there are four rows of lifting rods G, G′, etc., one row for each matrix bar and each row containing a lift bar for each stop pin in the corresponding row. The four rows of pin-lifting rods G, G′, etc., stand side by side, in position to be acted upon by a row of upright actuating slides H, guided at their upper ends in a horizontally sliding frame I, the movement of which will set the series of slides H, under one set of pin-actuating rods or another as required.

The slides H, have their lower ends arranged each over corresponding lifting yokes J, carrying cams K, which overlie continuously revolving rolls L. The yokes J, are pivoted at one end so that they may rise and fall and are normally sustained at the opposite end on frictional dogs M, connected by vertical bars N, with the finger-key levers, *f*, these key-board parts being constructed and arranged as in Patent 531,266.

When a finger-key F, is actuated the yoke is released, the cam key permitted to vertically engage the roller, causing rotation of the cam which, bearing on the roller, lifts the yoke J, above its original position, causing it

in turn to lift the slide H, and the overlying rod G, which, through the intermediate parts, lifts the stop pin D.

It will be observed that the stop-pin is grooved circumferentially at the upper end and the end of the matrix bar formed as shown in Fig. 11, with a lip to enter the groove. The end of the matrix bar abuts against the pin, whereby the latter is held in its elevated position for the time being.

When the slides H, stand in the position shown the actuation of any key in the keyboard will be followed by the elevation of the corresponding stop-pin in the path of the first matrix bar B. By moving the guide I, rearward the series of slides H, may be moved at the upper end so that they will stand beneath the pin-actuating rods G′, G² and G³, for actuating the stop-pins of the second, third and forth matrix bars. Thus it will be seen that the one series of finger-keys may be caused to actuate the stop-pins of any bar at will.

In practice it is required to set but a single pin for one matrix bar and then a single pin for the next, and so on in rotation or succession. It is therefore necessary to effect automatic shifting of the slides from one set of rods to another. To this end the sliding guide I, is constructed with a vertical slot *i*, to receive the end of the crank *i′*, carried by a ratchet wheel i^2, journaled in the frame. The ratchet wheel is actuated by a vertical ratchet bar i^3, pressed into engagement by the spring i^4. The lower end of this bar carries a cam i^5, overlying one of the continuously-driven rolls L, and mounted on a rising and falling yoke J′, normally sustained by a trigger M′, this yoke and cam being the same as those already described for lifting slides H. The trigger M′, is actuated by a vertical slide N′, engaging a rocker-plate O, which is extended across the entire width of the keyboard and acted upon by all the yoke-releasing slides N, above referred to. When therefore any key is actuated to set a stop-pin its corresponding slide N will actuate the rocker-plate O, which will in turn, through slide N′, release yoke J′ permitting the cam i^5, to engage the underlying roll and receive motion therefrom.

The rotation of the cam will act momentarily to lift the ratchet bar i^3, which in descending under the influence of spring i^8, will turn the ratchet wheel i^2, and the crank *i′*, will move slide I, and the contained slides H, until the latter are advanced beneath the next row of pin-actuating rods G. This action follows each operation of the finger-key, and the crank *i′*, is rotated step by step. The effect is to connect the series of finger-keys with the series of stop-pins of the respective matrix bars, the order of connection being in the present instance, the rods G, G², G³, and G′ and then again in the same order or in other words, the keys are connected with the pins of the first, third, fourth and second bars in the order named.

It will be remembered that the detaining pins for each matrix bar must be withdrawn immediately after the proper stop-pin is set in position so that the bar may advance to the stop-pin. This is effected automatically whenever a key is actuated, by the means shown in Figs. 18 and 19.

There is an extra slide H′, at the end of the row acted upon by the extra yoke J′, referred to. At the end of each row of rods G, G′, etc. there is an extra rod G^5, acting at its upper end on a centrally pivoted lever c^2, which is connected at the opposite end by a link c^3, to the overlying detaining pin C.

It will be observed that the movement of the yoke J′, is controlled through the rocker-plate O, from all the finger-keys. When, therefore, a finger-key is operated and acts through the plate O, to set the yoke J′, in action, the latter, through the intermediate parts, withdraws the detaining pin, permitting the matrix bar to pass forward to the stop-pin.

As the actuating slides H, are moved step by step to connect with the different rows of rods corresponding to the respective matrix bars, connections are at the same time made with the detaining pins, so that whenever a stop-pin in any row is actuated the corresponding detaining pin will be retracted. In this manner movement of the stop-pins and detaining pins is effected automatically in connection with the successive matrix bars as the finger-keys are operated, so that the matrix bars are automatically brought, one after another, into action.

When a key is actuated to produce a given letter, for example "S", the matrix brought into action may be in one or another of the matrix bars. If the letter should be repeated it will be selected in successive bars.

Passing now to the casting device, it is to be noted that there are four complete mechanisms alike in construction, one for each bar. Each mechanism embraces, as shown in Fig. 11, a mold E, an intermediate gate or sprue-plate P, through which the metal is delivered to the mold, a delivery nozzle Q, and a melting pot R, connected with the nozzle and containing a plunger *r*, by which the molten metal is driven from the pot through the nozzle and sprue-plate into the base of the upright mold and into that character in the matrix bar which is for the time being over the top of the mold.

The mold is constructed as shown more particularly in Figs. 10, 20 & 21, and consists of two stationary side-plates *e*, *e′*, an intermediate sliding blade e^2, the end of which serves as one wall of the mold cell and also as an ejector of the type, and an end plate e^3, arranged to slide closely against the

ends of the plates e, e', to serve as the remaining wall of the mold. This plate contains a cavity e^4, and after the type is cast between the blade e^2, and the plate e^3, the blade e^2, is retracted and the plate e^3, shifted until the cavity e^4, is opposite the type, when the blade e^2, advances and ejects the type from the mold into the cavity. The slide then moves horizontally to its first position, again closing the side of the mold and at the same time carrying the type until it arrives over a channeled chute or conductor e^5, through which it descends foot first into a galley or receiver.

In order to secure the proper casting action the nozzle must be thrust upward tightly into the sprue-plate under the mold and the matrix bar must be forced down tightly on the upper surface of the mold, this in order to close all the joints to prevent the escape of the molten metal. The elevation of the nozzle is effected through an intervening spring q, by a lifting lever q', acted upon by the cam q^2, carried loosely on the main driving shaft T, which is seated in the main-frame and constantly rotated, as shown particularly in Figs. 7, 11, 14 & 15. The depression of the matrix bar upon the mold is effected as shown in Figs. 7, 16, 17, etc., by a pressure lever U, bearing upon the bar and urged downward by a spiral spring u, encircling the rod u', connected with a depressing lever U^2, acted upon by a cam u^3, so that when the cam is in the proper position the lever U, is pressed downward by the spring so that it in turn holds the matrix bar in intimate contact with the mold. The pressure lever has on its under edge a projection u^4, which enters the notch in the upper edge of the matrix bar opposite the character. This engagement serves to accurately determine the longitudinal adjustment of the bar and to insure proper relation of the matrix character to the mold thereunder.

The end slide e^3, receives motion, as shown in Figs. 12 and 13, through a link e^6, and an upright lever e^7, acted upon by a cam e^8, which acts alternately on the lever and on the end of the slide, causing the mold to be moved to and fro at proper intervals.

The mold blade e^2, for determining the size of the mold cell and the thickness of the type and for ejecting the type, is controlled in its advance by the side surfaces or steps b^2, in the matrix bars above referred to in the manner shown in Fig. 10, the blade having on its upper side a shoulder e^{10}, to bear against the matrix bar. Thus it is that each character presented to the mold determines the adjustment of the mold so that the body produced in the mold will be of width corresponding to the character.

The mold blade e^2, receives the reciprocating motions previously described from a compression spring e^9, acting upon a bell crank lever e^{12}, which in turn is acted upon by a cam e^{11}, as shown particularly in Figs. 7, 8, and 9.

Motion is communicated to the various operative parts above described in the manner following: A transverse driving shaft T, is continuously rotated through a pulley t, on its end and by a belt t', receiving motion through a pulley t^2. The last-named pulley is carried by a horizontal shaft connected by bevel-gears t^3 and t^4, with a shaft t^5, provided with a driving wheel t^6, which receives continuous rotation from an electric motor t^7, or other source of power. The shaft t^5, carries a pulley connected by a belt t^8, with a rotary star-wheel or assembler t^9, by which the type descending from the molds are driven forward successively side by side into a receiving galley Y. The same shaft is also connected by belts and pulleys with the keyboard rolls L, which receive continuous motion therefrom. The driving shaft T is surrounded by and rotates within a sleeve or hollow shaft S, upon which are fastened the cams e^{11}, q^2, u^3, and e^8, for operating the mold blade e^2, nozzle Q, locking lever U, and end-plate e^3, respectively. It also carries a spiral gear s. As previously stated, there is a set of these cams and spiral gears for each mold, each set integral with an individual hollow shaft S, all of the shafts S, being, however, loosely mounted on the common driving shaft T, so that each sleeve S, with its set of cams may be separately connected with said driving shaft T. On each cam shaft S, a disk W, is loosely mounted and has an arm w, and is normally held in the position shown in Fig. 11 by a spring w', in a notch w^2, formed in the matrix bar B. The disk W has on its side and integral with it a spiral shaped cam surface w^3, against which rests the shoulder w^5, of a spring-actuated dog w^4, seated within the cam e^8, and passing through an opening of the hollow shaft S, as shown particularly in Figs. 11, 11^a, and 22.

The cam surface w^3, passes from its highest to its lowest portion through an abrupt step w^6. Normally, when the cam shaft is at rest, the shoulder w^5, of the dog w^4, rests on the highest portion of the cam, just in advance of the step w^6, as shown in Fig. 11. Whenever the matrix bar is released through the withdrawal of its detaining pin C, it rides over the arm w, of the disk W, slightly turning the same and causing the shoulder w^5, of the dog w^4, to slip over the step w^6, to the lower portion of the cam surface w^3, and to come to rest against the rotating shaft T. At a certain point on its cylindrical surface the shaft T, has a depression forming a shoulder t^{10}, with which it engages the dog w^4, thus connecting itself for the time being with the hollow cam shaft S, setting in

motion all the cams carried by the same, as shown in Fig. 11.

The spiral gear s, on the cam shaft S, meshes with a similar gear s', on shaft s^2, at right angles to the cam shaft S, and carrying at its left end the pump cam r', and the matrix bar returning cam b^{16}. Just before the completion of one revolution the cam b^{16}, has retracted the matrix bar B, into a position of rest against its detaining pin C, and the arm w, of the clutch disk W, has reentered the notch w^2, of the matrix bar. The cam shaft S, completing its revolution, causes the shoulder w^5, of the dog w^4, to ride over the cam surface w^3, to the highest portion of the same, withdrawing the dog from the shoulder t^{10}, of shaft T, disconnecting the same from the cam shaft S, which then comes to rest together with the shaft s^2, and cams r', and b^{16}; the mechanism is then ready for another cycle of motions.

The pump cam r', acts on the plunger r, through the medium of a roller r^2, carried in a vertically sliding push-rod r^3, and a lever r^4, depressed by a spring r^5.

It will be perceived that each of the casting mechanisms is complete in itself and capable of producing the entire assortment of characters represented in the keyboard, and further that each casting mechansim is operative regardless of the others. The actuating cams of the respective casting mechanisms are advanced one ahead of another around the shaft in the order in which the molds are called into action, so that the casting mechanisms will start successively and deliver their respective type in the order in which they are designated in the keyboard. Two or more casting mechanisms may be in action concurrently but at different steps or stages in the cycle of operation. The fact that each mold produces type of all widths contained in the font, coupled with the fact that the casting action may be carried on with any mold regardless of the stage of operation in the preceding molds, admits of the machine being operated at much higher speed than those machines in which molds of fixed size are employed, and which require all the operations attending the production of a type of given width to be completed before the operation of casting a second type of like width can be begun.

Having described my invention, what I claim is,

1. In combination, a series of molds acting in rotation, matrices, a single series of finger-keys indicating the various characters, and means whereby the matrices are presented in the order of their selection to the successive molds.

2. In combination, matrices, finger-keys representing the matrix characters, a number of molds acting in rotation, and means controlled by the finger-keys for presenting the matrix characters in the order of selection to the successive molds.

3. A plurality of type molds, a series of matrices to coöperate with each mold, a single series of finger-keys representing the characters, and intermediate means controlled by the keys for presenting the selected matrix characters to the successive molds in the order of selection, whereby the casting of the type in one mold may be carried on during the selection and presentation of a matrix to another mold.

4. The combination of plural type molds adjustable runningwise to vary the width of the type, plural and like series of matrices coöperating with the respective molds and controlling their adjustment, a single series of finger-keys, and means controlled thereby to determine the presentation of matrices to the respective molds.

5. In a machine for casting and composing type, a series of adjustable molds operating in rotation, a series of matrices, and means for selecting the matrices, in the order in which the characters are to appear in print and presenting them in like order to the successive molds.

6. A plurality of variable molds simultaneously operative, a series of matrices for each mold, a single series of finger-keys, means controlled by the keys for presenting the selected matrix characters of the different series to the respective molds in succession, means for delivering molten metal to each mold, a galley or receiver, and means for delivering the type in the order of production to the galley.

7. In a machine for casting and composing single type, a plurality of molds each adjustable running-wise of the type, a series of matrices for each mold adapted to control its adjustment according to the width of the character presented, a series of finger-keys, means controlled by the keys for presenting the selected matrix characters to the successive molds, means for supplying molten metal to the molds, and means for causing the operation of the molds in rotation.

8. In a machine for casting and composing single type, a series of molds operating in repeated succession in combination with matrices and means for selecting and presenting the matrix characters to the mold in the order of their operation.

9. In a machine for casting and composing single type, a series of molds operative in a fixed order of succession, matrices, finger-keys, and means controlled by the finger-keys for presenting the selected matrix characters to the successive molds.

10. In a machine for casting and composing type, a plurality of adjustable molds, a matrix bar for each mold provided with a

series of matrix characters, a single series of finger-keys, and means controlled by the finger-keys for automatically adjusting the matrix bars in succession to present their selected characters to the respective molds.

11. In a machine for casting and composing single type, a series of molds, a corresponding number of matrix bars containing like series of characters, a single finger-key mechanism, means controlled by the finger-keys for adjusting the matrix bars in relation to the molds to present the selected characters thereto, and means for causing the operation of the matrix bars and molds in rotation.

12. In a machine for casting single type, the combination of a mold variable in width and a longitudinally movable matrix bar containing a series of characters and adapted to control the adjustment of the mold according to the width of the characters presented thereto.

13. In a machine for composing and setting single type, a number of variable type molds, a like number of matrix bars each containing a series of characters and movable to present a selected character to the mold, means for moving the matrix bars endwise, a series of stop-pins for each bar, a single series of finger-keys, and automatic means whereby the keys coöperate with the different series of stop-pins in rotation.

14. In a type casting machine the combination of a variable mold, a matrix bar containing characters of different widths movable longitudinally thereover, a series of stop pins to control the advance of the matrix bar, finger-keys controlling the stop-pins, and means for advancing and retracting the bar.

15. In a machine for casting and composing single type, a reciprocating notched matrix bar, a detaining pin directly engaging said bar to hold the same normally out of action, a series of stop pins directly engaging the notches of the bar to determine its longitudinal adjustment, finger-keys, connections through which the keys effect the setting of a stop-pin and the retraction of a detaining pin.

16. In a type-casting machine, a reciprocating bar containing a series of matrices of different widths, a coöperating variable mold, spring connections tending to advance the bar, a detent engaging the bar to hold the same normally in an inoperative position, a series of stops arranged to directly engage the bar to limit its advance, finger-keys and connections through which each key actuates a stop and disconnects the detent.

17. In a type casting machine, a reciprocating matrix bar containing a series of matrices and provided with surfaces to control the adjustment of the mold and with alining notches, in combination with a variable mold, means for adjusting the matrix bar to bring the selected characters one at a time opposite the mold, and means for binding the mold and bar together.

18. In a type casting machine, a series of molds and a corresponding series of matrix bars movable with relation to the molds, a series of stops for each bar, a single series of finger-keys, connections whereby the keys actuate the stops, and automatic mechanism for shifting the connections from one series of stops to another after the key is actuated.

19. In combination with a type mold, a reciprocating matrix bar, a series of stops to engage the bar and arrest the same in different positions, a continuously operative mechanism for actuating the stops, a series of finger-keys, and means controlled thereby for connecting the stops one at a time with the actuating mechanism.

20. In combination with the movable matrix bar B, a series of stop-pins D, their actuating devices d, d^5, and d^7, rods G, slides H, and key-board mechanism coöperating with said slides.

21. In a type casting machine, a series of rods G, an actuating slide H, a finger-key, and power-driven mechanism controlled by the finger-key and serving first to actuate the slide H, and the connecting rod G, and second to adjust the slide H, in position to operate the second rod.

22. In a type casting machine, a series of rods G, G′, etc., a single actuating slide H, power-driven devices for automatically moving the slide H, from one rod to another and manual devices controlling the action of the power-driven devices; whereby the operator is enabled to set in action mechanism for shifting the actuating slide.

23. In a machine for casting and setting single type, the combination of concurrently operative molds, plural and like fonts of matrices, and a finger-key mechanism for bringing the selected matrices of the respective fonts in operative relation to the respective molds whereby the characters represented in the machine may be produced in any desired order, and each without reference to the production of the others.

24. In a machine for casting and setting type, plural adjustable molds concurrently operative, corresponding fonts of matrices, a single keyboard, and means whereby the keyboard determines the presentation of selected matrices of different fonts to the respective molds and means for adjusting each mold to the matrix momentarily presented thereto.

25. In a type-casting and setting machine, plural molds independently operative, and means for delivering molten metal thereto, plural and like fonts of matrices, one for each mold, a single keyboard and connections for presenting selected matrices from the respective fonts to the respective molds; whereby type may be cast in one mold without await-

ing the completion of the operation in another, and the characters produced in any desired order.

26. In a type-casting and setting machine, a plurality of type-casting units each including matrices of similar fonts of type, in combination with a set of operating character keys and means for starting and controlling the type-casting units from any of the operating keys to cause type of the same character to be formed by each unit corresponding to the character on the operating keys manipulated.

27. In a type-casting and setting machine, in combination, a plurality of type-casting units; a set of operating character keys; and means whereby the type-casting units are caused to be started successively and controlled by the manipulation of one or more of the keys and move through different stages of their operation at the same time.

28. In a type-casting and setting machine, in combination, a plurality of type-casting units, each adapted to form the type of a given font; means for actuating the units at uniform speed; a set of operating keys; and means whereby the manipulation of the keys, in the order in which the type are required, will cause as many types as there are type-casting units to be under process of formation and to be delivered in the order in which the keys are manipulated.

29. In a type-casting and setting machine, a plurality of type-casting units each including matrices of similar fonts of type, in combination with a set of operating character keys; means for starting and controlling the type-casting units from any of the operating keys to cause type of the same character to be formed by each unit corresponding to the character on the operating key manipulated; and a passage or chute for each unit uniting in a discharge opening down which the type fall in order of their completion to be assembled.

30. In combination, a plurality of type-casting units; a set or bank of operating keys; means for successively setting in action and controlling the type-casting units when the keys are manipulated; and chutes for guiding the type from the type-casting units as made to a common discharge opening whereby they may be assembled in a galley.

31. In a type-casting and setting machine, in combination, a plurality of type-casting units, each including a matrix carrier adapted to form a similar font of type; a set of operating keys; means whereby the type-casting units are consecutively started by the manipulation of one or more of the keys to move through different stages of the operation at the same time; and means for setting in operative position the type matrices of the carriers of the respective units corresponding to the character or characters on the key or keys that are manipulated to set the units in action.

32. In a type-casting and setting machine, in combination, a plurality of type-casting units, each including a matrix carrier adapted to form a similar font of type; a set of operating keys; means whereby the type-casting units are consecutively started by the manipulation of one or more of the keys to move through different stages of the operation at the same time; and means for setting in operative position the type matrices of the carriers of the respective units corresponding to the character or characters on the key or keys that are manipulated to set the units in action; and means for resetting the matrix carriers into normal inoperative position.

33. In a type-casting and setting machine, a plurality of type-casting units each including matrices of similar fonts of type, in combination with a set of operating character keys; means for starting and controlling the type-casting units from any of the operating keys to cause type of the same character to be formed by each unit and corresponding to the character on the operating key manipulated; and means for delivering the type as made by the successively acting units to composing devices.

34. In a type-casting and setting machine, in combination, a plurality of type-casting units, each adapted to form the type of a given font; means for actuating the units at uniform speed; a set of operating keys; means whereby the manipulation of the keys, in the order in which the type are required, will cause as many types as there are type-casting units to be under process of formation and be delivered in the order in which the keys are manipulated; and means for delivering the type in order to composing devices.

35. In a machine of the general character described, in combination, a plurality of type-casting units, each including matrices of similar fonts of type; a set of operating keys; and means for operating the units successively by the same or different keys.

In testimony whereof I hereunto set my hand this twenty-sixth day of January, 1906, in the presence of two attesting witnesses.

JOHN R. ROGERS.

Witnesses:
P. T. DODGE,
J. F. GEORGE.