

No. 616,233.

Patented Dec. 20, 1898.

G. S. HEATH & M. L. SEVERY.
MACHINE FOR PRINTING BULLETINS, POSTERS, &c.

(Application filed July 2, 1897.)

(No Model.)

8 Sheets—Sheet 1.

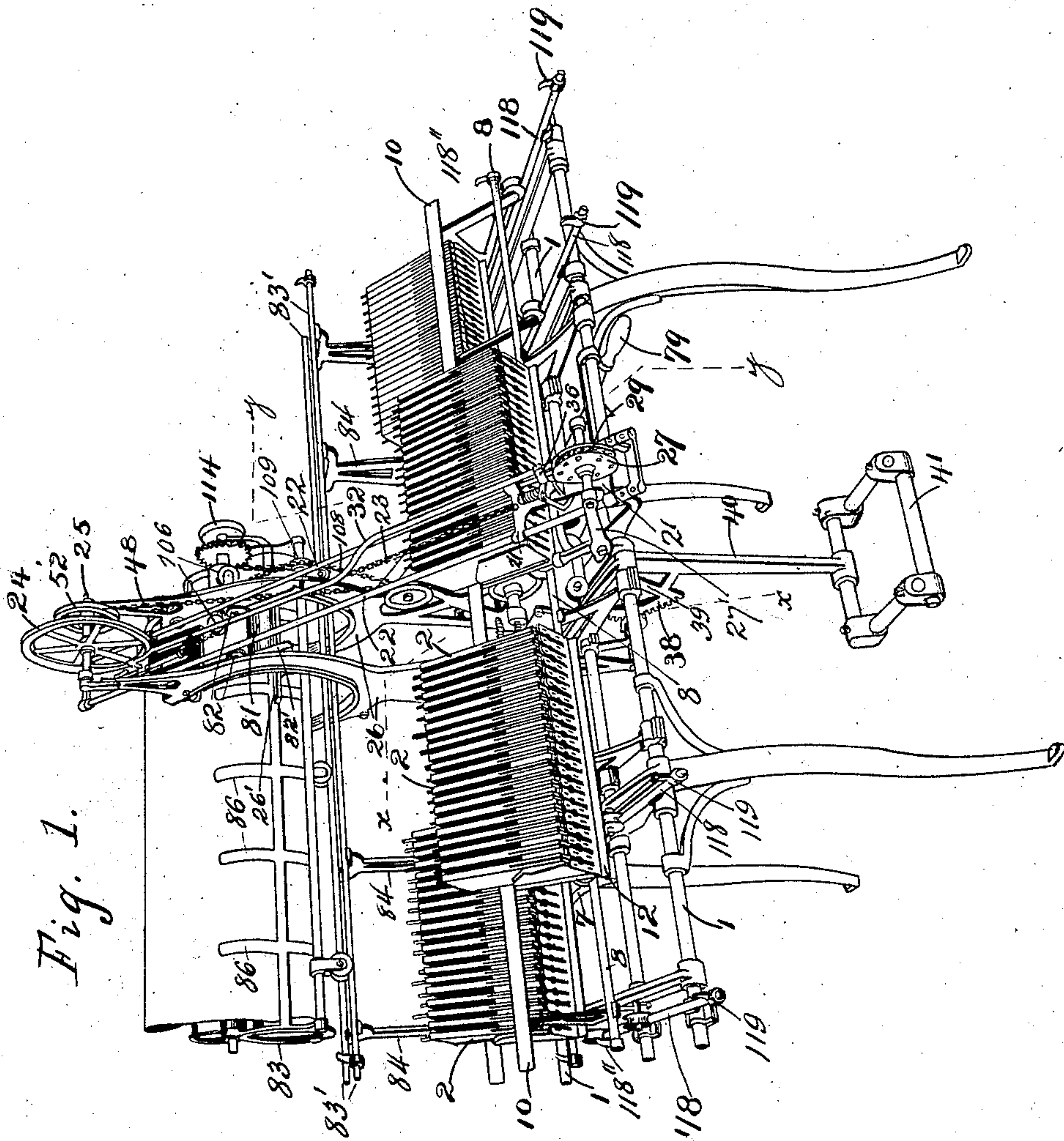


Fig. 1.

Witnesses.

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Patented Dec. 20, 1898.

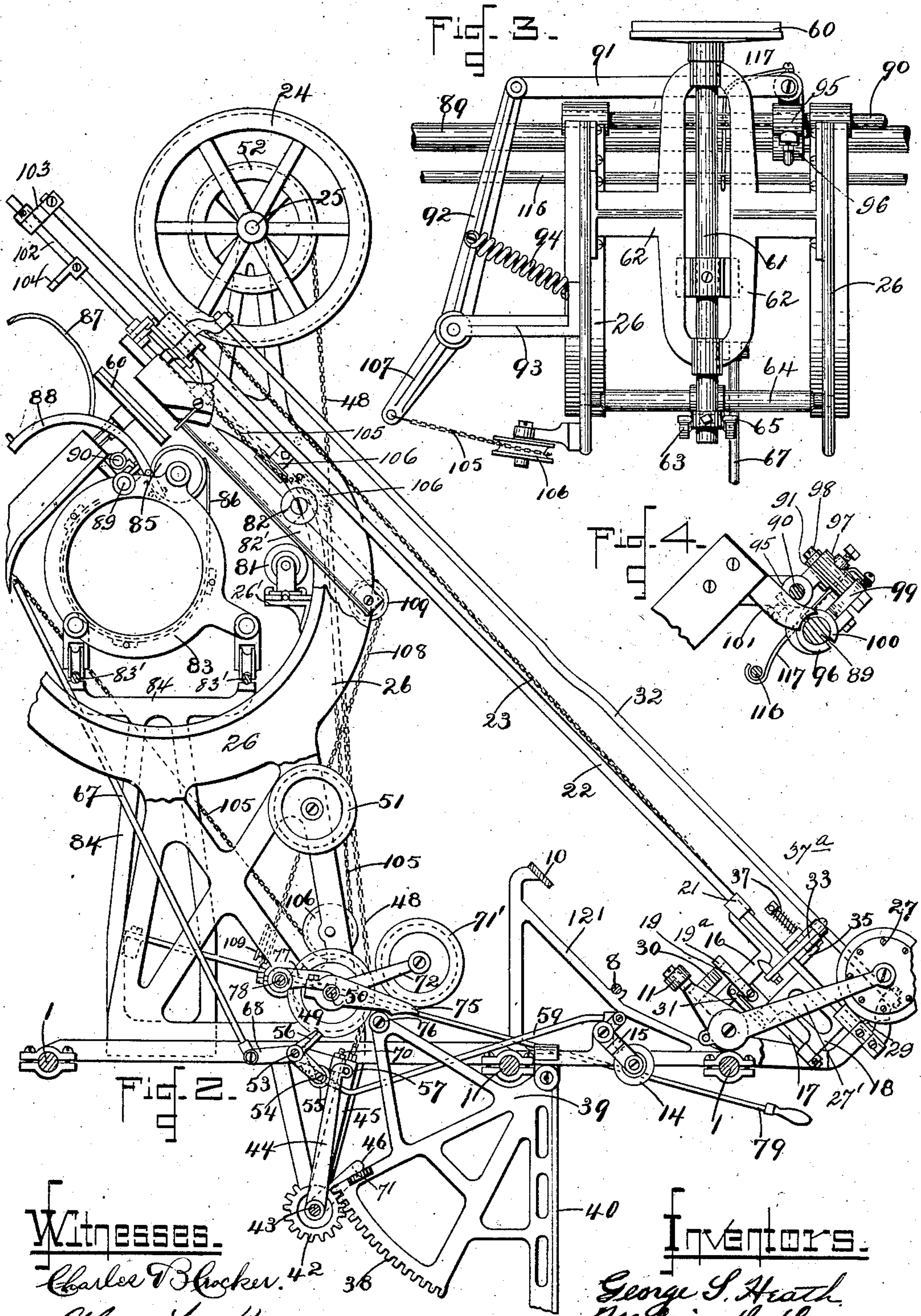
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(Application filed July 2, 1897.)

(No Model.)

8 Sheets—Sheet 2.



Witnesses.

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No. 616,233.

Patented Dec. 20, 1898.

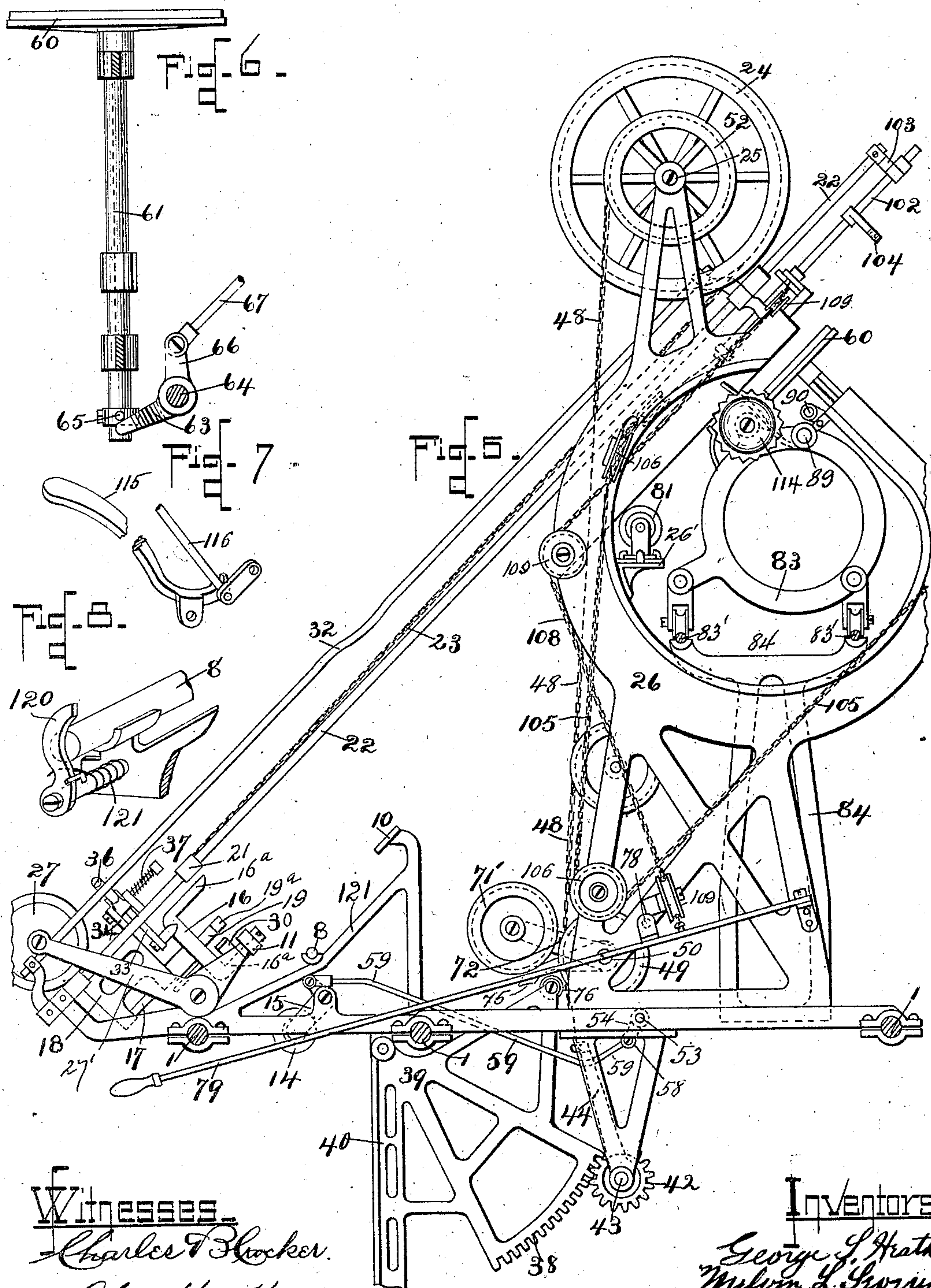
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(Application filed July 2, 1897.)

(No Model.)

8 Sheets—Sheet 3.



Witnesses.

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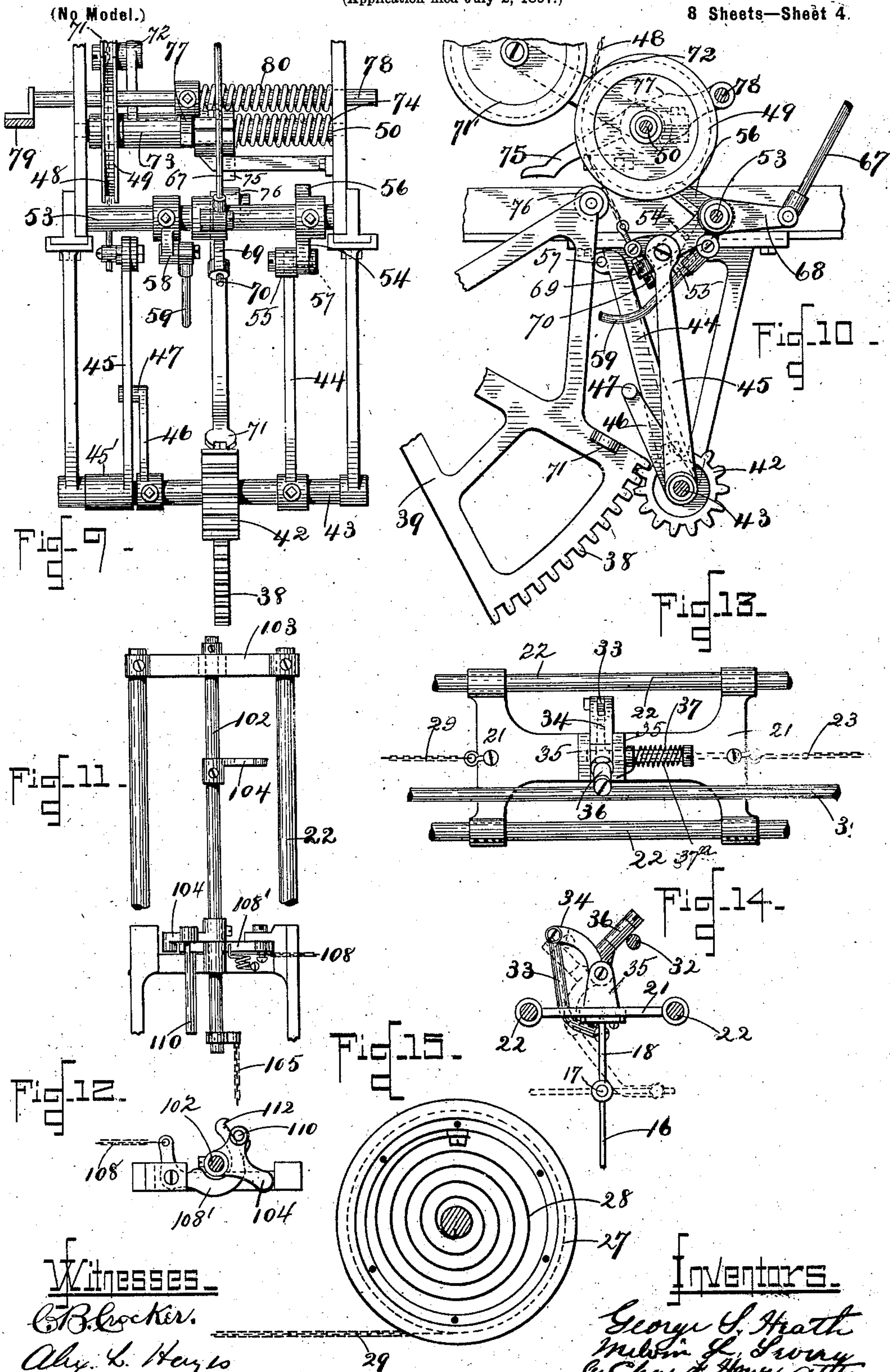
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8 Sheets—Sheet 4.



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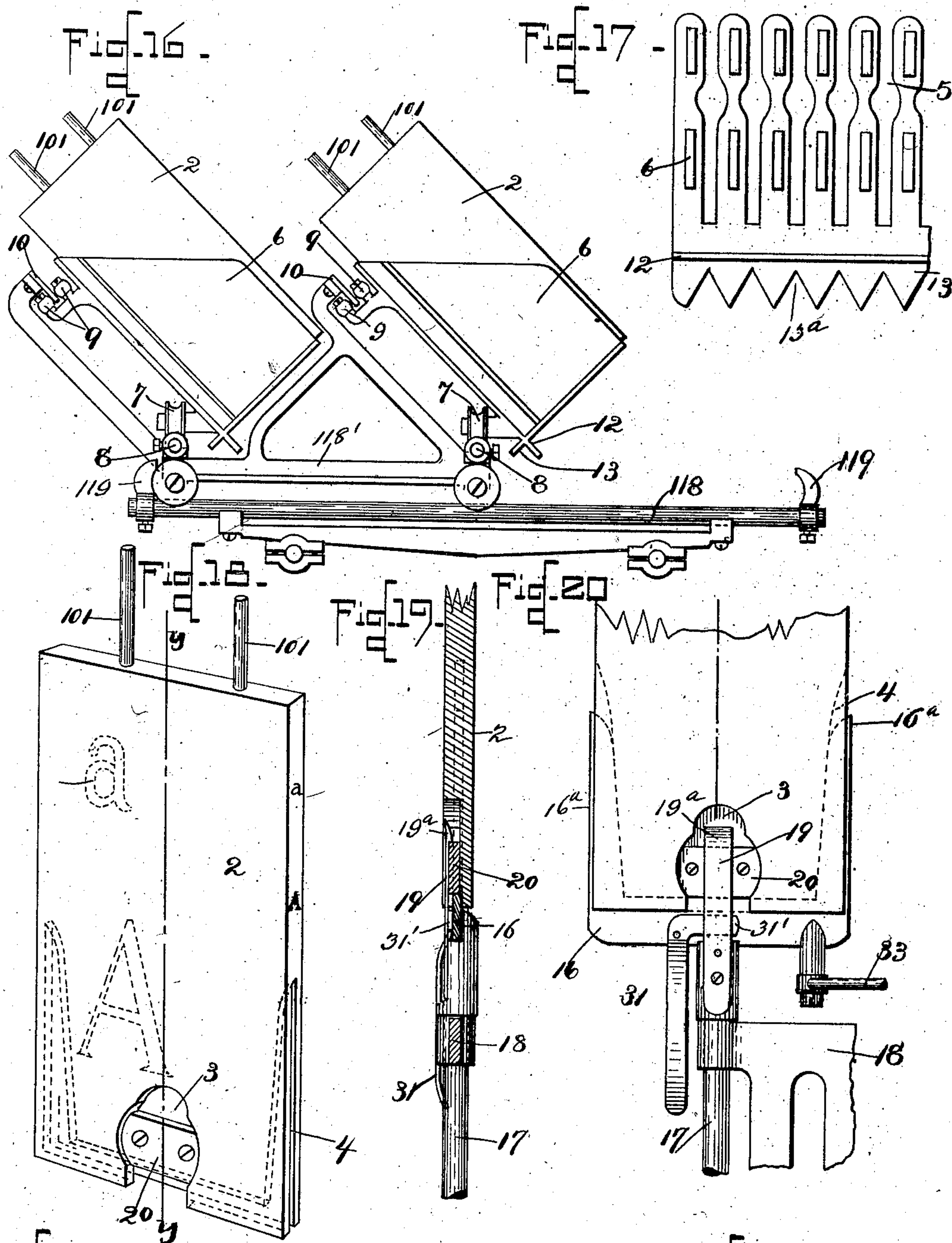
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(Application filed July 2, 1897.)

8 Sheets—Sheet 5.



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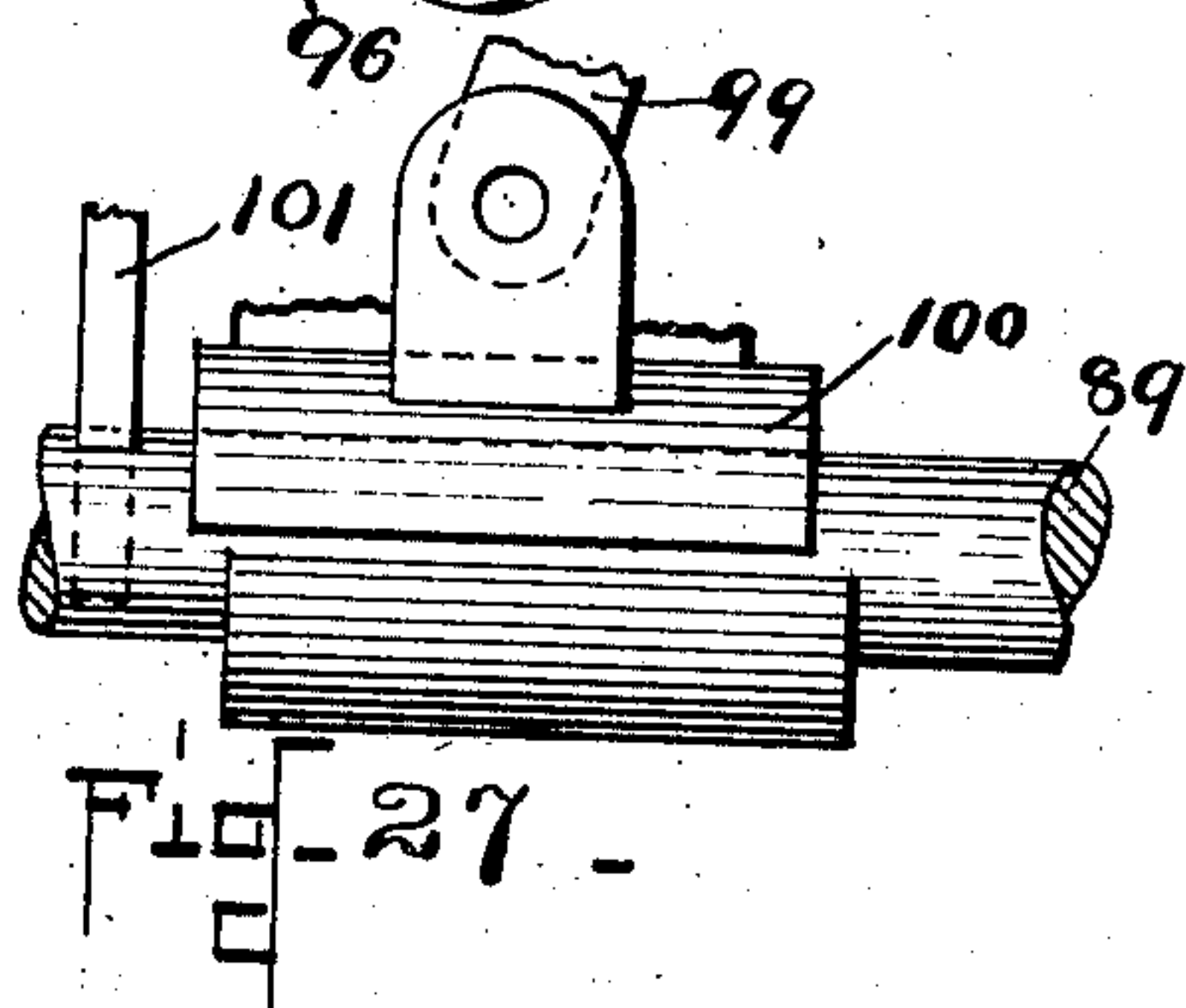
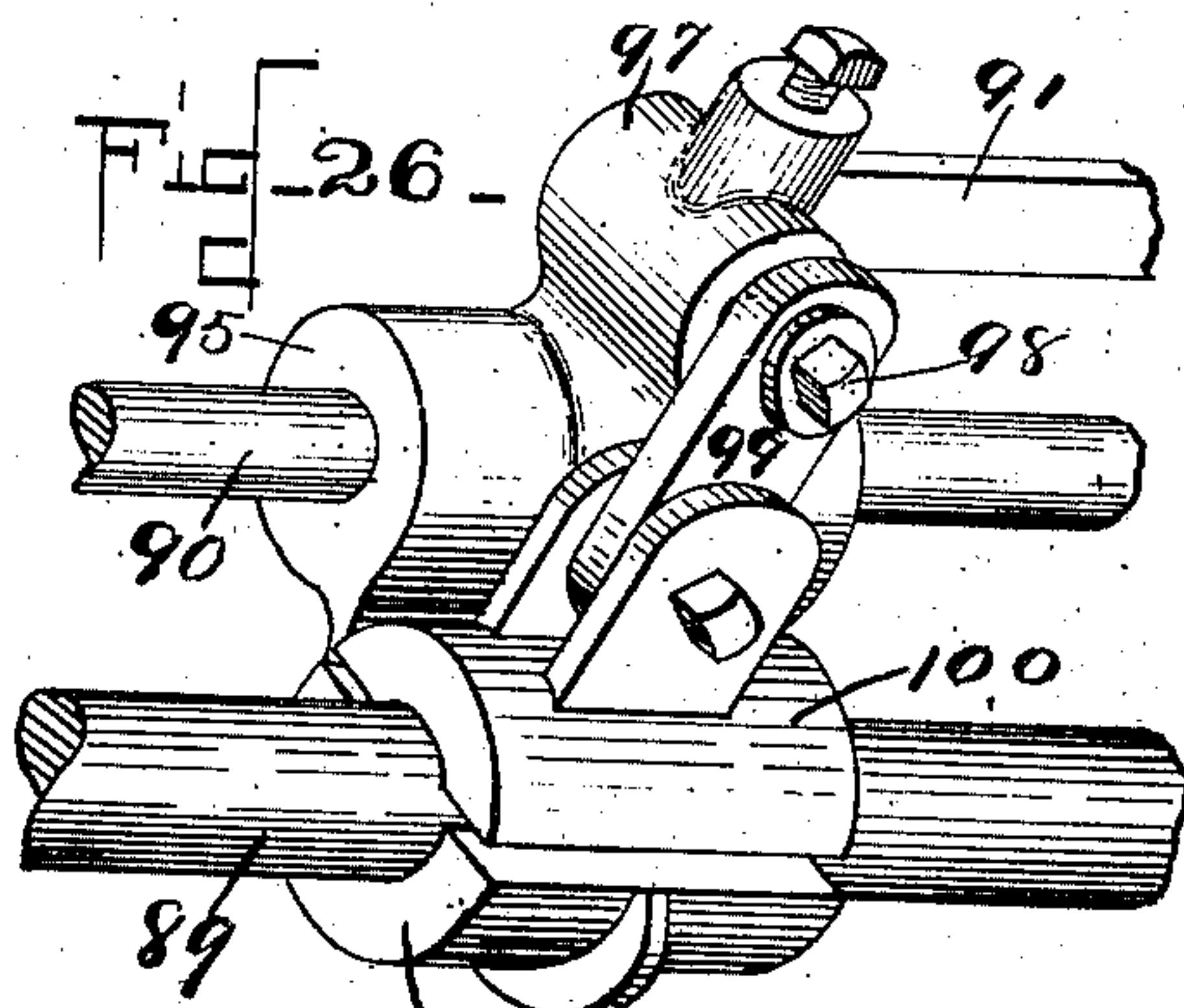
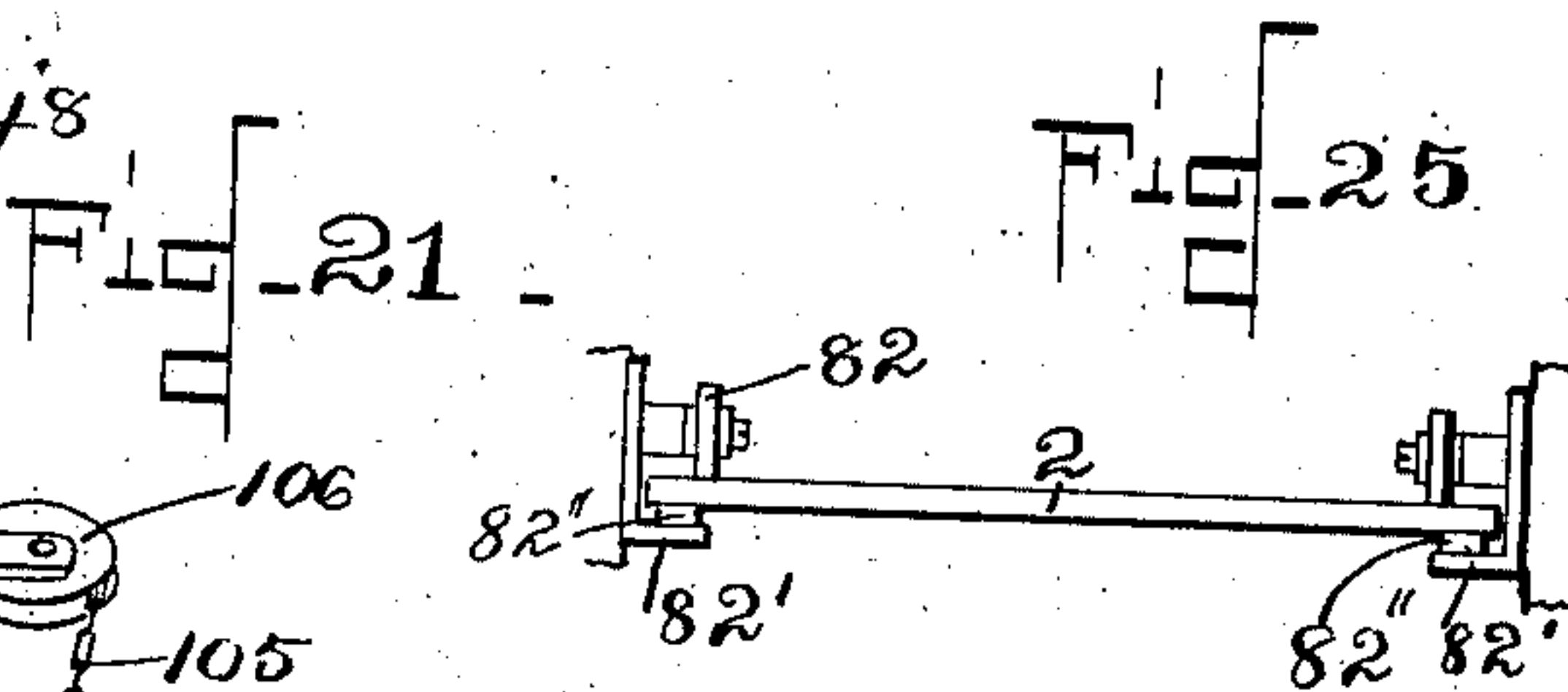
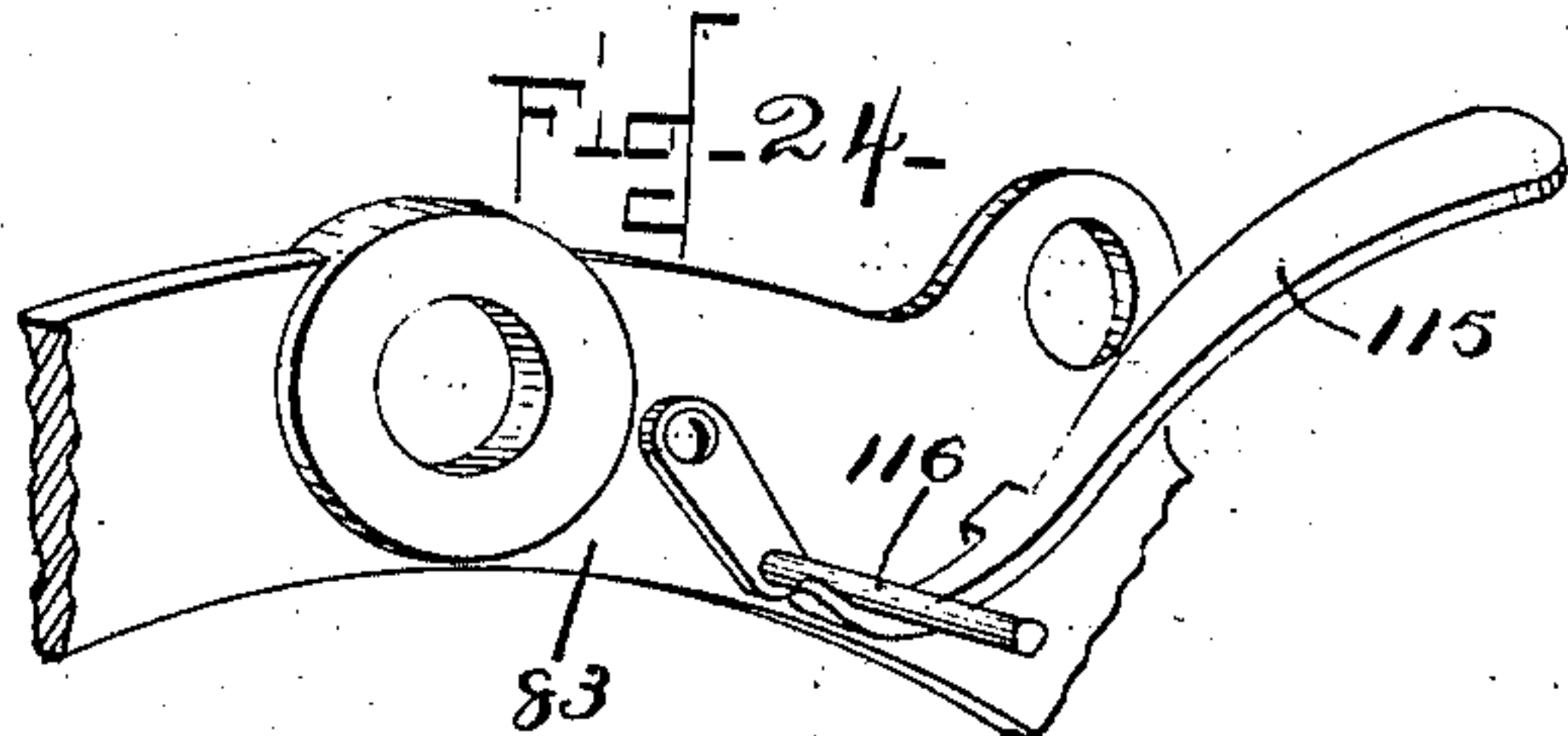
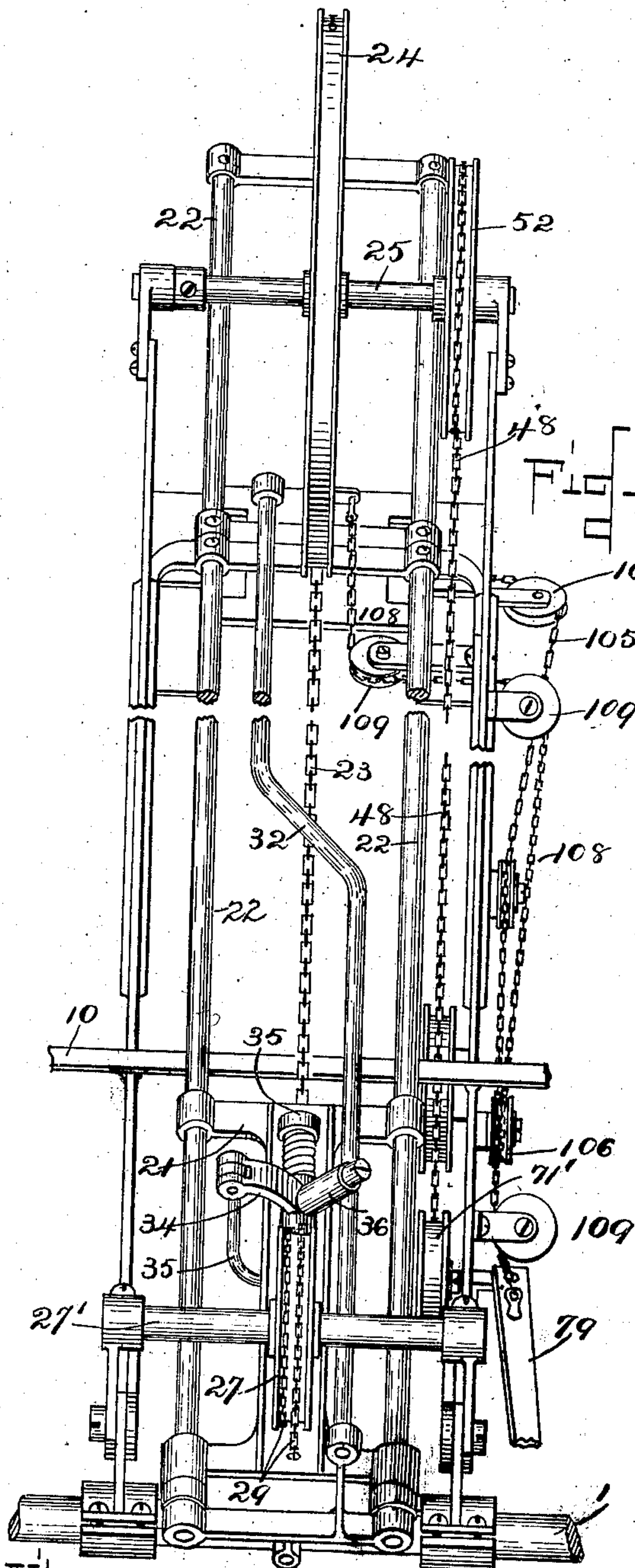
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(No Model.)

(Application filed July 2, 1897.)

8 Sheets—Sheet 6.



Witnesses.

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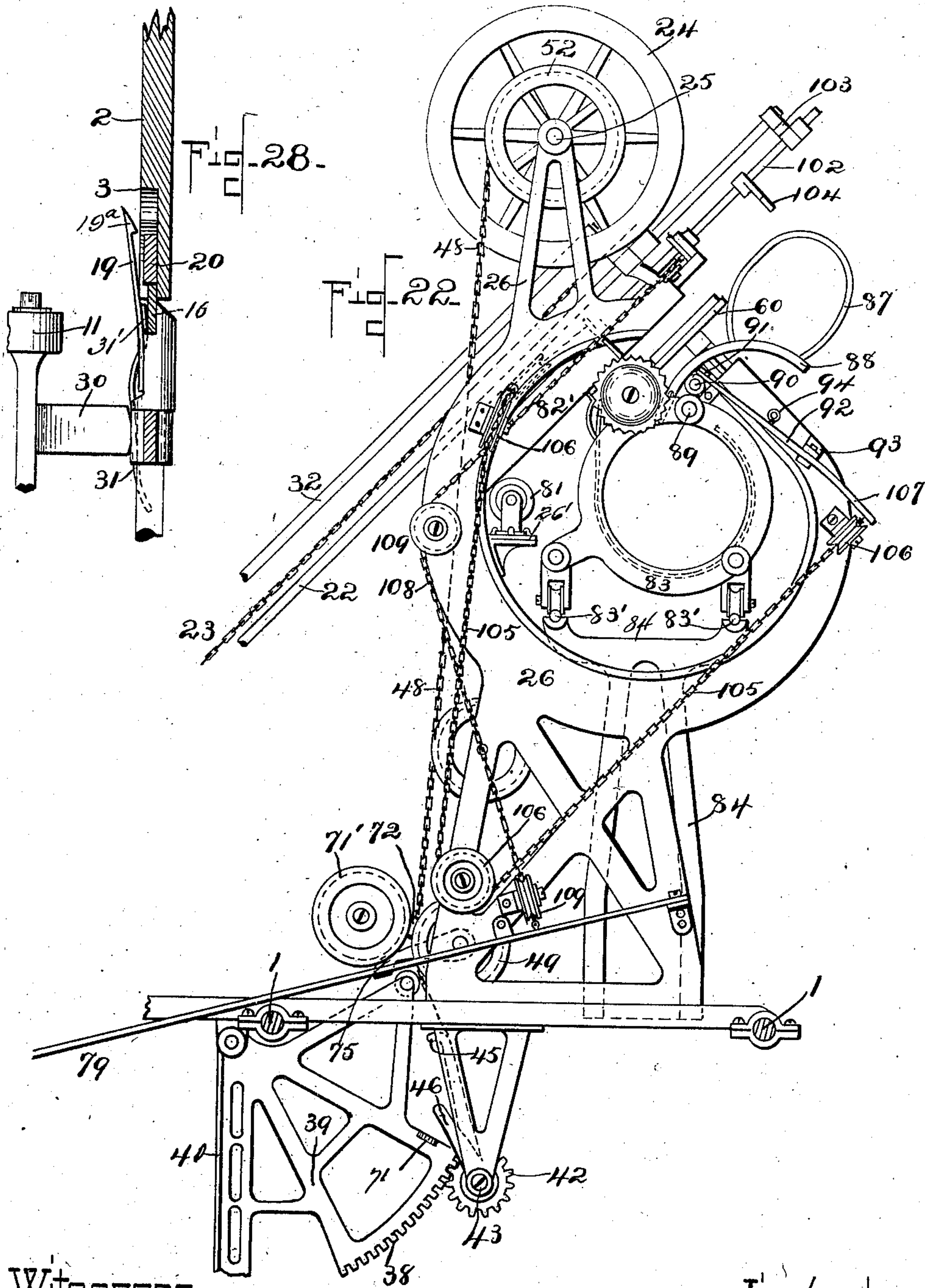
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(Application filed July 2, 1897.)

(No Model.)

8 Sheets—Sheet 7.



Witnesses.

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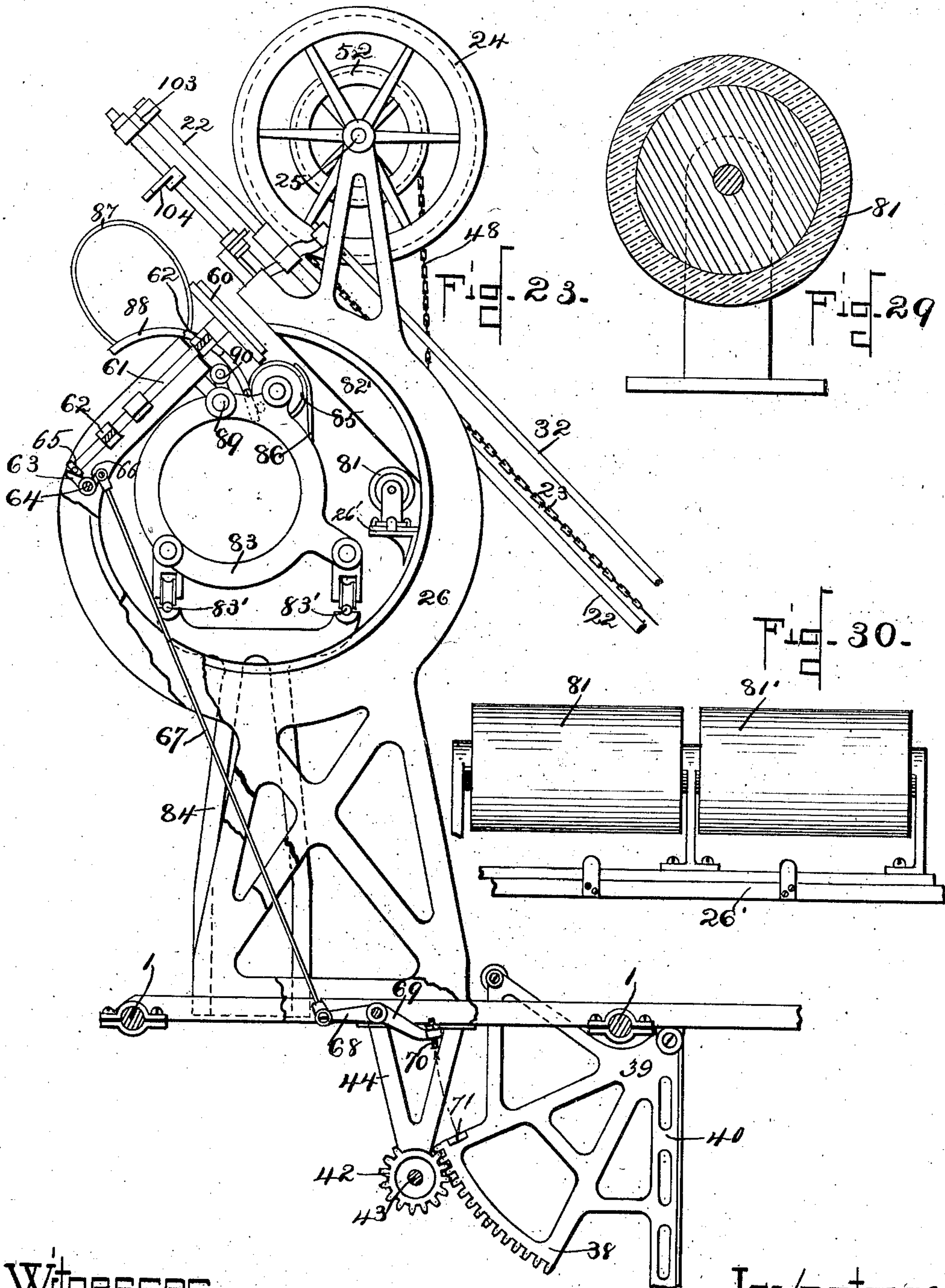
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(Application filed July 2, 1897.)

8 Sheets—Sheet 8.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR PRINTING BULLETINS, POSTERS, &c.

SPECIFICATION forming part of Letters Patent No. 616,233, dated December 20, 1898.

Application filed July 2, 1897. Serial No. 643,250. (No model.)

To all whom it may concern.

Be it known that we, GEORGE S. HEATH, of Revere, in the county of Suffolk, and MELVIN L. SEVERY, of Arlington, in the county of Middlesex, State of Massachusetts, citizens of the United States, have invented new and useful Improvements in Machines for Printing Bulletins, Posters, and the Like, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to a machine for the successive and individual printing in series of the large letters or other characters employed in bulletins, placards, and like productions designed to be posted in public places to be read at a distance—as, for example, the bulletins placed in front of newspaper offices; and the object of the invention is to provide a machine by which that class of printing can be more easily and rapidly produced than by the present method of performing it by hand, either by painting or by the use of separate rubber type. This result is accomplished by means of a series of separately-detachable and independently-movable type-holding devices or cases, each carrying one or more removable type plates or bars and supported in such a manner that any desired one of these devices can be brought to a position to be connected with a single carrying device common to all of the type-holding devices, means for carrying type plates or bars by the exercise of power at the will of the operator to bring the selected type-plate to a position to present any desired type thereon to the surface of the material upon which the impression is to be made, means operated by the same exercise of power to effect the movement of this material sufficiently to afford a fresh surface for another impression in line with the impression just made, and means operating after an impression to return the type-plate to the type-holding device to its normal place therein.

By the use of the separately-detachable and independently-movable type-holding devices it is rendered possible to print from larger type than by any other machine of this class, and also to arrange the type-holding devices in a compact form in a pack or group before

the operator, thereby saving space. It is also rendered possible by the use of these devices to print at will from the same machine any one of a series of type carried thereby, thus enabling the succession of printed characters to be changed at will after each impression to different fonts—as, for example, from a block letter to a script letter or from upper to lower case—without the use of a separate type-holding device for each character, thus saving space, or to enable type of different letters or characters to be placed on the same type-plate, thus saving the number of plates required in the machine, and it is also rendered possible after each impression to feed the paper or other material which is printed upon for a distance proportionate to the width of the type which has just been printed from, thus securing spaces of equal length between each character, group of characters, or picture printed.

This invention can be carried into effect by various forms of mechanism, and we do not limit ourselves to any specific embodiment of the same.

The machine herein described and shown in the accompanying drawings illustrates a convenient form for the purpose required.

In the drawings, Figure 1 is a front view of this machine in perspective. Fig. 2 is an end view of the same on the left hand of the operator on the line X X, Fig. 1, a part of the frame being broken away and the type-holding cases removed. Fig. 3 is a rear view of the platen for taking the impression, the frame supporting the same, the device for moving the platen, and the device for moving the paper-carriage. Fig. 4 is an end view of the clutch shown in Fig. 3. Fig. 5 is an end view of the machine, on the right hand of the operator, on the line Y Y, Fig. 1, the type-holding cases being removed. Fig. 6 is a side view of the device for drawing up the platen to effect an impression. Fig. 7 is a view of the device for releasing the paper-carriage. Fig. 8 is a perspective view of the device for preventing type-holding cases from being thrown from the machine. Fig. 9 is a rear view in elevation of the mechanism for effecting the movement of the carrier for

the type-plate, for effecting the impression, and for securing in position the carriage for the type-plate. Fig. 10 is a side view of the same. Fig. 11 is a front view of the device for determining the movement of the type-plate. Fig. 12 is an end view of the same. Fig. 13 is a plan view of the device for bringing the type-plate to the printing-point. Fig. 14 is an end view of the device used for effecting the movement of the type-plate from one plane to another. Fig. 15 is a sectional view of the wheel on which is moved the cord which retracts the type-plate after an impression has been made. Fig. 16 is an end view of the device for supporting the supplementary cases or carriages for a series of type-plates. Fig. 17 is a view of part of the bottom of one of these cases or carriages. Fig. 18 is an isometrical perspective view of one of the type-plates. Fig. 19 is a sectional view of the device for seizing a type-plate and of a part of a type-plate on the line *y y*, Fig. 18. Fig. 20 is a side view of this device and of a part of the type-plate. Fig. 21 is a front elevation of the central portion of the machine, showing the mechanism for carrying the type-holding device to the printing-point. Fig. 22 is a view in elevation from the right-hand side of the machine of the mechanism at the back of the machine. Fig. 23 is a view in elevation from the left-hand side of the machine of the same mechanism. Fig. 24 is a detail view of the lever and a part of the swinging bar used to disengage the clutch for moving the paper-carriage. Fig. 25 is an end view of the type-plate, supports for the same, and the rollers bearing on the type-plate. Fig. 26 is a perspective view of the clutch. Fig. 27 is a view of part of the clutch in elevation and of the stop-plate acting to prevent the overrunning of the paper-carriage. Fig. 28 is a side view, in partial section, of the device for releasing the type-plate. Fig. 29 is a sectional view of the inking-roller, and Fig. 30 is a view in elevation of the inking-rollers and the support for the same.

In the several figures the same numerals refer to the same parts.

The frame of the machine is composed of a series of horizontal parallel rods 1, connected by suitable cross-pieces and supported upon suitable legs, and to this frame are attached the several castings supporting the parts of the machine.

The type-plates used in the machine herein described will first be explained. It is essential that the size of these type-plates should be sufficient to carry large type, sometimes with an area of four square inches or more, which it is necessary to use, and the less the expenditure of time and power required to bring any one of these type-plates into the position to enable it to be carried to the printing-point the greater will be the utility of the machine. It is also desirable that the same type-plates should be capable of carrying two or more

type, thus enabling the same device to be used for printing from different characters or from different fonts of the same character—as, for example, block or script letters or upper and lower case—and effecting a saving in the number of type-plates required for printing a variety of letters or other characters. These results can be efficiently accomplished by the use of oblong plates, and in the embodiment of the principle of the invention herein described type-plates of this form are used, one of which is shown in isometrical perspective in Fig. 18; but other forms of type-plates may be used in other embodiments. These plates may be made of any suitable material, but are preferably made of a light material, such as wood, and are of the same size, and when the machine is intended for printing newspaper bulletins are about four inches in width and nine inches in length; but they may be larger or smaller, according to the work which the machine is intended to perform and the size of the machine.

The form of machine hereinafter described may vary considerably in size, and machines for printing letters or characters of the size printed by the ordinary type-writer may be constructed on this plan, and they may also be made to print from larger type-plates or type-blocks than those of the size specified.

In order to reduce as much as possible the distance through which each type-block must be moved to bring it into a position to be carried to the printing-point, the plate should be as thin as is consistent with strength and the proper performance of its functions.

Upon one face of the plate is secured in any suitable manner—as, for example, by cement or glue—a type of any suitable material. Rubber type can be conveniently used with an ink adapted for use with such type.

Each plate of a series will have upon it a type of a different letter or character, and the form of the plate admits of placing thereon two or more types, placed one above the other, each of which may be of different fonts—for example, as shown in Fig. 18, of the upper and lower case—or a letter and numeral may be on the same plate, or a punctuation-mark or other character and a letter, thus enabling different forms of type to be printed in succession at will without requiring a separate type-plate for each type.

In the lower end of the plate is a recess 3 for the reception of the catch by which the plate is seized to be carried to the printing-point, and in each side of the plate, at its lower end, is a recess 4 for the reception of one of the tines of the fork by which the plate is seized, and the construction and mode of operation of which fork will hereinafter be more fully described. Each of these plates must be brought to the same point to be seized and carried to the printing-point, and a convenient manner of accomplishing this result consists in the use of a case or carriage for supporting the plates.

In the case used with the machine described the plates are supported at an angle in vertical parallel planes and each with its type-face turned to the same direction.

5 The case or carriage is capable of moving transversely upon the frame of the machine and before the operator, who by hand moves the case or carriage to bring the type-plate which it is desired to print from to a position
10 to be seized by the fork by which the plate is carried to the printing-point. This case or carriage is shown in an enlarged view in Fig. 16. Its bottom is provided with slots 5 (see Fig. 17) opposite the lower end of the type-plate, which slots permit the entrance of the
15 fork which seizes the type-plate, and each type-plate is placed in a receptacle formed, respectively, by the parallel partitions 6.

A convenient manner for enabling the case
20 or carriage to have a transverse movement is by supporting it at the lower end of its under side by a wheel 7, supported at this end and moving on a suitable longitudinal rod 8, supported transversely upon the machine behind
25 the device for carrying the plate to the printing-point, and at the upper end by means of two guide-rolls 9, both attached to an arm extending from the upper end of the under side of the case or carriage, each of which
30 guides moves on opposite sides of the horizontal bar 10, also supported by the frame of the machine and parallel to the rod 8. The case or carriage may also be guided and held from an upward movement when brought in
35 front of the carrier by a roller 11, Fig. 2, on an inclined arm extending backward from the frame of the machine, which roller bears on the upper side of a flange 12 on the front of the case or carriage.

40 When the plate carrying the type from which it is desired to obtain an impression is brought to the position to be carried to the printing-point, it is desirable, in order to enable the plate to be seized by the device which
45 carries it to this point, that the case should be firmly held in such a manner as to prevent its lateral movement, and it is also necessary that the selected plate should register with the carrying device in order that the
50 catch and fork on the same should enter the recesses 3 and 4, respectively. This result is accomplished by providing a bar 13, extending along the case on the under side of its lower corner and having on it a series of V-
55 shaped notches 13^a, corresponding in number to the plates in the case and each having its apex in a vertical plane passing through the center of the edge of the type-plate above the notch, and also by providing a double beveled wheel 14, having its edge in a vertical
60 plane passing through the center of the edge of the plate when in position to be carried to the printing-point, said wheel being mounted upon the arm 15 of a bell-crank lever pivoted
65 in the frame of the machine, whereby the edge of the wheel can be brought against the bar 13 and by entering a notch on the same

will not only prevent the case from moving laterally, but will bring the plate above that notch exactly to the position which will enable it to be seized by the fork by which it is
70 carried to the printing-point. The roller 11 prevents the upward movement of the case during this operation.

Upon the edge of each plate may be placed
75 a letter or character similar to that on the type on the face of the plate and for the purpose of indicating the type on the plate, Fig. 18. The operator by moving the case laterally or transversely before him brings the
80 plate carrying the type from which it is desired to take an impression approximately opposite the seizing device, and then by effecting an upward movement of the beveled wheel he causes this wheel to engage with a
85 notch 13^a in the bar 13, and thus hold the case and bring the selected type-plate in position to be seized.

The device for seizing the type-plate is shown in an enlarged detail view in Fig. 20. It
90 consists of a fork 16 of a width equal to that of a type-plate and attached to a shaft 17, rotating in suitable supports attached to a vertical plate 18, fixed to the under side of a sliding frame 21 and in a vertical plane. The fork
95 16 is normally in a vertical plane and its tines 16^a are adapted to each enter the corresponding recess 4 in the sides of the type-plate. A flat spring 19 is attached at one end to the shaft of the fork and the other
100 end of this spring is provided with a hook 19^a, which enters the recess 3 and passes over a cross-bar 20 in this recess 3 and engages with the same, thus holding the type-plate.

The type-plate is brought to the printing-
105 point by the movement of the frame 21, supported on each side, respectively, on one of two inclined parallel rods 22, extending from the front of the machine to a point above the roller carrying the paper or other material on
110 which the impression is made, and the upward movement of this frame is effected by winding a cord or chain 23—a chain preferred—attached thereto upon a wheel 24, to the periphery of which the cord or chain 23 is
115 attached, which wheel is fixed upon a shaft 25, supported above the rods 22 and near the upper ends of the same upon the parallel standards 26, forming a part of the frame of the machine. A circular opening is formed in
120 each of these standards and a part of each standard at this point is carried backward. The means for effecting the rotation of this wheel 24 will be hereinafter described. After the type-plate has been brought to the print-
125 ing-point and an impression has been made and the power effecting the impression is released the frame 21 would return by the action of gravity to its original position at the lower end of the parallel rods 22; but it is
130 preferred, in order to overcome friction and insure a speedy return of the frame 21 and type-plate carried thereby, to effect this return movement by winding upon a suitable

wheel 27, connected to its shaft by a spring 28 and having its shaft supported in arm 27', secured to the front of the machine, said wheel being between the lower ends of the rods 22, a cord or chain 29, attached to the frame 21. (See Fig. 15.) When the frame 21 is drawn up toward the printing-point, the cord or chain on the wheel is unwound against the tension of the spring 28 and is therefore automatically rewound when the frame 21 and type-plate carried thereby is released. Other means may be used for effecting the return movement of the frame 21 by a force other than gravity. When the frame 21, after the impression, returns to its normal position, the type-plate carried thereby passes to its original position in the case or carriage and is automatically disengaged from the fork 16. This result is effected by the contact of a spring projection 30, suitably supported in the path of the fork 16—as, for example, on the arm supporting the roller 11, with the end of a spring 31 attached to the fork and having a bent end 31' extending under the spring 19 and catch attached thereto. Upon the upward movement of the fork the projection 30 bears against the longer end of the spring 31 and depresses the same, thus throwing out the hook 19^a on the spring 19; but after the fork has seized the type-plate and the carriage 21 commences to move the longer end of the spring-lever 31 escapes from the projection 30 and the hook 19^a falls into the recess 3 above the bar 20 and holds the type-plate to the fork. When the type-plate returns to its normal position, the engagement of the projection 30 with the longer end of spring 31 throws out the hook and releases the type-plate, as shown in Fig. 28.

Inasmuch as for the purpose of forming a compact pack or group each of the series of type-plates stands in a vertical plane, while in order to effect the impression the type in the plate must be brought opposite to the surface of the material upon which the impression is made, it is necessary to rotate the type-plate through an angle of ninety degrees before it reaches the printing-point. This result is accomplished by the provision of a guide-rod 32, parallel to the rods 22, but bent at one part, so that the direction of the rod is in two parallel lines, and by attaching to the fork 16, by a rod 33 at a point eccentric to its axis, one arm 34 of a bell-crank lever pivoted on supports 35, attached to the frame 21 and having its other arm 36 bearing upon the rod 32. This rod is so bent that as the arm 36 moves on the same the end of this arm describes an arc of ninety degrees, and thus effects the movement of the type-plate from a vertical position to one in which its lower edge is horizontal, as shown in Fig. 14, in which the normal position of the arm 36 is shown in full lines and its position and that of the parts connected therewith when the type-plate is in a position for printing is shown in dotted lines. A suitable

spiral spring 37^a on the arbor 37 of the bell-crank lever connects the support 35 with said arbor, and by the action of this spring the arm 36 is maintained in contact with the bent rod 32.

The movement of the type-plate to the printing-point, with the consequent movement of the paper-carriage after each impression and the movement to effect an impression, may be effected by power exerted by the foot of the operator, thus leaving his hands free to move the carriage containing the type-plates. The device which is used in the machine shown consists of a segmental rack 38 on a quadrant 39, moving in a vertical plane at right angles to the front bar of the machine and suitably pivoted to the front of the machine. This segmental rack extends backward from the front of the machine, and connected to the front of this rack and moving with it on the same axis is a bar 40, extending downward, and which bar, as is shown, may be cast in the same piece with the rack.

Attached to the bottom of the bar 40 is a device for receiving the foot of the operator. As shown in Fig. 1, it may be conveniently formed from four bars 41, connected to form a quadrilateral frame. This frame is swung backward by the pressure of the foot of the operator, thus partially rotating the segmental rack, and when the pressure of the foot is removed from the frame this frame returns by its weight to its original position and carries down the segmental rack. This device is a suitable means for applying foot-power to operate the machine; but other means may be used and the segmental rack may be used when the power used is other than foot-power.

It is desirable that the case or carriage containing the type-plates shall be held in position and the selected type-plates shall be seized by the fork 16 before the movement of the type-plate to the printing-point commences and that this movement should commence slowly, proceed with an accelerated motion, and end slowly, thus avoiding a violent blow of the type-plate upon the device, with which it comes into contact on the completion of its movement, and also that the impression should be effected with force after the type-plate has been brought to the printing-point. The mechanism now to be described is designed to accomplish these results.

The segmental rack 38 engages with a pinion 42, fixed upon a shaft 43, parallel with the front of the machine and suitably supported under the frame of the machine, and this pinion is in such relation to the teeth of the segmental rack that the pinion engages with the segmental rack as soon as the latter commences to move.

Fixed upon the shaft 43 is an arm 44, which by its movement effects the engagement of the beveled wheel 14 with a notch on the bar 13 on the under side of the case or carriage for the type-plates and by its return move-

ment effects the disengagement of the beveled wheel, and attached to a sleeve 45' on the shaft is another arm 45, which by its movement effects the rotation of the wheel 24 and the consequent movement of the type-plates to the printing-point.

As soon as the shaft 43 commences to rotate by the engagement of a tooth of the segmental rack with the pinion 42 on the first movement of the segmental rack the arm 44 swings backward and effects the sudden upward movement of the beveled wheel by the device hereinafter to be described, so that the case or carriage holding the series of type-plates is brought into place, so that one of the plates can be seized by the fork 16. As the shaft continues to rotate by the continued movement of the segmental rack the end of another shorter arm 46, fixed on the shaft 43, engages with the arm 45, being provided for that purpose with a projection 47 at right angles to the arm 46, and when the arm 45 moves it draws downward a chain or cord 48, attached to the extremity of the arm and passing under a pulley 49 on a shaft 50, which is properly supported parallel to the shaft 43. For the purpose of steadying its movement this chain or cord 48 passes over another pulley 51, and at the other end is attached to the periphery of a wheel 52, fixed on the shaft 25 of the wheel 24, and consequently when the cord 48 is pulled down this wheel 24 is rotated and the cord or chain 23, attached to the periphery of the same, is wound on the wheel 24, the frame 21 is drawn up, and the selected type-plate is carried to the printing-point.

The ratio between the diameters of the wheels 24 and 52 will depend upon the distance which it is necessary to move the frame 21 to bring the type-plate to the printing-point. The ratio between the diameters of the wheels 52 and 24 shown is one to two, and this for the machine described is a satisfactory ratio.

The arm 45 is slightly inclined forward from the perpendicular and sufficiently so that when brought to this perpendicular it will bring the chain 48 under the pulley 49, and thus bind it on the pulley, so that the chain will have a regular movement; but the rate at which the cord is pulled while being carried under the pulley while the arm 45 is becoming perpendicular will be, in accordance with well-known principles, less than the rate given to the cord or chain by the further movement of the arm, and that rate will constantly increase until the arm has reached a certain point and then diminish until the arm has moved through a semicircle, when practically no further pull will be exerted upon the cord or chain. The wheels 24 and 52 will therefore commence their rotation slowly, and the rate of rotation will accelerate and then diminish, and consequently the frame 21 and type-plate carried thereby will start slowly, then move rapidly toward the printing-point,

and then move slowly, and thus reach that point without shock or blow to the part with which it comes into contact.

The mechanism for moving the beveled wheel is designed to give a sudden movement to that wheel. It consists of a shaft 53, suitably supported parallel to the shaft 43 and having an arm 54 fixed thereon in the path of the arm 44 and struck by the same when this arm first commences its movement, thus partially rotating the shaft, and for the purpose of avoiding friction a roller 55 may be placed on the end of the arm 54. Another arm 56 is also fixed to the shaft 53, and this arm on the return movement of the arm 44 is struck by a pin 57 on the end of the arm 44, thus effecting the rotation of the shaft 53 in the other direction, and near the other end of the shaft is fixed another arm 58, which is connected by a suitable rod 59 or other suitable device to the shorter arm of the bell-crank lever 15, to which the beveled wheel 14 is attached. The first partial rotation of the shaft 53 draws back the shorter arm of the bell-crank lever 15 and throws up the beveled wheel, and the release movement of the shaft 53 throws the shorter arm of the bell-crank lever forward and depresses the longer arm of the bell-crank lever and the beveled wheel attached thereto.

A suitable spring may be attached to the arm 44 for the purpose of insuring its return movement.

The frame carrying the type-plate might be otherwise moved than by winding up a cord or chain—as, for example, by an arm suitably operated; but advantage is found in the use of a chain. The cord or chain may also be wound by mechanism other than that described.

In the hereinafter-described embodiment of the principle of this invention the impression of the type is effected by the action of a suitable platen, which presses against the type on the type-plate when the type is brought opposite the platen and the paper or other material on which the impression is made; but in carrying the principle of this invention into effect the impression may be effected by bringing the type on the type-plate against this material and the platen. This platen 60 is shown in detail view in Figs. 3 and 6. It may be constructed in the ordinary manner and is attached to a sliding rod 61, supported on a frame 62, attached to the rear of the standard 26 below the plane of the movement of the type-plate to the printing-point and at right angles to this plane. The upward movement of the rod 61 to bring the platen 60 against the paper or other material to be printed is effected by the engagement with a pin 65 on the rod 61 of an arm 63 of a bell-crank lever on a shaft 64, supported between the sides of the frame 26. The other arm 66 of the bell-crank lever is connected by a rod 67 with one arm 68 (see Fig. 10) of

another bell-crank lever pivoted on the shaft 53 and having its other arm 69 in the path of the quadrant 39.

A vertical adjustable bolt or set-screw 70 on the end of the arm 69 is brought into contact with a plate 71 on the upper side of the quadrant when the segmental rack 38 has nearly completed its movement, and thus the arm 69 is elevated with considerable force, so that the rod 61 of the platen is thrown upward and by the action of the platen and the paper or other material receiving the impression is brought against the type at the time when by the movement of the frame 21 the type-plate has been brought opposite the platen and when by the termination of the downward movement of the arm 45 the further movement of the cord or chain 23 has been practically arrested. The force of the impression can be controlled by the operator. The platen will return to its original position by the action of gravity when pressure upon the arm 69 is withdrawn; but a spring may be used to insure this return.

The extent of the movement of the type-plate determines which one of the types placed on its face in a line coincident with its line of movement shall be brought to the printing-point—as, for example, the lower-case type on the upper part of the type-plate or the upper-case type on the lower part of the type-plate, which upper-case type obviously will require a greater extent of movement of the type-plates to bring the type to the printing-point than the lower-case type, and this extent of movement is determined at will by varying the amount of rotation given to the wheel 24, and consequently to the periphery of the wheel 52, to which is connected one end of the chain or cord 23, connected by its other end to the sliding frame 21, having the selected type-plate carried thereby. This result may be effected by taking up a part of the chain 48, and convenient means for doing this is by bringing a supplementary pulley 71' against the cord or chain 48, connecting the wheel 52 with the moving arm 45, whereby the pull of the chain 48 is increased and a greater movement of rotation given to the wheel 24, and consequently to the wheel 52, than when the chain is free from this pulley. In order that this supplementary pulley may be brought with force against the chain and at the will of the operator, this pulley is mounted upon the end of an arm 72, attached to a sleeve 73 on a shaft, preferably the shaft 50, Figs. 9 and 10, and slides on this shaft against the pressure of a spring 74. Fixed on this sleeve is another arm 75, the end of which may be brought into the path of a roller 76 or other suitable device carried upon the frame of the segmental rack. The arm 75 is moved transversely by means of a fork or clutch 77, embracing the sleeve 73, and the end of the arm is brought into the path of the roller 76, and thus the arm is caused to swing upward by

the engagement with it of this roller when the segmental rack commences to move. The clutch or fork 77 bears against the side of the arm 75 and is attached at right angles to a rod 78, parallel to the shaft 50 or its equivalent and supported to move transversely, and this transverse movement is effected by means of the lever 79, attached at one end to the rod and having its other end in reach of the operator and capable of being held to the frame by engagement with a suitable catch. A spiral spring 80, mounted on the rod 78 between the fork or clutch 77 and one side of the frame supporting the rod 78, acts to return the lever 79 and move the clutch 77, so that the spring 74 can act to move the arm 75 from the path of the roller 76 on the frame carrying the segmental rack.

When the arm 75 is thrown up by the engagement of the roller 76 with the extremity of this arm, the arm 72 is also thrown up and the supplementary pulley 71 is brought against the chain or cord 48, thereby pressing it inward and increasing the extent of its pull. When the lever 79 is moved to bring the arm 75 in the path of the roller 76 or other similar device on the frame carrying the segmental rack, the first movement of the rack will cause the supplementary pulley 71 to be brought against the chain 48, so that its pull will be increased, and when on the further application of power the frame 21 is moved the type-plate carried thereby will be carried far enough to bring the type on the lower part of the type-plate opposite to the printing-point.

On the inside of the curved standard 26 is a suitable support 26' for a suitable ink-roller 81, and this roller extends transversely and is in such relation to the type-plate that on the passage of the same the under side of the plate will come into contact with the surface of the roller and the type will be inked.

Rollers each having ink of a different color may be supported end to end, so that the type can be inked with any desired color, as shown in Fig. 30, the rollers being adjusted along the support 26' to bring the desired roller in position.

It will be observed that the type comes into contact with the inking-roller in its movement to the printing-point and on its return movement.

Suitable rollers 82, each respectively mounted on one of the standards 26, respectively, and above the ink-roller bear on the type-plate as it passes to the printing-point and hold it against supports 82', attached to the frame on each side. A suitable elastic cushion 82'' may be placed on each of the supports. This means for supporting the type-plate is shown in Fig. 25.

The device for supporting the paper or other material for receiving the impression is similar to that used in the ordinary type-writing machine. It consists of a cylindrical frame 83, mounted to move through circular open-

ings in the standards 26 and below the platen on suitable ways 83' on suitable standards 84, each supported on cross-pieces connecting the rods 1 or otherwise suitably supported, and of a roller 85, mounted on said frame and parallel with the axis thereof, which roller supports the paper or other material receiving the impression. Suitable springs 86 act to keep this material against the surface of the roller, and the material for printing may be supported within the cylindrical frame 83, and after a line has been printed the material is carried over suitable springs 87, suitably attached to the frame—as, for example, by the curved bars 88.

Attached to the upper part of the cylindrical frame 83 and behind the paper-roller 85 is a rod 89, parallel with the axis of the frame 83, and parallel with this rod and moving in and supported by the frame 62, carrying the platen, is another rod 90. To this rod 90 is fixed a suitable clutch by means of which the paper-carriage is moved after each impression to form the spaces between the impressions and to afford a fresh surface for another impression. To this clutch is pivoted one end of a horizontal bar 91 or other suitable connecting device, and the other end of the bar is pivoted to one end of one arm 92 of a bell-crank lever pivoted to an arm 93, attached to the side of the frame. A suitable spring 94 connects the arm 92 to the frame. When the end of the arm 92 is drawn away from the frame against the tension of the spring 94, the clutch is inoperative on the rod 89 and moves on the same without moving this rod; but when the spring retracts the arm 92 the clutch is engaged with the rod 89, and consequently the paper-carriage is moved.

The outward movement of the arm 92 is effected by the type-plate as it comes to the printing-point, but when after the impression the type-plate commences to return to its original position the spring 94 is allowed to act, and consequently the clutch engages the rod and the paper-carriage is moved for a distance equal to the movement of the clutch. It will be seen that the clutch has a variable movement according to the extent of movement of the arm 92.

Instead of a clutch a suitable pawl acting upon a rack on the rod 89 may be used or any other device for effecting the intermittent connection between the rods 90 and 89.

The clutch used is shown in an end view in Fig. 4. It is composed of a cylinder 95, through which the rod 90 passes and which is fixed on this rod. Forming a part of the cylinder is a semicylinder 96, which embraces the under side of the rod 89, and to the cylinder is attached an arm 97, through which passes a short shaft 98. To this shaft is attached, by a suitable arm 99, a semicylinder 100, opposite to the semicylinder 96 and embracing the upper side of the rod 89, and to the shaft 98 is also attached the bar 91. The arm 99 acts as a toggle, and when the arm 91

is drawn in one direction by the arm 92 the semicylinder 100 is loose on the rod 89 and the clutch does not move this rod; but when the arm is moved in the other direction by the action of the spring 94 the semicylinder 100 binds the rod, so that it moves with the clutch and throws the rod 89 forward, as shown in Fig. 27. To prevent the rod 89 from continuing to move by its momentum after the bar 91 has returned to its normal position by the complete retraction of the spring 94, a plate 101 is attached to the inside of the frame supporting the rod 90, against which plate the semicylinder 100 strikes when the bar 91 has completed its return movement, thus throwing back the semicylinder 100 to bind it upon the rod 89. This clutch is applicable to any form of type-writing machine and can be used for giving a variable movement to the paper-carriage.

The device by means of which the type-plate is made to move the arm 92 is shown in a detail view in Fig. 11. It consists of a rod 102, parallel to the guide-rods 22 and between the same and moving in a cross-piece 103, connecting the upper ends of these rods. Fixed on this rod are two arms 104 at right angles thereto and separated from each other by a space equal to that between the two types on the type-plate. To the rod 102 is connected a cord or chain 105, passing over suitable pulleys 106, attached to the frame of the machine, to the lower arm 107 of the bell-crank lever pivoted to the arm 93, and therefore the upward movement of the rod 102 draws in the arm 107, and thus effects the transverse movement of the rod 90. This movement of the rod 102 is effected by the engagement with one of the projecting arms 104 of either of two pins 101, set at equal distances apart upon the upper edge of each type-plate, one arm being moved by one pin and the other arm by the other pin and the action of the respective pins being determined by the extent of movement of the type-plate. As the type are shown as placed on the type-plate shown in Fig. 18 the lower projecting arm 104 will be moved when the lower-case letter "a" is brought to the printing-point and the upper projecting arm 104 when the upper-case letter "A" is brought to the printing-point. These arms 104 are so placed that the rod 102 will be moved some distance before the type comes into position for giving the impression. The length of each of these pins 101 is proportionate to the width of the type upon which it is placed, and therefore the distance through which the rod 102 is moved and the extent of movement of the clutch upon the rod 89 and the consequent movement of the paper-carriage when the clutch engages with the rod 89 will depend upon the width of the character, group of characters, or picture printed, thus insuring spaces of equal length between these impressions.

When a type on the lower part of the type-plate is to be printed, it will be necessary to

remove out of the path of the pin 101 above this type the projecting arm 104, which is in the path of the pin above the other type. This is effected by the movement of the hand-
 5 lever 79 when the supplementary pulley 71 is moved against the chain 48, so that this chain has the extent of pull required to bring the type on the lower part of the type-plate to the printing-point by means of a cord or
 10 chain 108, connected at one end to this lever and passing over suitable pulleys 109, attached to the frame of the machine and connected at the other end to the device for moving the projecting arm out of the path
 15 of the pin 101, whose engagement with one of the arms 104 is not desired. A convenient device for accomplishing this is shown in Figs. 11 and 13. The rod 102 is capable of rotation on its axis, and one of the arms
 20 104, fixed to the rod 102, has projecting downward from it a rod 110, which is embraced by a fork 112 on one arm of a bell-crank lever 108', having the chain or cord 108 attached thereto and pivoted on a suitable part of the
 25 frame under the guide-rods 22. The fork may be kept against the rod by a spring. Drawing on this chain moves the bell-crank lever, rotates the rod 102, moves the lowermost of the arms 104 out of the path of the
 30 pin 101 for the type on the upper part of the case, and brings the uppermost of the arms 104 in the path of the pin 101 for the type on the lower part of the case. The length of each pin varies with the width of the type to
 35 which the pin corresponds, and consequently each time either of the arms 104 is struck by a pin the extent of the upward movement of the rod 102, and consequently the extent of the movement on the rod 89 of the clutch, will
 40 be determined by the length of the pin, and after an impression the paper-carriage will be moved for a distance equal to the movement of the clutch before an impression, and consequently will vary with the space occu-
 45 pied by the impression made, thus forming spaces of equal length between each impression.

The invention is not limited to the use of pins on the upper edge on the type-plates and
 50 of arms engaged by these pins, and thus moving a rod connected to the mechanism moving the paper-carriage; but any other suitable devices can be used; but it is desirable that the mechanism should determine a move-
 55 ment of the paper-carriage after each impression in accordance with the width of that impression.

The paper-roller can be turned by hand by means of a suitable wheel 114 to produce the
 60 required spaces between the lines, and a ratchet-wheel and dog may be used to afford a step-by-step movement.

The clutch can be loosened on the rod 89 to permit the free movement of the paper-carriage by moving a lever 115, bearing against
 65 a swinging rod 116 on arms pivoted in the frame 83, upon which rod a wire 117, con-

nected at one end to the toggle bar or arm 99, is hooked at the other end.

In order to provide a sufficient number of
 70 type-plates for the various different characters and forms of type which may be required in the practical use of the machine, supplementary cases or carriages for the type-plates
 75 are provided. These cases or carriages, as shown in Fig. 16, are each supported upon rods 8, and, as before described, these rods are parallel and are on the same plane with the rod extending along the front of the machine. These rods are supported upon a frame
 80 118', and this frame moves on rods 118 at each end of the main frame of the machine and extending from the front to the rear, and by registering either of the rods 8 with the similar rod extending along the front of the machine
 85 either of the cases or carriages can be brought before the operator. Stops 119 are provided at each end of the rod 118 to retain the cases or carriages on the rods, and on the frame 118
 90 and opposite the inner end of each of the rods 8 (see Fig. 8) is pivoted an arm 120, extending above the surface of the rod 8, curved at its upper end and maintained upright by a suitable spring 121. This prevents the carriage from moving from the rods 8 except
 95 when they register with the rod extending before the operator when the end of this rod, by engagement with the arm 120, depresses the end of the same. Suitable stops 118'' are secured to the outer ends of rods 8 to retain the
 100 carriages thereon.

Having thus described our invention, what we claim, and desire to secure by Letters Patent of the United States, is—

1. In a machine for the individual and suc-
 105 cessive printing of characters or groups of characters, the combination substantially as set forth, of a series of suitably-supported and individually and independently movable type-holding devices or cases each carrying
 110 one or more removable type plates or bars, means for enabling the selection, independently of the others of any one of these type-holding devices, to bring any one of the type plates or bars to the same point, a single
 115 means, common to all of the type-holding devices of the series, and acting to remove the type plate or bar from the type-holding device and bring the same to a point opposite to the surface upon which the impression is
 120 to be made and common to all of the type-holding devices; means acting to effect an impression upon a suitable material, and means for returning, after the impression, the type plate or bar to its place in the type-
 125 holding case or device, whereby characters can be successively printed of a size sufficient to enable them to be seen at a distance.

2. In a printing-machine of the class described, the combination, substantially as set
 130 forth, of a series of suitably-supported and individually and independently movable type-holding devices or cases and each carrying one or more removable type plates or

bars, means for enabling the selection independently of the others of any one of these type-holding devices to bring any one of the type plates or bars to the same point, a single means common to all the type-holding devices and acting to remove the type plate or bar from the type-holding device and carry the same to a point opposite the surface upon which the impression is to be made and common to all the type-holding devices, means acting to effect an impression upon a suitable material and brought to a common point, means operated by the movement of the type-holding device to effect the operation of means acting to move the material to afford a fresh surface for the next impression, and the said means for moving the material.

3. In a printing-machine of the class described, the combination, substantially as set forth, of a series of suitably-supported and individually and independently movable type-holding devices or cases, each carrying one or more removable type plates or bars, means for enabling the selection, independently of the others of any one of these type-holding devices to bring any one of the type plates or bars to the same point, a single means, common to all the type-holding devices, and acting to remove the type plate or bar from the type-holding device and carry the same to a point opposite to the surface upon which the impression is to be made, and common to all the type-holding devices, means acting to effect an impression upon a suitable material, means operated by the movement of the type plate or bar to effect the operation of means acting after the impression to move the material for a distance proportionate to the width of the character which has been printed whereby spaces of equal length are obtained between the characters, and the said mechanism for moving the material varying distances.

4. In a printing-machine of the class described, the combination, substantially as set forth, with a movable type plate or bar having two or more characters thereon, means to move the type plate or bar varying distances to bring any one of the characters to the printing-point, two or more devices each acting according to the extent of movement of the type-plate and operated by the movement of the type-plate to effect the operation of the mechanism feeding the paper or other material receiving the impression for a distance sufficient to afford a fresh surface for an impression, and the said feeding mechanism.

5. In a printing-machine of the class described, the combination, substantially as set forth, with a movable type plate or bar of two or more devices each actuated by the movement of a type-plate to a different extent to effect the movement of the mechanism for feeding the material receiving the impression to afford a fresh surface for the next impression, the said feeding mechanism, means

to determine the extent of movement of the type-plate, means for moving the type-plate, and means to move one of the devices out of the path of movement of the type-plate and to throw the other of said devices in position to be actuated thereby.

6. In a printing-machine of the class described, the combination, substantially as set forth, of a series of suitably-supported, separately-detachable and independently-movable type-plates each carrying one or more characters and supported each in a vertical plane with each character-surface turned in the same direction, means for carrying any one of these plates to the printing-point, and means automatically acting during the movement of the plate to turn the same on its axis so as to bring the character-surface opposite to the surface to be printed upon and in a plane parallel with this surface.

7. In a printing-machine of the class described, the combination substantially as set forth, of a suitably-supported and independently-movable rectangular type-plate capable of being moved to the printing-point, characters on one surface of the plate, means for bringing either character to the printing-point by a different extent of movement of the plate, a pin on the upper edge of the plate for each character of a length proportionate to the width of the type, and means operated by said pin to move the material printed upon the proper distance to afford a fresh surface for the next impression.

8. In a printing-machine of the class described, and having a series of suitably-supported, separately-detachable and independently-movable type plates or bars, grouped and movable before the operator and each carrying one or more characters, the combination substantially as set forth, of a device mounted to swing on a suitable axis and moved on this axis and away from the operator by the pressure of the foot of the operator, and returned to its normal position by gravity, means operated by the first movement of the swinging device to prevent the series of type plates or bars from moving and to bring that one of the type plates or bars which is selected for printing into position to be seized by a suitable carrying device, means operated by the further movement of the swinging device to effect the seizure of the selected type plate or bar and to carry said plate or bar to the printing-point, means operating on the still further movement of the swinging device to effect an impression upon a suitable material, and means to effect the release of the series of type plates or bars.

9. In a printing-machine of the class described and having a series of suitably-supported, separately-detachable and independently-movable type plates or bars grouped and movable before the operator and each carrying one or more characters, the combination substantially as set forth, of means for preventing the groups of type plates or bars from

moving and to aline that one of the type plates or bars which is selected for printing with a carrier, the said carrier and the same adapted to seize the selected type plate or bar and to convey it to the printing-point with a movement accelerated at first and then decreased in velocity, means acting on the cessation of the movement of the type-plate to effect an impression on a suitable material, all operated by a single exercise of power, and means to effect the release of the type-plate.

10. In a printing-machine of the class described, the combination, substantially as set forth, of a quadrant pivoted on the frame of the machine and swinging in a vertical plane toward the rear of the machine, a segmental rack on the rear of the quadrant, a vertical bar attached to the front of the quadrant, means attached to the lower end of this bar for receiving the foot of the operator, a type plate or bar, means to carry the type plate or bar to the printing-point, means to effect the impression, means to determine after an impression the movement of the device effecting the movement of the material receiving the impression, the last means being operated by the segmental rack.

11. In a printing-machine of the class described, and having a series of suitably-supported, separately-detachable and independently-movable type plates or bars, grouped and movable before the operator and each carrying one or more characters, the combination, substantially as set forth, of a segmental rack partially rotatable on its axis, a pinion engaging with said rack and fixed on a rotatable shaft, mechanism operating to prevent the movement of the type plates or bars, and to bring the selected type plate or bar into position to be seized by a carrier to convey the type-plate to the printing-point, a device on said shaft acting on the first movement of the shaft to operate said mechanism, another device on said shaft acting on its further movement to operate the carrier for bringing the type-plate to the printing-point, and a device operating on the reverse movement of the shaft to effect the release of the aforesaid mechanism which acts to prevent the type-plate from moving.

12. In a printing-machine of the class described, the combination, substantially as set forth, of a carriage holding a series of type plates or bars and movable transversely before the operator, a bar on the under side of this carriage having V-shaped notches therein each having its apex in a vertical plane passing through the center of the type-holding device, a bell-crank lever suitably pivoted on the frame of the machine and having its lower arm extending down, a double-beveled wheel on the extremity of this lower arm and having its edge in a vertical plane and acting when entering any one of the V-shaped notches on the lower side of the bar on the carriage for the type plates or bars to bring the type-plate above the apex of that notch into posi-

tion to be seized by the device which carries this type plate or bar to the printing-point.

13. In a printing-machine of the class described, the combination of a bell-crank lever 15 carrying a beveled wheel 14, shaft 53 having a bell-crank lever with arms 54 and 56, rod 59 connecting said bell-crank lever 15 and arm 54, shaft 43 having arm 44 adapted to engage arm 54 on its first movement and to engage arm 56 on its return movement, and means for oscillating shaft 43, substantially as and for the purpose shown and described.

14. In a printing-machine of the class described, the combination with means for holding the type-plates in position to be engaged by a carrier for conveying the same to the printing-point, the said carrier and means for moving the same, of a shaft 43 having arm 44 adapted to operate the means for holding the type-plate on its first movement, arm 45 loose on shaft 43 and connected with and adapted to operate the means for moving the carrier, an arm 46 on said shaft 43 adapted to engage arm 45 after the commencement of the rotation of shaft 43, and means for oscillating said shaft, substantially as set forth.

15. In the herein-described printing-machine, the combination of a carrier for the type-plates, and means for bringing the same to the printing-point comprising shaft 43 and means for rotating the same, arm 45 on said shaft, shaft 25, pulley 52 thereon, a chain or cord 48 connecting the arm 45 and pulley 52, pulley 24 on shaft 25, and a chain or cord 23 connecting pulley 24 and the carrier, substantially as shown and described.

16. In the herein-described printing-machine, the combination of a platen for making the impression, and means for operating the same comprising an oscillating quadrant 39, a lever having arm 68 and an arm 69, the latter adapted to be engaged by the quadrant at the end of its stroke, a lever having arm 63 and arm 66, rod 67 connecting arms 66 and 68, and a sliding rod or stem 61 having a projection 65 adapted to be engaged by the arm 63, substantially as shown and described.

17. In a printing-machine of the class described, the combination of a sliding carrier-frame 21, shaft 17 rotatable therein, a type-plate holder connected with said shaft, a lever having arms 34 and 36 pivoted on said frame, rod 33 connecting arm 34 with the type-plate holder, rod 32 arranged along the path of the sliding frame and having a bent portion adapted to rotate the arm 36 to change the position of the plate-holder, and means for returning arm 36 to its normal position, substantially as shown and described.

18. In a printing-machine of the class described, the combination of a carrier, a holder thereon adapted to automatically seize the type-plate individually and independently support the same, and means for automatically releasing the type-plate at or near the end of the return movement of the carrier, substantially as described.

19. In a printing-machine of the class described, the combination of a carrier, a holder thereon adapted to seize the type-plate, a spring 19 adapted to secure the plate to said holder, a lever 31 adapted to engage spring 19, and a projection or part 30 adapted to engage the lever 31 to release spring 19, substantially as shown and described.

20. In the herein-described printing-machine, the combination of a carrier for the type-plate, means for bringing the carrier to the printing-point including wheel 52 and operating chain or cord 48 therefor, shaft 50, sleeve 73 having arm 72 and arm 75, pulley 71' on arm 72 to be brought against the chain, means for shifting sleeve 73 on shaft 50, and the quadrant 39 having a part to engage arm 75 to bring the pulley against the chain, substantially as shown and described.

21. The mechanism for moving the paper-carriage comprising a suitable movable frame 83 for supporting the paper, a rod 89 fixed thereto, a rod 90 supported in and sliding longitudinally on a stationary frame 26, an arm 97 and an arm or semicylinder 96 constructed to embrace one side of rod 89 fixed on rod 90, a part or semicylinder 100 constructed to embrace the opposite side of said rod 89, shaft 98 on arm 97, arm 99 on said shaft and connected with part 100, lever 92, rod 91 connecting arm 97 and said lever 92, and means for operating said lever, substantially as shown and described.

22. In a printing-machine of the class described, the combination with a suitable movable frame for supporting the paper, a rod 89 fixed thereto, a rod 90 supported in and sliding longitudinally in a stationary frame 26, an arm 97 and an arm or semicylinder 96 constructed to embrace one side of rod 89 fixed on rod 90, a part or semicylinder 100 constructed to embrace the opposite side of rod 89, shaft 98 on arm 97, arm 99 on said shaft and connected with part 100, and rod 116 parallel with rod 90 and pivoted to swing in the paper-supporting frame, a wire 117 connecting rod 116 and arm 99, and a lever 115 to move rod 116, substantially as shown and described.

23. In a printing-machine of the class described, the combination of a type-plate, means for carrying the same to the printing-point, sliding rod 102 having arm 104 arranged to be engaged by the type-plate, paper-feeding mechanism, and means connecting said rod and paper-feeding mechanism so that the latter will be operated by the type-plate, substantially as shown and described.

24. In a machine of the class described, the combination of a type-plate having two or more pins or projections 101 101 and means for carrying the same to the printing-point, means for varying the extent of movement of the type-plate, a sliding rod 102 having arms 104 104 arranged at different points and adapted to be engaged respectively by the pins or projections, paper-feeding mechanism, means connecting said mechanism with rod

102, and means for throwing either one of arms 104 104 in position to be engaged by one of the projections or pins 101, substantially as shown and described.

25. In a machine of the class described, the combination of a type-plate having two or more pins or projections 101 101, means for carrying the same to the printing-point, means for varying the extent of movement of the type-plate, sliding rod 102 having arms 104 104 arranged at different points and adapted to be engaged respectively by the pins or projections, rod 110 secured to rod 102, lever 108' adapted to engage rod 110, and means for operating said lever, paper-feeding mechanism, and means connecting said mechanism and rod 102, substantially as shown and described.

26. The combination substantially as set forth, with a case containing parallel receptacles for the type-plates, a bar on the under side of the case having V-shaped notches each having its apex in a vertical plane passing through the center of a receptacle, a double-beveled wheel mounted in a vertical plane and adapted to engage that notch which is in position to be seized by the carrier, the carrier and means for bringing the same to the printing-point, and means for operating the beveled wheel.

27. The combination, substantially as set forth, of a case or carriage moving transversely and containing a series of inclined type-plates, each in a vertical plane, the roller attached to the under side of the case at its lower end, the horizontal rail or rod upon which the roller moves, the guide parallel thereto, and means attached to the under side of the case at its upper end for supporting the case on the guide.

28. The combination, substantially as set forth, of a frame containing two or more inclined type-plate cases each moving upon a rod and guide, the said rod and guide, means for supporting this frame on the machine to bring the rail of either type-plate case on the frame, to register with the rail extending across the front of the machine used for supporting a type-plate case and the said rail.

29. The combination, substantially as set forth, with the supporting-frame, the rods on which the supplementary cases or carriages move laterally, and the supplementary cases thereon of an arm pivoted on the supporting-frame, and opposite the end of the rods and extending above the same, and a spring acting to restore that arm to a vertical position when the upper end of the arm is depressed.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, on this 27th day of May, A. D. 1897.

GEORGE S. HEATH.
MELVIN L. SEVERY.

Witnesses:

ALEX. L. HAYES,
K. G. AMORY.