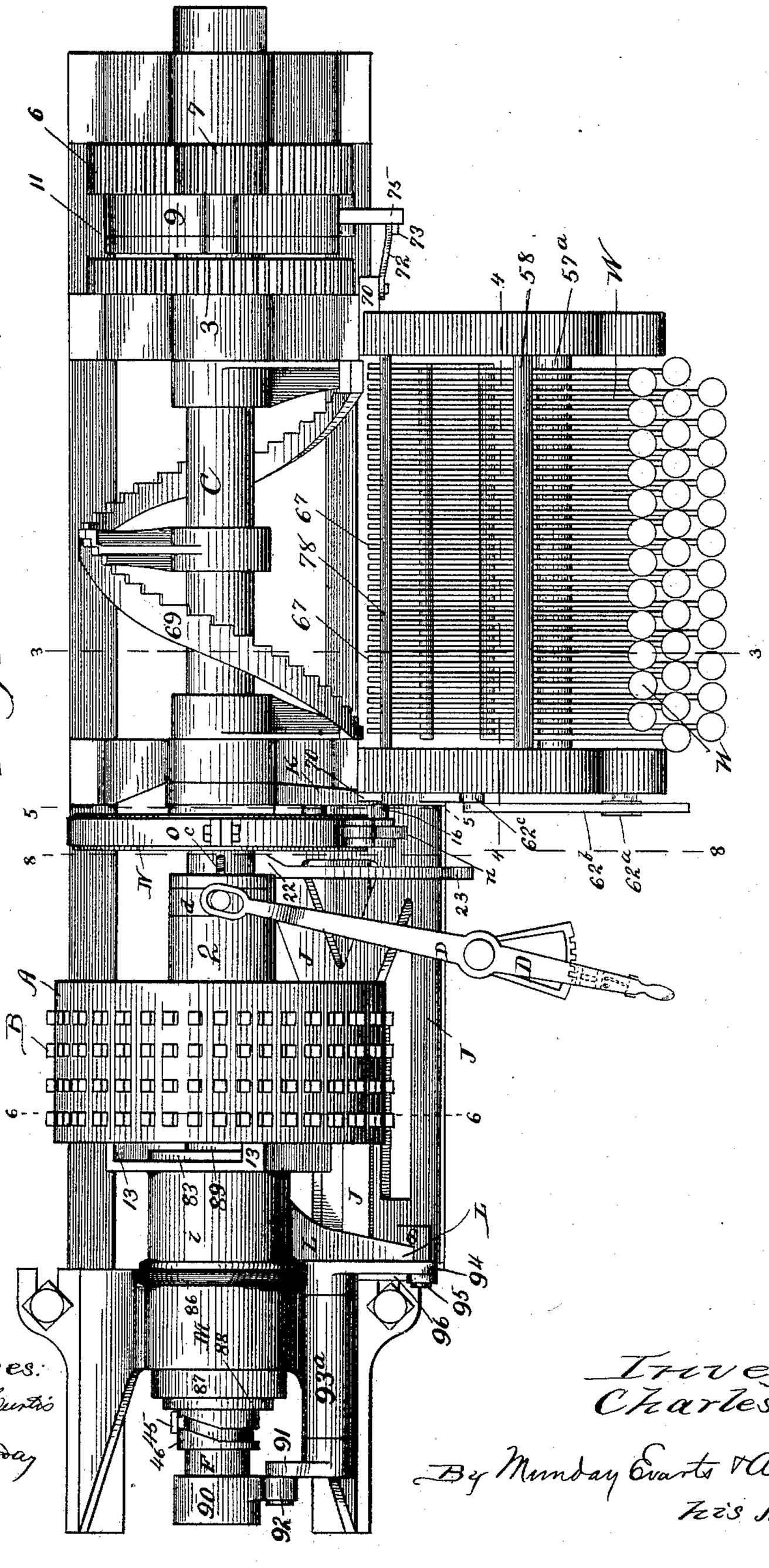
(No Model.) 8 Sheets—Sheet 1.

C. SEARS.

MATRIX MAKING MACHINE.

No. 475,805. Patented May 31, 1892.



Witnesses:
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H. T. Munday

Inventor:
Charles Sears

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(No Model.) 8 Sheets—Sheet 2.

C. SEARS.

MATRIX MAKING MACHINE.

No. 475,805. Patented May 31, 1892.

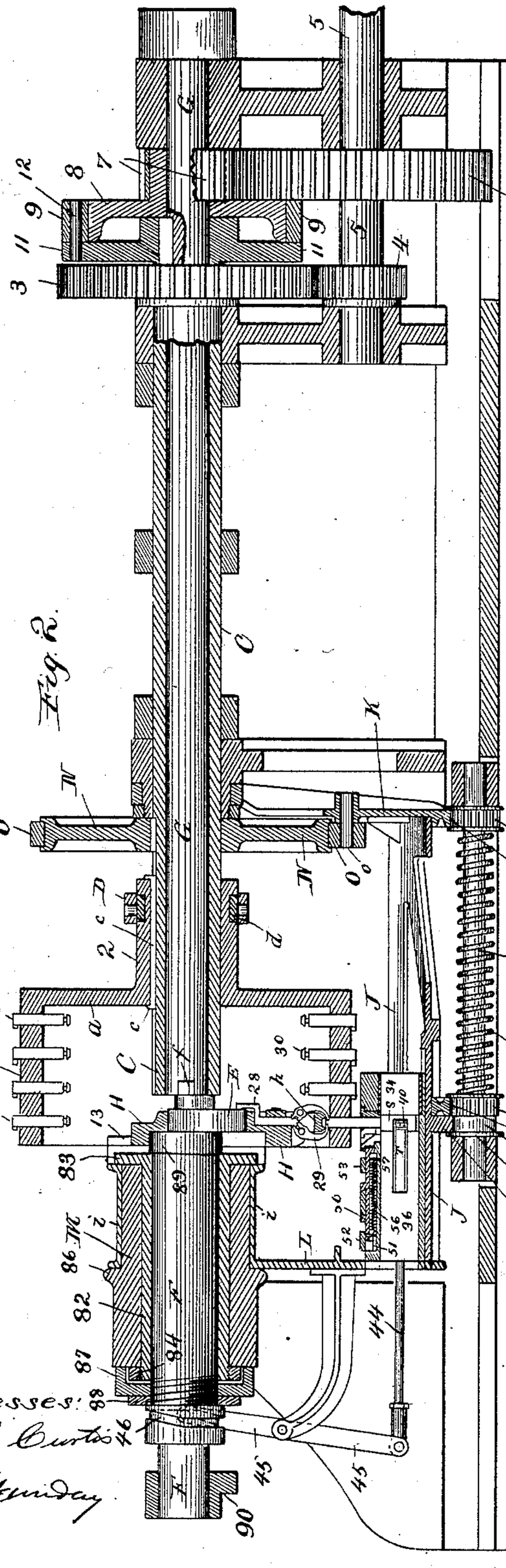

Fig. 2.

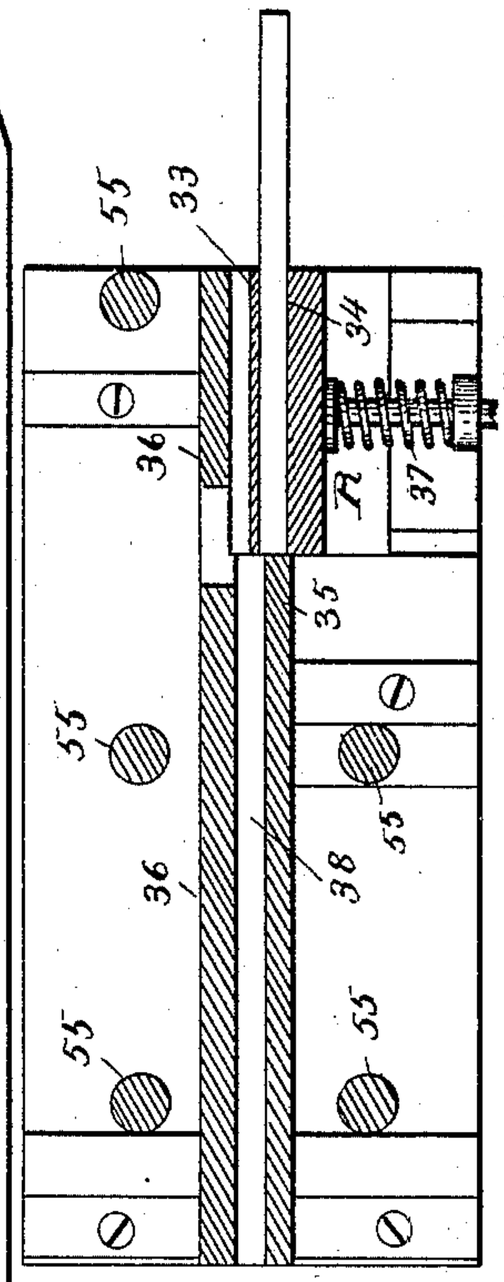

Fig. 3.

Witnesses:
Sam E. Curtis
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(No Model.) 8 Sheets—Sheet 3.

C. SEARS.

MATRIX MAKING MACHINE.

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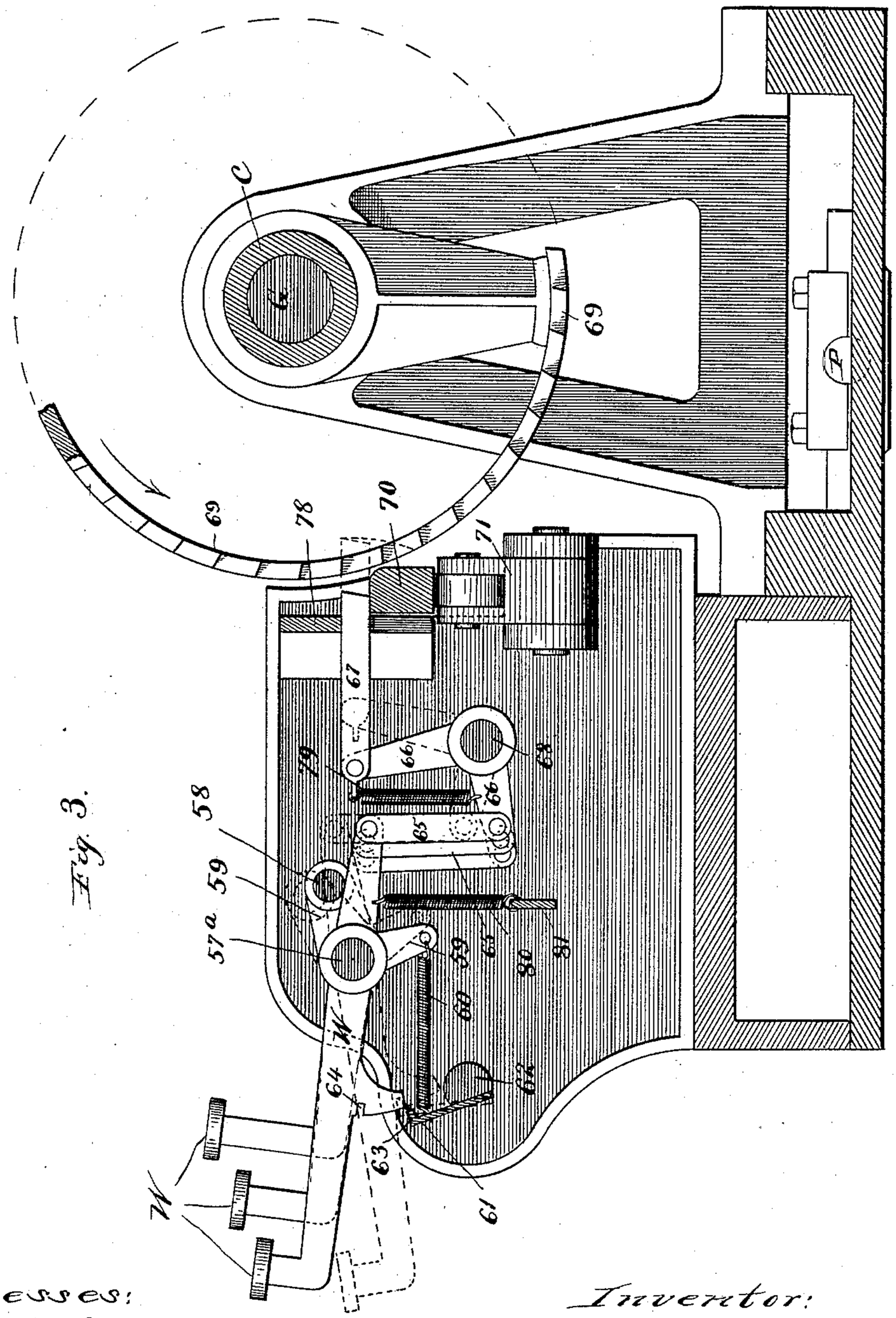

Fig. 3.

Witnesses:
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8 Sheets—Sheet 4.

C. SEARS.

MATRIX MAKING MACHINE.

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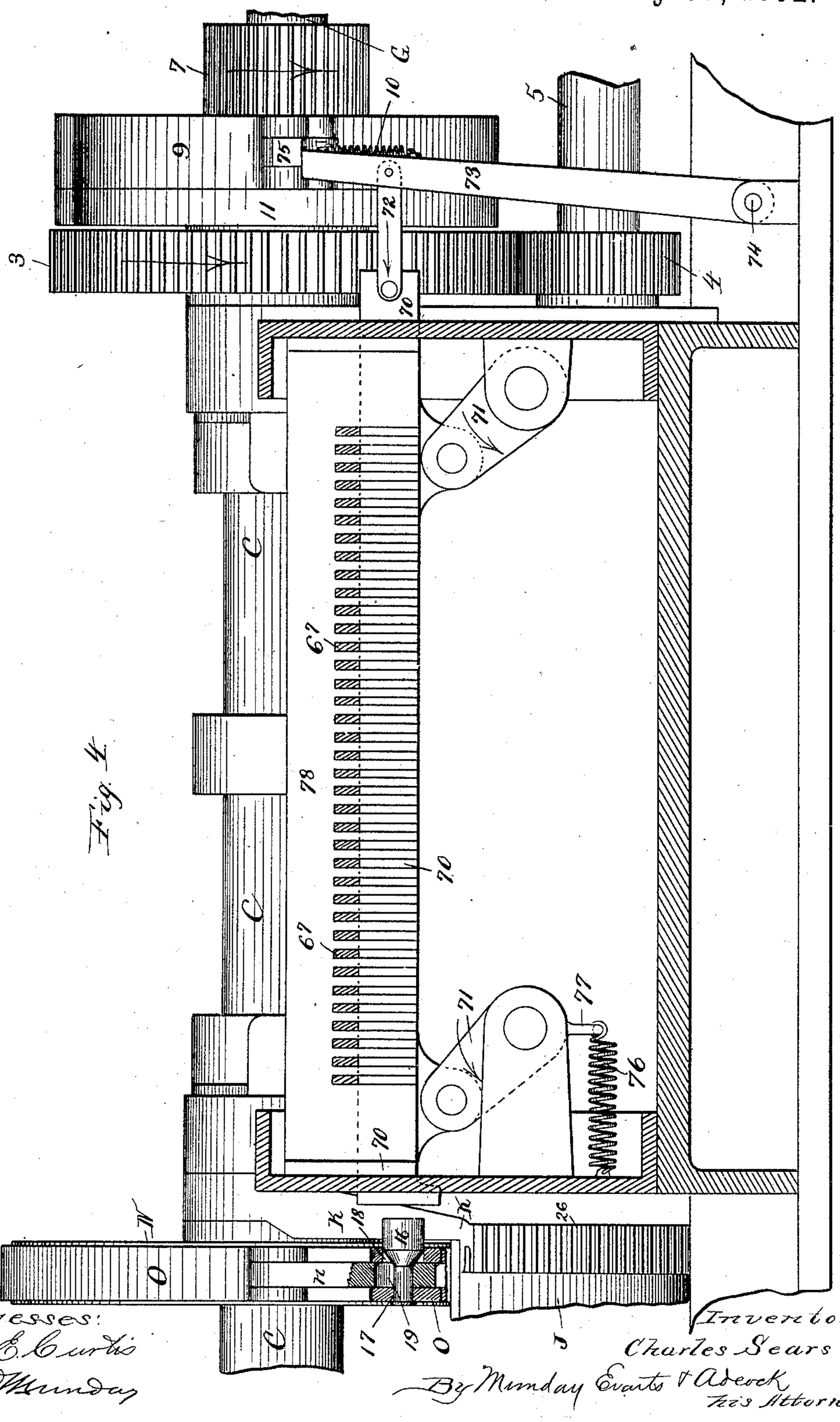

Fig. 4.

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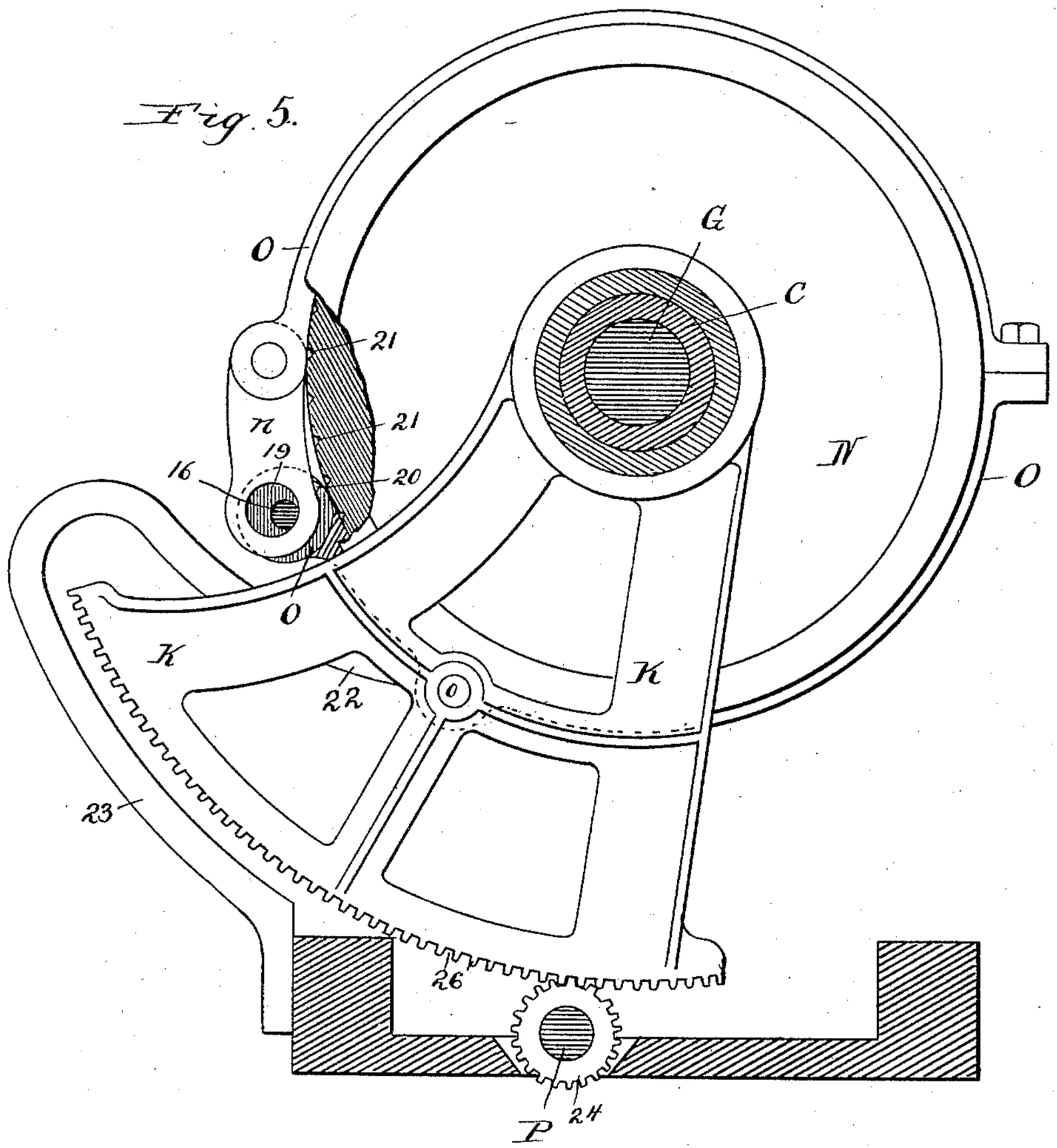
(No Model.) 8 Sheets—Sheet 5.

C. SEARS.

MATRIX MAKING MACHINE.

No. 475,805. Patented May 31, 1892.

Fig. 5.



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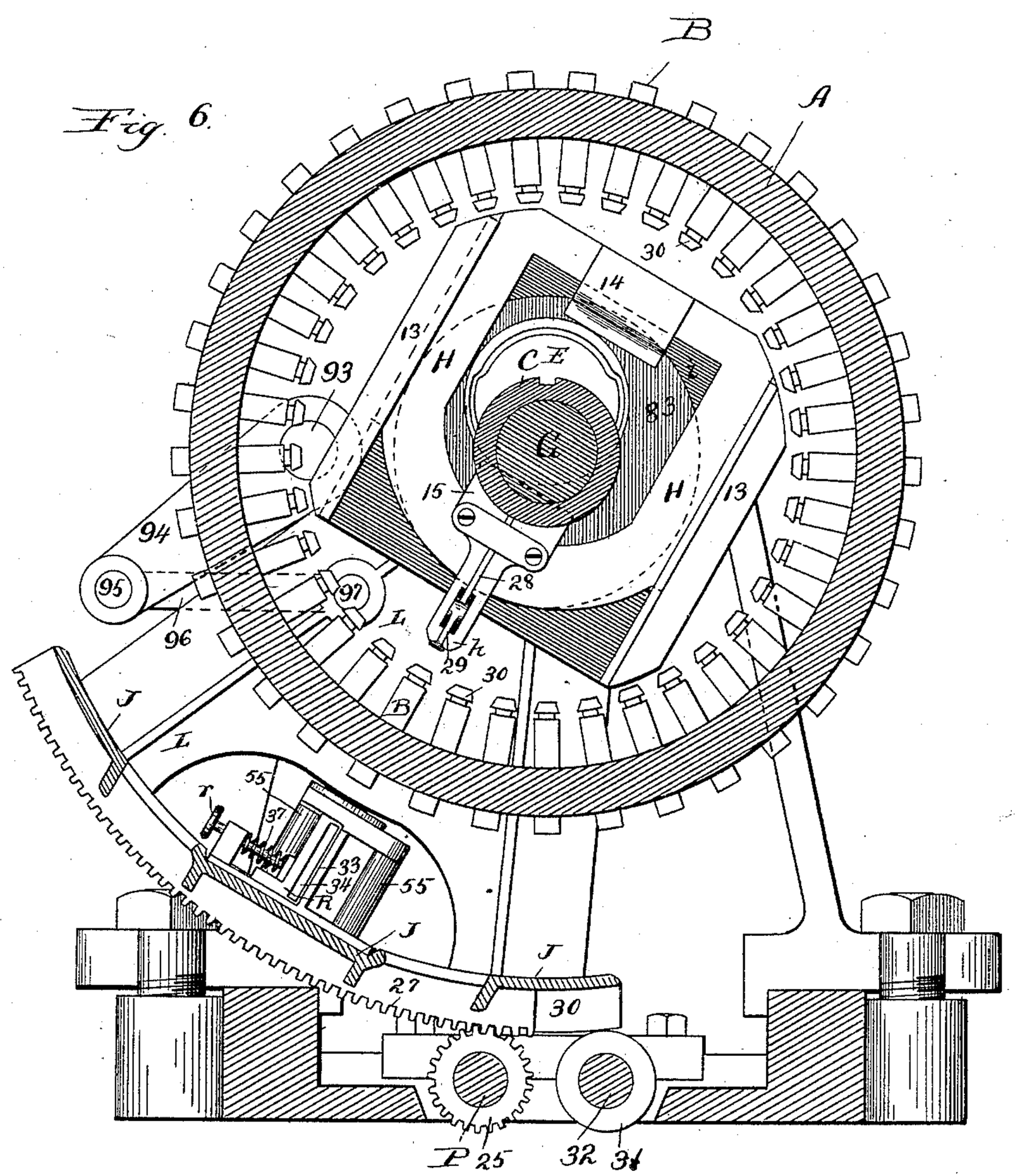
(No Model.) 8 Sheets—Sheet 6.

C. SEARS.

MATRIX MAKING MACHINE.

No. 475,805. Patented May 31, 1892.

Fig. 6.



Witnesses:
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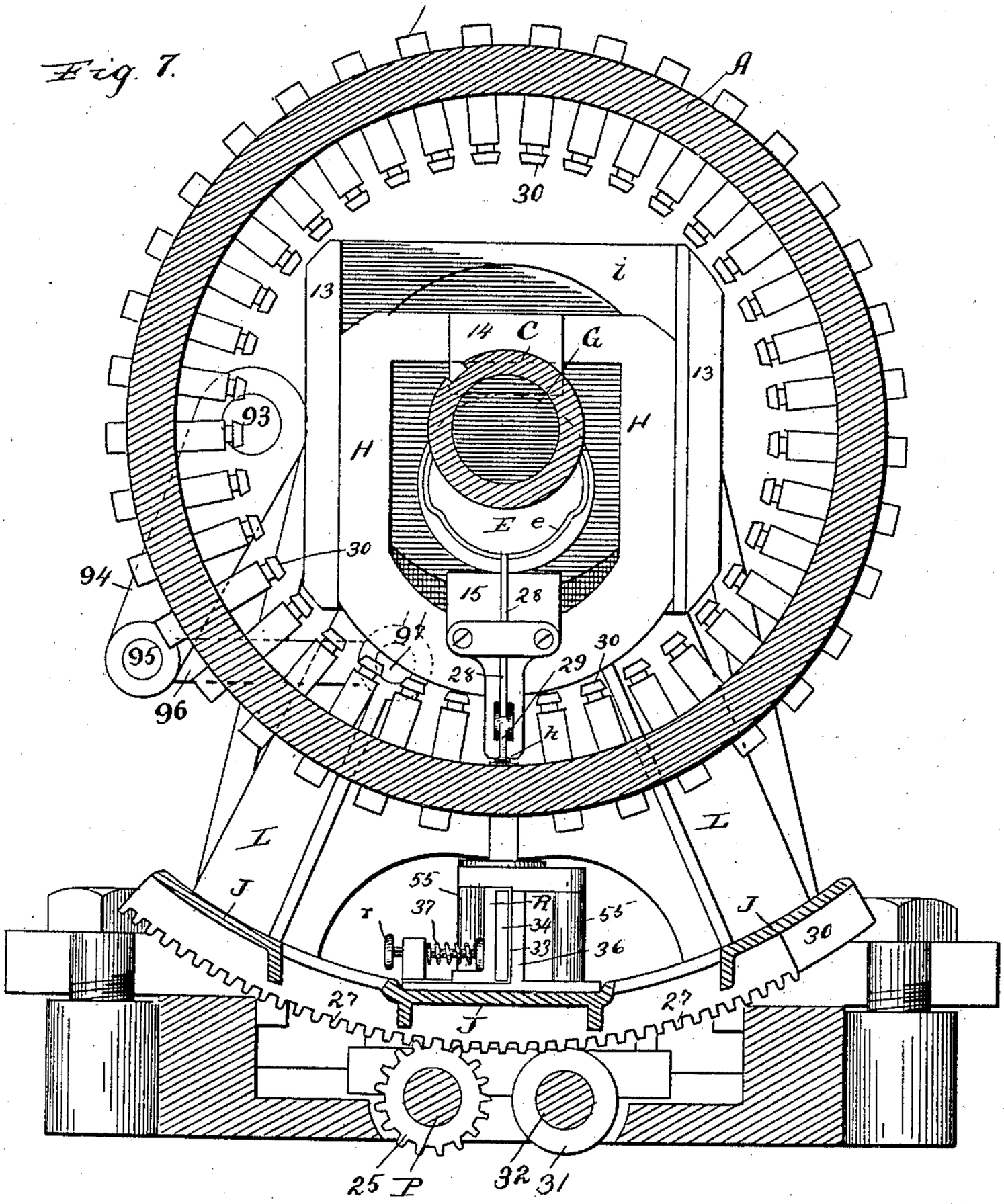
(No Model.) 8 Sheets—Sheet 7.

C. SEARS.

MATRIX MAKING MACHINE.

No. 475,805. Patented May 31, 1892.

Fig. 7.



Witnesses:
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Inventor:
Charles Sears
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His Attorneys.

(No Model.) 8 Sheets—Sheet 8.

C. SEARS.

MATRIX MAKING MACHINE.

No. 475,805. Patented May 31, 1892.

Fig. 8.

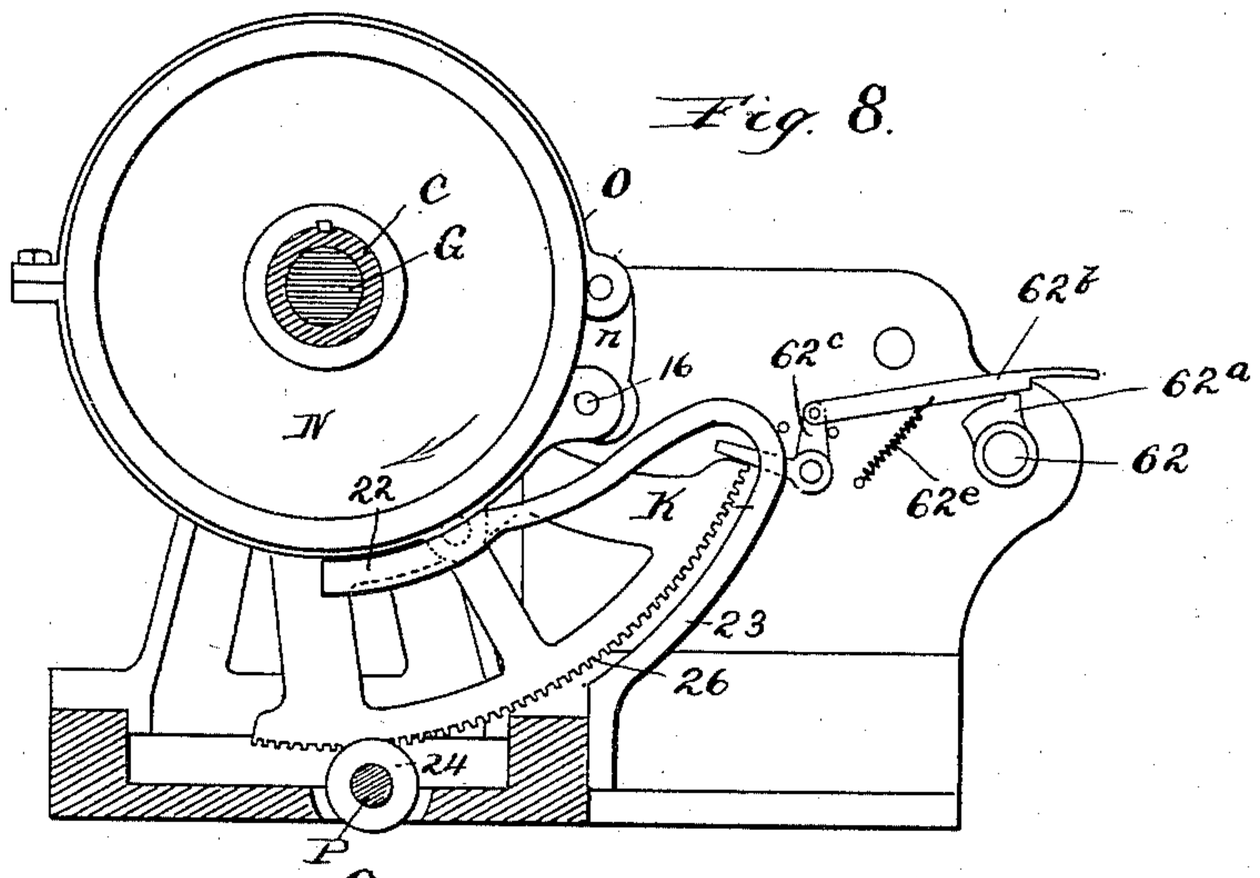


Fig. 9.

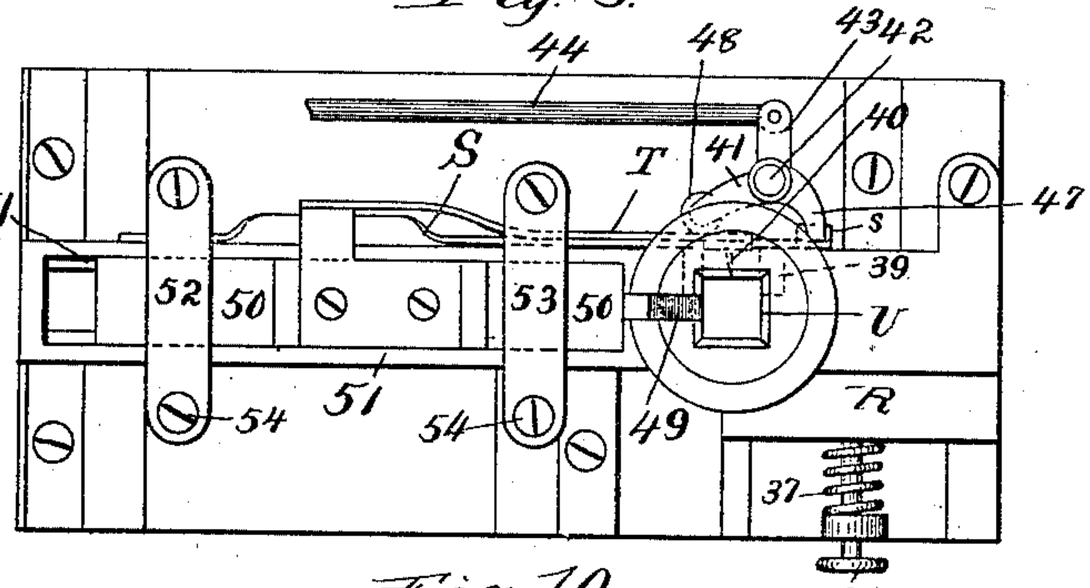


Fig. 10.

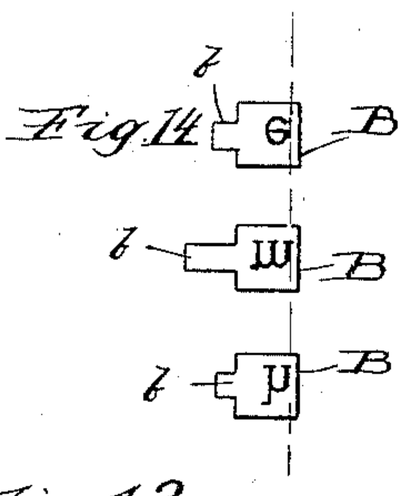


Fig. 12.

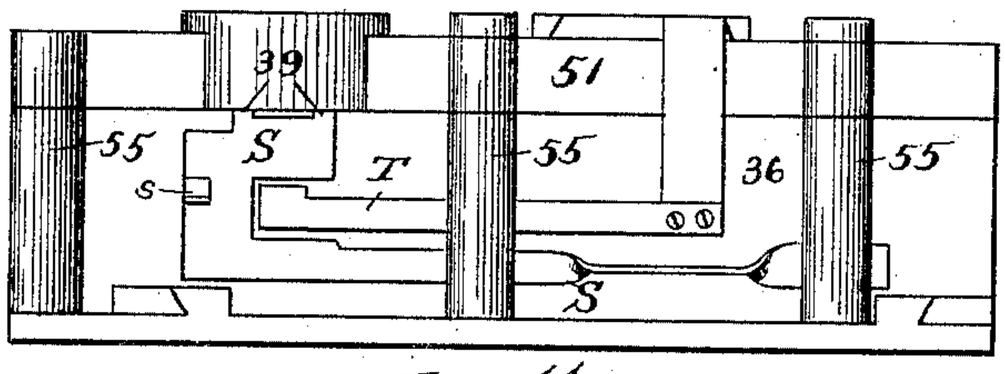
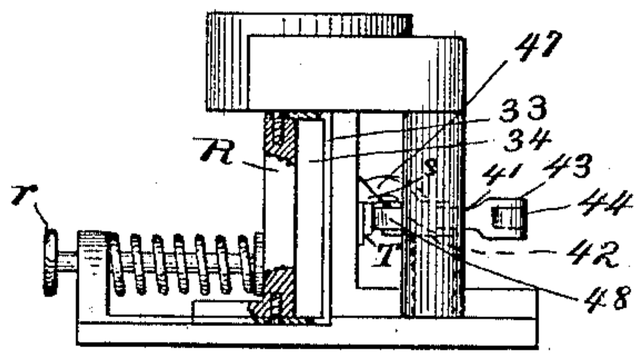
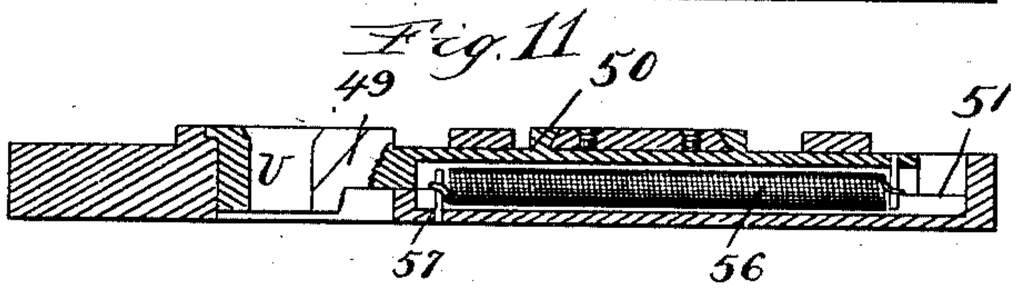


Fig. 11.





Witnesses:
Lew. E. Curtis
H. D. Munday.

Inventor:
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UNITED STATES PATENT OFFICE.

CHARLES SEARS, OF SOUTH EVANSTON, ILLINOIS.

MATRIX-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 475,805, dated May 31, 1892.

Application filed July 18, 1890. Serial No. 359,208. (No model.)

To all whom it may concern:

Be it known that I, CHARLES SEARS, a citizen of the United States, residing in South Evanston, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Matrix-Making Machines, of which the following is a specification.

My object in this invention is the production of an improved machine for making matrices from which casts can be made adapted to be used in printing-presses.

The machine is designed to form the matrix in wood or any equivalent material in which the characters may be impressed singly or letter by letter; but I prefer to use wood with its fibers lying in the direction the impression is made, so that the dies may compress the fibers in the line of their length.

In this machine I employ a rotating type-die wheel, in which the type-dies are disposed in radial openings and through which they are forced against the matrix and a swinging matrix-carrier adapted to be locked to and move with the die-wheel during the making of the impression. I also make the rotation of the die-wheel continuous. The dies are forced outward from the wheel at the proper time by means of a rotating eccentric located within the die-wheel and operated intermittently and with the making of the several impressions. The shaft carrying this eccentric is provided with a clutch, one part of which is continuously driven, and which is closed by the striking of a key-lever to make an impression, thus causing the eccentric to move through a revolution and actuate the type-die which at the time is in the proper position to be actuated from the eccentric. Means are also provided for releasing this clutch at the proper time and stopping said shaft.

The machine also embodies devices for coupling the swinging matrix-carrier to the type-die wheel, devices for releasing such attachment, and devices for returning the carrier to its normal position.

All these features of the machine, as well as other details thereof, I have fully set forth below, and illustrated in the accompanying drawings, in which latter—

Figure 1 is a plan, and Fig. 2 a central longitudinal vertical section, of the machine. Figs. 3, 4, 5, and 6 are sections upon the lines 3 3, 4 4, 5 5, and 6 6, respectively, of Fig. 1. Fig. 7 is a section similar to Fig. 6, showing the parts in another position. Fig. 8 is a section on the line 8 8 of Fig. 1. Figs. 9, 10, 11, 12, and 13 are details of the matrix-carrier. Fig. 14 shows the face ends of several of the type-dies and their relative arrangement on the type-wheel.

In said drawings, A represents the cylindrical or die carrying portion of the type-wheel. Said wheel consists of said portion A, a supporting-disk *a*, and a hub 2. It carries one or more fonts of type B, arranged each font in a row running around the cylinder, the type being disposed in radial openings with liberty to slide therein. The hub of the wheel is keyed to a hollow and preferably a continuously-rotated shaft C by a key *c*, but is movable longitudinally on said shaft by the lever D and the collar *d*, loosely fitted in an annular groove of the hub 2, to bring the wheel into position to change the font of type being impressed. The shaft C may be actuated in any suitable manner—as, for instance, by the spur-gear 3 and the pinion 4, meshing therewith, the latter being rigid upon the driving-shaft 5. The type-dies are forced outward to impress the matrix by the eccentric E and a plunger actuated thereby, the former being secured to the end of a journal F, having a key or square point *f* entering a corresponding recess in the end of the shaft G, fitting the interior of hollow shaft C. Said shaft G is driven from shaft 5 by the spur-gear 6, pinion 7, loose upon shaft G, and a friction-clutch, which consists of the wheel 8, fast to pinion 7, the band 9, encircling said wheel and tightened thereon by the spring 10, and the disk 11, fast upon shaft G and connected to and supporting said band by means of the pin 12. The eccentric actuates in a straight path a slide H, carrying a plunger or point *h*, which strikes the head or top of the type-dies and forces them to descend upon the matrix. The movements of the slide are guided by the ways 13 13, carried by the matrix-supporting frame, as hereinafter described, and moving therewith, and the eccentric actuates the slide through the medium of the upper and lower contact-blocks

14 and 15, mounted upon the slide and maintaining constant contact with the eccentric. The pinion 4 is smaller than the spur-gear 6 on the same shaft 5, and the pinion which drives the shaft G is smaller than the spur-gear 3 on the type-wheel shaft C, wherefore the eccentric E will be revolved much faster than will the type-wheel. The rotation imparted to the eccentric by shaft G results in the actuation of the slide and plunger while the latter are moving with the type-wheel and while the proper relative position is maintained between the type and matrix for the making of the desired impression upon the latter. The slide H is secured to and works upon bracket L, or, more correctly speaking, upon the sleeve *i*, attached to said bracket and encircling the bearing M, which in turn encircles said journal F. The type are drawn back after the impressions through the medium of the same eccentric. A cam-groove *e* in the side of the eccentric actuates at the proper time a lever 28, having a sliding movement upon and supported by the slide H (or its plunger portion) and with its upper point hooked over and into said groove *e*, and causes said lever to move the grippers 29, pivotally supported upon the plunger with their upper ends engaging said lever into gripping position under the heads 30 of the type. The continued rotation of the eccentric will now lift the type. The grippers are also adapted to be opened by the descent of said lever, and the cam-groove is adapted to give all the necessary movements to the lever and at the proper times to cause these operations by the grippers.

The matrix-carrier consists of a bed-plate J, supported upon swinging brackets K L, and appropriate devices, to be described farther on, for holding the matrix firmly thereon. The first of these brackets is journaled in the hollow shaft C and the other upon the journal F. This matrix-carrying frame is, as already intimated, intermittently locked to and moves with the type-wheel through a portion of the path of the latter. The means which I have devised for this purpose I will now describe.

At N is a wheel fast upon the type-wheel shaft C. Encircling this wheel is a friction-ring O, coupled to the bracket K of the matrix-frame by a pin *o*, so as to move with the matrix-frame. The ends of ring O are united by a link *n*, pivotally joined to one end of the ring and united to the other end thereof by a joint, which permits the tightening of the ring upon the wheel. The tightening action may of course be obtained in various ways; but a simple method is to employ a movable pivot-pin—such as is shown at 16 and provided with a tapering enlargement—and to make the openings in the link and ring to correspond with this pin and permit its movement. Thus the opening 17 in one of the forks of the ring is of the diameter of the small part of the pin, while that at 18 in the other fork is large enough to admit the enlargement of the pin. The opening 19 in the link is also of a diameter which will permit the entrance of the tapered part of the pin. In the normal position with the ring loose upon the wheel the openings 18 and 19 do not exactly register, as shown at Fig. 5, and the pin occupies the position also shown at said figure. Now if the pin be moved so that its enlarged portion is forced to enter the opening in the link this end of the link will be drawn upon sufficiently to tighten the ring upon the wheel, and thus cause the two to move together. I prefer, however, not to rely upon friction alone to move the matrix-frame, and hence I provide upon the link a tooth 20 and upon the wheel a series of recesses 21, each adapted to receive said tooth and to engage therewith when the link is drawn upon to tighten the ring. The pin is actuated to thus enter within and tighten the link and ring with each stroke imparted to the keys of the machine by the operator, as hereinafter set forth. The matrix-carrying frame thus locked to the type-wheel moves with the latter through a portion of its revolution, the united movement continuing during the time occupied in making the impressions. I estimate that the union should continue through about one-sixth of a revolution, though this depends upon the speed and the diameter of the parts, and of course I do not wish to be limited in this regard. When the limit of the united movement has been reached, the pin 16 strikes a stationary cam 22 upon arm 23, and is thereby forced back to its normal position, thereby releasing the strain upon the ring, and the frame or carrier is now at liberty to swing back to its starting-point. It is caused to do this by the following devices: At P is shown a horizontal shaft in stationary bearings carrying pinions 24 and 25, the latter meshing, respectively, with segmental racks 26 upon bracket K and 27 upon bottom of bed J. A spring *p* encircles this shaft P, and as soon as the friction-ring is released from the wheel its power becomes effectual to reverse the rotation of the shaft, and thus cause the return of the matrix-carrier.

Inasmuch as the actuating power is applied to the matrix frame or carrier at its end, it is advisable to prevent any twisting or racking of the carrier and insure the movement of all parts thereof in strict unison. This I accomplish by the employment of the shaft P with two pinions thereon meshing with corresponding racks upon the carrier, one pinion and rack being located at the end of the carrier receiving the power, and the other pinion and rack being sufficiently near the other end to counteract the racking or twisting strain. The flanges upon the pinions also bear upon the sides of the racks and assist in this function. The smooth roller 28, which is employed for another purpose, may also have a flange 29 at one side acting in conjunction with the flange or rim 30 upon the carrier.

In the use of this construction the flanges upon the pinions serve to compel the movement of the carrier in a straight plane, while the intermeshing of the pinions and racks compel both ends of it to swing at the same instant and with the same speed. I also deem it advisable to support the matrix-carrier at the point where the impressions are made to prevent strains upon the journals, and for this purpose the roller 28 may be used, and also a companion roller 31. The roller 28 may be on the shaft P, and the roller 31 is preferably given a separate bearing 32 at a point in the rear of roller 28.

The matrix-carrier is provided with suitable devices for holding and feeding the matrix. When a matrix-block is to be put into the machine, it is inserted in a pocket formed of the laterally-moving slide R, which may be actuated by a thumb-piece *r* and a loop 33, secured to said slide, the pocket referred to being formed between the slide and the loop, as at 34. At 35 and 36 are guides, between which the matrix moves. When the matrix-block is inserted, the slide R is pulled outward by the operator a short distance, which enables him to enter the matrix-block in the pocket with its end against the guide 35. This act positions the matrix-block correctly so far as the distance it should be entered at the start is concerned. The operator now releases the thumb-piece *r*, and the slide R moves backward in obedience to the spring 37 sufficiently to bring the matrix-block in line with the passage 38 between guides 35 and 36.

At S is a spring having a projecting incline *s* and also provided with horizontal arms 39, reaching over and bearing upon the top of the matrix-block. At T is another spring, having sharp points 40, designed to enter the matrix-block. These springs are alternate in their action upon the matrix-block and are rendered so by a rocking-lever 41, pivoted stationarily at 42 and having an outstanding arm 43, connected by a pitman-rod 44 to the swinging lever 45, actuated by a cam 46 upon the end of journal F. When the matrix-block is to be held stationary during the making of the impression, the spring S is forced to bear upon it by the point 47 of the rocking lever bearing upon the projecting cam *s*, the spring being forced both laterally and downward. This pressure is released, so that the holding-spring may retract when the position of the lever 41 is reversed by the movements communicated from the cam 46, the end of the lever bearing the anti-friction roller 48 being now brought to bear upon the toothed spring T. This latter spring is connected to a sliding plate, which is actuated by the type when the impressions are made, as hereinafter set forth, the slide being moved a distance corresponding to the width of the letter impressed, and that movement is communicated to the matrix-block through the medium of this spring T and its holding-teeth. Said spring T, like the spring S, springs out of engagement with the matrix whenever the pressure upon it by the rocking lever 41 is withdrawn.

The proper spacing of the impressions is obtained as follows: The type are arranged in a line running around the periphery of the type-wheel, with the rear or final points of all the letters lying in the same vertical plane, as indicated at Fig. 14. Each type carries near its operating or face end a lateral projection *b*, corresponding in dimension with the width of the letter upon the type plus the width of the normal inter-letter space. Thus the letter "W" is provided with a projection of considerable width, while the letter "h" carries one of considerably less width. When the dies are forced against the matrix, they enter a funnel or inwardly-tapering guide U, having upon one side an inclined-faced movable section 49, which is struck and moved by the projection *b* upon the type. This movable piece 49 is secured upon the end of a sliding plate 50, moving in ways 51 upon the top of the guides 35 and 36, and is confined thereon by the straps 52 53 and screws 54, passing down into posts 55. It will be understood from what has been written that the slide 50 is actuated and the matrix thus moved in advance of the making of the impression a distance corresponding with the width of the letter about to be impressed plus the normal inter-letter space. After the making of the impression the slide 50 is retracted by the spring 56, secured at one end to the slide and at the other to the stationary pin 57.

It remains to describe the operating-keys and their connections to the various parts of the machine. These keys are shown at W, and they are all loosely pivoted upon the stationary longitudinal shaft 57^a. That portion of the key-levers extending forward of the pivotal point comes in contact with a movable bar 58 each time a key is struck and lifts said bar to the position indicated by broken lines at Fig. 3. This bar 58 finds support at each end in one of the arms of an elbow-lever 59, journaled upon shaft 57. The other arm of said lever is connected by a spring 60 with a locking catch-bar 61 and rocks the latter upon its pivotal support 62. The catch 61 is provided with a longitudinal flange 63, which when the key is depressed enters the notch 64, formed in the under side of the key-lever W in obedience to the power of spring 60, which is caused to be exerted by the movement of elbow-lever 59.

The lock upon the key-lever just described is released in the following manner: Upon the shaft 62 at one end is a notched arm 62^a, riding upon which is a notched lever 62^b. The arm 62^a when the lock has taken place will occupy a position farther inward than that shown in Fig. 8. The inner end of lever 62^b is joined to a bell-crank lever 62^c, stationarily pivoted at 62^d. A spring 62^e draws on lever 62^b in the direction indicated at Fig. 8. The lower arm of the elbow-lever 62^c rests when

the parts are in their normal position upon the edge of the matrix-carrier, as also indicated at said figure. It will now be seen that when the matrix-carrier begins to descend and move with the type-wheel the elbow-lever and lever 62^b will be free to move in obedience to spring 62^e. This movement will bring said lever 62^b inward far enough so that its notch will engage with the notch of arm 62^a. The parts remain in this position until the matrix-frame returns to its position of rest, as shown in Fig. 8, in which movement it comes in contact with the elbow-lever 62^c and by rocking said lever forces lever 62^b outward, carrying the arm 62^a far enough to throw the catch-bar 61 out of engagement with the key-lever. The engagement between the teeth of lever 62^b and arm 62^a ceases when they have about reached their normal position of rest by reason of the slope or angle given to the teeth.

Extending from the forward end of the key-levers are pitmen 65, each joined to one arm of an elbow-lever 66, and each of these elbow-levers is joined to and actuates a sliding bar 67, the series of elbow-levers being journaled upon the stationary shaft 68. The striking of the key by these connections causes the sliding bars 67 to move forward and into the path of a toothed spiral 69, borne upon the type-wheel shaft C and rotated thereby. Each bar 67 is when thrust forward positioned so that in the rotation of said spiral it will be struck by a particular tooth upon said spiral and be depressed thereby, as indicated by the broken line in Fig. 3. This contact by the teeth of the spiral with the bar 67 determines which of the type shall be impressed, and this purpose is served by the locking of the matrix-carrier to the type-wheel shaft when the latter is in the proper position with the desired letter over the matrix. In other words, this contact of the spiral with the bar 67 immediately sets in operation mechanism for locking the matrix-carrier to the type-wheel shaft and also causes the operation of the clutch whereby the eccentric which forces the type to make the impression is set in operation. These features are fully explained later on. The sliding bars rest at their forward ends upon a longitudinal bar 70, which is supported upon two inclined parallel radius-bars 71, pivoted to stationary brackets on the frame. It will thus be seen that when bar 70 is depressed by the contact of the spiral with one of the slides 67 said bar 70 will receive not only a downward movement, but also an endwise one. This latter movement or end-thrust enables it to actuate the pivot-pin 16 in setting the friction-ring O down upon the wheel N to lock the matrix-carrier to the type-wheel shaft. Said end-thrust of bar 70 serves the further function of setting the friction-clutch whereby the eccentric for impressing the type is actuated. This clutch has already been fully described, and it is connected to said bar 70 so as to be set in operation thereby by a link 72, joining bar 70 to a vertical lever 73, pivoted stationarily at 74 so as to swing in the direction of the end-thrust of bar 70. This lever 73 is so positioned that when the parts are in their normal position it will engage with a lever 75 upon the band 9 and counteract the tightening power of spring 10, and it is drawn away from this engagement each time the bar 70 is actuated by the striking of a key. It is also caused to return to its normal position in season to meet said lever when the friction-band has completed a revolution by the return of bar 70 to its normal position under the power of the springs 76, acting upon arm 77, rigid upon one of the radius-bars.

The slides 67 all work in slots of a comb-like guide 78. Springs 79, joined to the rear end of each of said slides and to their respective elbow-levers 66, as shown at Fig. 3, lift the slides to their normal position as soon as the toothed spiral has depressed the forward end of the slides sufficiently to enable it to pass clear of the latter. Another spring 80 is joined to the forward end of the key-levers and to a stationary longitudinal bar 81 and acts to retract the key-lever to its normal position whenever the lock caused by the catch 61 62 63 ceases.

A sleeve 82 surrounds the journal F and is provided at one end with a flange 83 and at the other end with a screw-thread adapted to receive a nut 84. Surrounding this sleeve is the bearing M, provided with a shoulder 86. The sleeve *i* of bracket L of the matrix-carrier is confined on this bearing between the flange 83 of the sleeve and the shoulder 86 of the bearing, and the journal F is held by shoulder 89 at one end and the nut 87 and the jam-nut 88, both threaded on journal F at the other end.

I have also provided the machine with means which will positively insure the return of the matrix-carrier to its normal position should the spring *p* fail to perform that function. This mechanism consists of a cam 90, mounted upon the outer end of journal F and actuating at one point in its revolution the arm 91, carrying an anti-friction roller 92, which receives the impact of the cam. Said arm 91 is rigid upon a shaft 93, journaled in a bearing 93^a and carrying another arm or lever 94. This arm 94 is joined at 95 to a link 96, which extends to and is pivoted to the bracket L of the matrix-carrier at 97. The cam 90 is so timed in its operation that it will depress arm 91 and lift arm 94 at the proper time to actuate the matrix-carrier and bring it back to its position of rest. The various parts by which the cam 90 thus actuates the matrix-carrier are all returned to their normal position by the return of the matrix-carrier itself.

The operation of the machine is substantially as follows: Continuous motion being imparted to the drive-shaft 5 and carried to the type-wheel shaft by appropriate mechan-

ism and a matrix-block being positioned in the carrier, the operator strikes that one of the keys representing the letter he wishes to impress. This causes a forward movement of the slide 67, attached to the type-key struck, and whenever the corresponding tooth of the spiral reaches said slide it strikes the same and depresses it, together with bar 70. This results in the downward and endwise movement of bar 70 and sets in operation the friction-clutch, which carries power to the interior shaft G, through which the eccentric E is actuated, and at the same time it sets in operation the friction-ring upon wheel N and locks the matrix-carrier to the type-wheel shaft, so that the carrier begins to move with said shaft. In the course of the revolution of the eccentric and during the time the matrix-carrier is locked to the type-wheel shaft the eccentric forces one of the type into contact with the matrix. The particular type thus impressed being the one corresponding to the key which is struck, the eccentric continues to rotate until the friction-clutch by which it is driven is released by contact of lever 75 with lever 73. The matrix-carrier continues to move with the type-wheel until the pivot-pin 16 strikes the cam 22, and is thereby caused to release the friction upon wheel N. As soon as it has been thus released the matrix-frame is returned to its normal position by the spring *p*. When the type descends to make the impression, it actuates the slide which feeds the matrix, and said slide, being retracted after each impression, is of course in position to receive a fresh impulse with each actuation of the type. By means of the cam 46 the matrix is alternately held and fed, as already described.

I lay no claim herein to the subject-matter of the claims of a previous application filed by me, serially numbered 297,592.

I claim—

1. The combination, in a matrix-machine, of a rotating type-wheel carrying a series of radially-movable type-dies with a swinging matrix-carrier pivoted concentric with said wheel, means for moving said matrix-carrier intermittently in fixed relation to said type-wheel, and means for actuating the type-dies during the time the type-wheel and matrix-carrier maintain said fixed relation, substantially as set forth.

2. The combination, in a matrix-machine, of a rotating type-wheel carrying a series of radial type-dies, a swinging matrix-carrier pivoted concentric with said wheel, means for moving said carrier intermittently in fixed relation to said type-wheel and with any desired die in proper relation to the matrix-block, and means for making an impression of said die in the matrix-block, substantially as set forth.

3. The combination, in a matrix-machine, of a rotating type-wheel carrying one or more fonts of radially disposed and movable type, a swinging matrix-carrier, means for locking said carrier to the type-wheel so that it will move therewith, and means for actuating the type to make the impression, substantially as set forth.

4. The combination, in a matrix-machine, of a rotating type-wheel carrying one or more fonts of radially disposed and movable type, a swinging matrix-carrier adapted to be locked to and moved with the type-wheel, an eccentric for actuating the type, and means for giving motion to the eccentric when a key is struck, substantially as set forth.

5. The combination, in a matrix-machine, of a continuously-rotating type-wheel carrying one or more fonts of radially disposed and movable type, a swinging matrix-carrier adapted to be locked to and moved with the type-wheel, an eccentric for actuating the type, and means for giving motion to the eccentric when a key is struck, substantially as set forth.

6. In a matrix-machine, a continuously-rotating type-wheel and an eccentric for actuating the type borne by the wheel, said eccentric being given a single revolution with each stroke imparted to the operator's key, in combination with said keys and mechanism connecting them with and controlling said eccentric, substantially as set forth.

7. In a matrix-machine, a continuously-rotating type-wheel, an eccentric for actuating the type borne by the wheel and traveling through a single revolution at each impression, a matrix-carrier adapted to be locked to and move with the type-wheel during the making of the impression, mechanism for controlling the movements of the eccentric, and mechanism for locking the carrier to the wheel, substantially as set forth.

8. In a matrix-machine, the combination, with a rotating type-wheel, a swinging matrix-carrier, and the series of keys to be struck by the operator, each provided with a slide 67, of the bar 70, mechanism for locking said matrix-carrier to the type-wheel, and the toothed spiral on the type-wheel shaft, said bar yielding to allow the spiral to pass the slides, substantially as set forth.

9. In a matrix-machine, the combination, with a rotating type-wheel, a swinging matrix-carrier, and a rotatable type-impressing device, of a clutch for actuating the latter and a brake for locking the carrier to the wheel, both the clutch and brake being set in service by the striking of the key corresponding to the type impressed, substantially as set forth.

10. In a matrix-machine, the combination, with the clutch for actuating the type-impressing eccentric and the brake for locking the matrix-carrier to the type-wheel, of the bar 70, serving to put both the clutch and the brake into operation, said eccentric, said carrier, and said wheel, substantially as set forth.

11. In a matrix-machine, the combination, with the clutch for actuating the type-impressing eccentric and the brake for locking

the matrix-carrier to the type-wheel, of the bar 70, serving to put both the clutch and the brake into operation, said eccentric, said carrier, said wheel, the slides 67, moved into position by the key-levers, and the rotating toothed spiral, substantially as set forth.

12. In a matrix-machine, the combination, with the clutch for actuating the type-impressing eccentric and the brake for locking the matrix-carrier to the type-wheel, of the bar 70, supported upon inclined parallel radius-bars and serving to put both clutch and brake into operation, said eccentric, said carrier, and said wheel, substantially as set forth.

13. In a matrix-machine, the combination, with the type-wheel and matrix-carrier, of the devices for locking them together, consisting of a friction-wheel upon the type-wheel shaft, a friction-band encircling said wheel and secured to the matrix-carrier, and a device for tightening said band set in operation preparatory to the making of each impression, substantially as set forth.

14. In a matrix-machine, the combination, with the type-wheel and the matrix-carrier, of the devices for locking them together, consisting of a friction-wheel upon the type-wheel shaft, a friction-band encircling said wheel and secured to the matrix-carrier, and a pin for tightening said band, and a device set in operation by the striking of the keys for actuating said pin, substantially as set forth.

15. The combination, with the friction-wheel and the friction-band surrounding the same, of the tapering pin for tightening said band, the endwise-moving bar 70, acting upon said pin, and a cam for releasing said pin, substantially as set forth.

16. In a matrix-machine, the combination, with the series of keys to be struck by the operator, each having a slide 67, of the bar 70, supported so as to yield with a downward and endwise movement, the toothed spiral striking said slides and depressing said bar, and a pin 16, actuated by said bar and controlling the devices for locking the matrix-carrier and the type-wheel together, substantially as set forth.

17. In a matrix-machine, the combination, with the type-wheel and the type-impressing eccentric, of a friction-clutch for carrying power to the latter and mechanism set in operation by the striking of the operator's key for closing said clutch, such mechanism consisting of the slides 67, the toothed spiral, the bar 70, and the connections between said bar and the clutch, substantially as set forth.

18. In a matrix-machine, the combination, with the type-wheel and the type-impressing eccentric, of a friction-clutch for carrying power to the latter, the bar 70, and the connections between said clutch and said bar, substantially as set forth.

19. In a matrix-machine, the combination, with the type-wheel and the type-impressing eccentric, of a friction-clutch for carrying power to the latter, the bar 70, the link 72, and lever 73, engaging boss 75 upon the clutch, substantially as set forth.

20. The combination, with the clutch for actuating the eccentric having the boss 75, of the endwise-moving bar 70, acting with each impression, the link 72, lever 73, and means for returning the bar to its normal position, substantially as set forth.

21. The swinging matrix-carrier having two segmental racks at a remove from each other, in combination with shaft P and the pinions thereon meshing with said racks, substantially as set forth.

22. The swinging matrix-carrier having two segmental racks at a remove from each other, in combination with shaft P and the pinions thereon meshing with said racks, and a retracting-spring *p*, substantially as set forth.

23. The swinging matrix-carrier having two segmental racks at a remove from each other, in combination with shaft P and the flanged pinions thereon meshing with said racks, substantially as set forth.

24. The swinging matrix-carrier having two segmental racks at a remove from each other, in combination with shaft P and the pinions thereon meshing with said racks, and the flanged roller 28, substantially as set forth.

25. In a matrix-machine, the combination, with a rotating type-die wheel, a swinging matrix-carrier, and mechanism for connecting said matrix-carrier and the type-die wheel, of a supporting roller or rollers supporting the matrix-carrier in the part of its movement when the impression is made, substantially as set forth.

26. In a matrix-machine, a font of movable type arranged with their final points in one common plane and a supporting-carrier for said type, in combination with a matrix-carrier, means for feeding said matrix, and means for forcing said type upon the matrix, substantially as set forth.

27. In a matrix-machine, a font of movable type arranged with their final points in one common plane and each carrying a spacing gage or projection and a supporting-carrier for said type, in combination with a matrix-carrier having a cam-surface connected to and feeding the matrix and actuated by the spacing-gage upon the type, and means for forcing the type upon the matrix, substantially as set forth.

28. In a matrix-machine, a font of movable type arranged with their final points in one common plane, substantially as set forth.

29. In a matrix-machine, the combination, with a supporting wheel or carrier, of a font of type movably supported in said wheel and arranged therein with their final or rearmost parts lying in the same vertical plane, substantially as set forth.

CHARLES SEARS.

Witnesses:
S. E. STONE,
T. W. DALY.