(No Model.)

4 Sheets—Sheet 1.

C. L. REDFIELD.

MATRIX MAKING MACHINE.

No. 448,994. Patented Mar. 24, 1891.

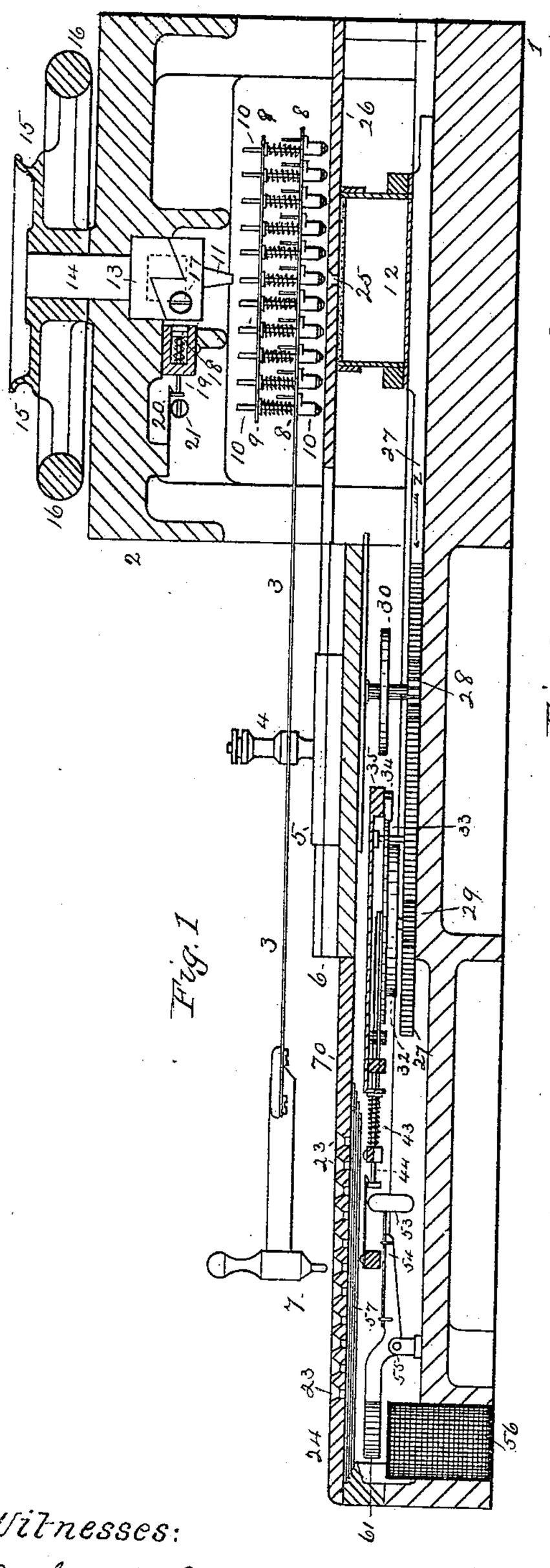


Fig. 1

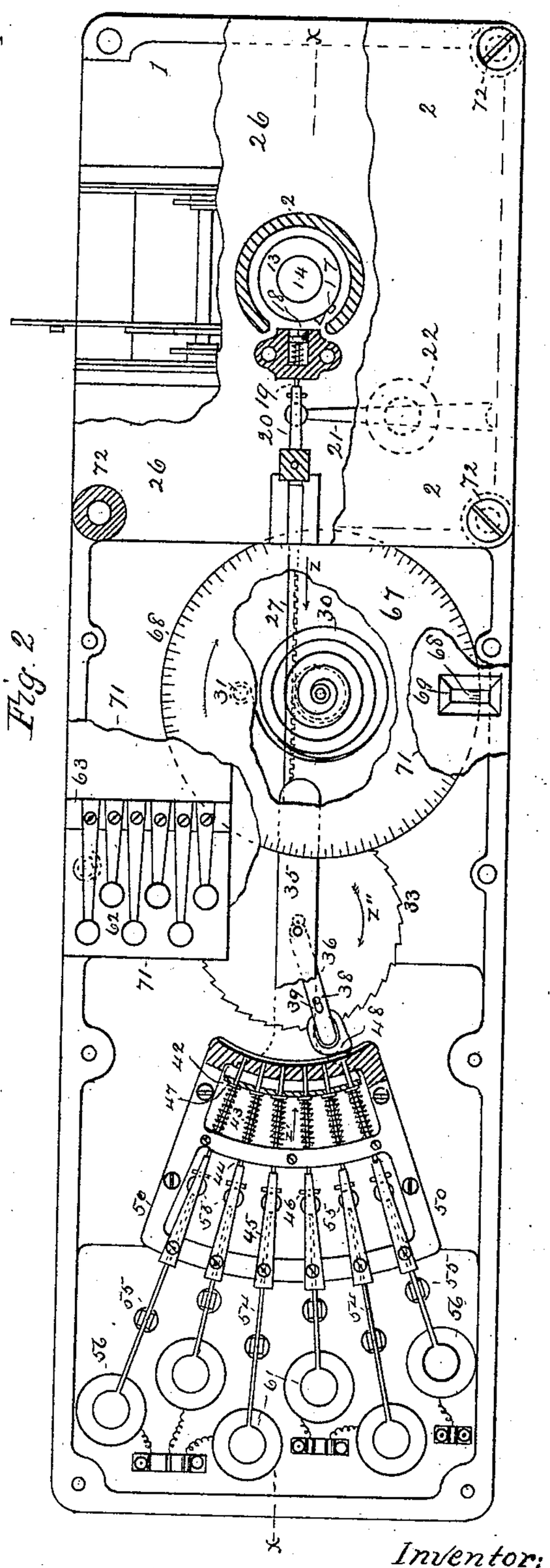


Fig. 2

Witnesses:

E. H. Schumann

J. T. Chrischilles

Inventor:

Casper L. Redfield

By his Attorney

P. H. Gunckel

(No Model.)

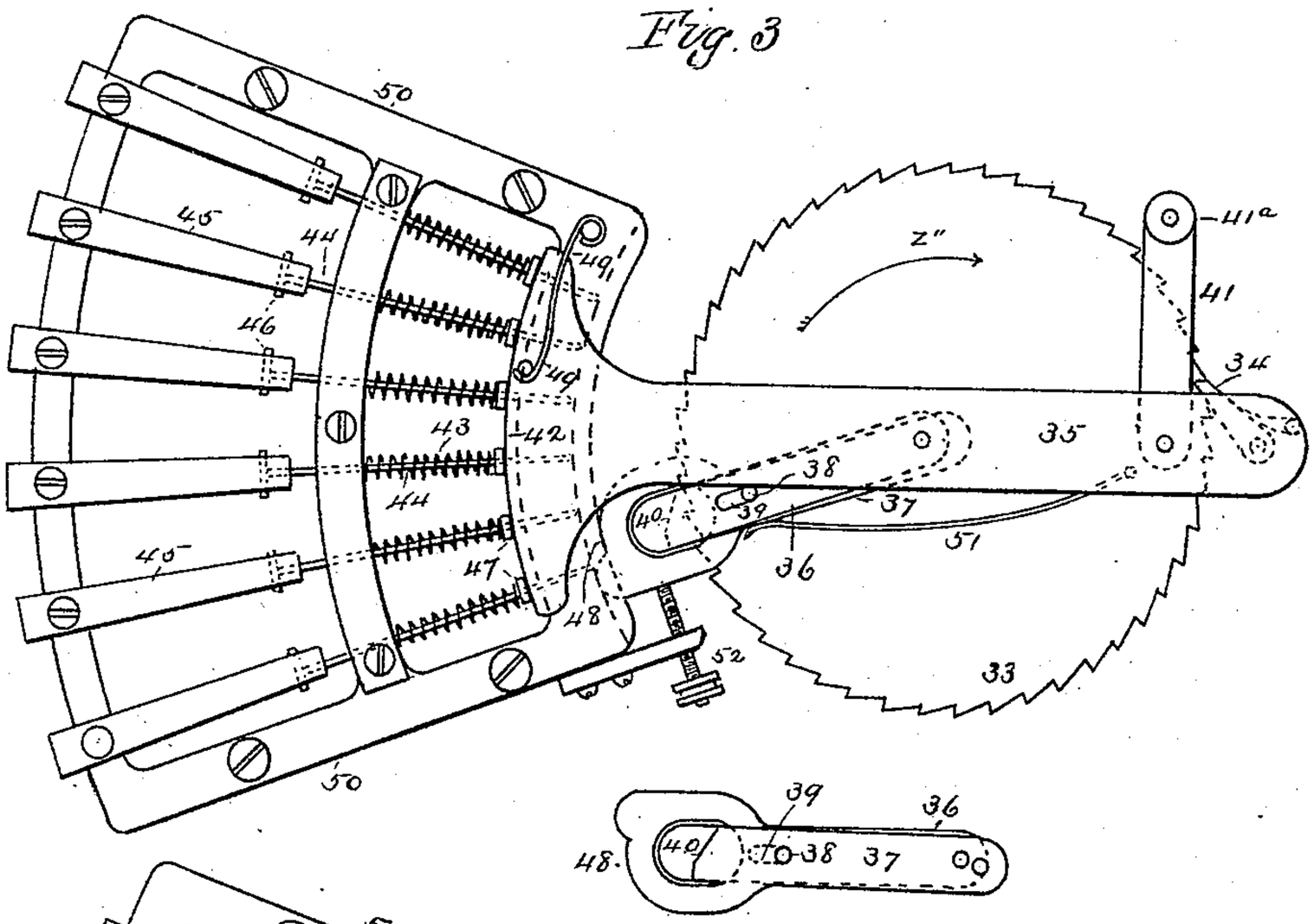
4 Sheets—Sheet 2.

C. L. REDFIELD.

MATRIX MAKING MACHINE.

No. 448,994. Patented Mar. 24, 1891.

Fig. 3



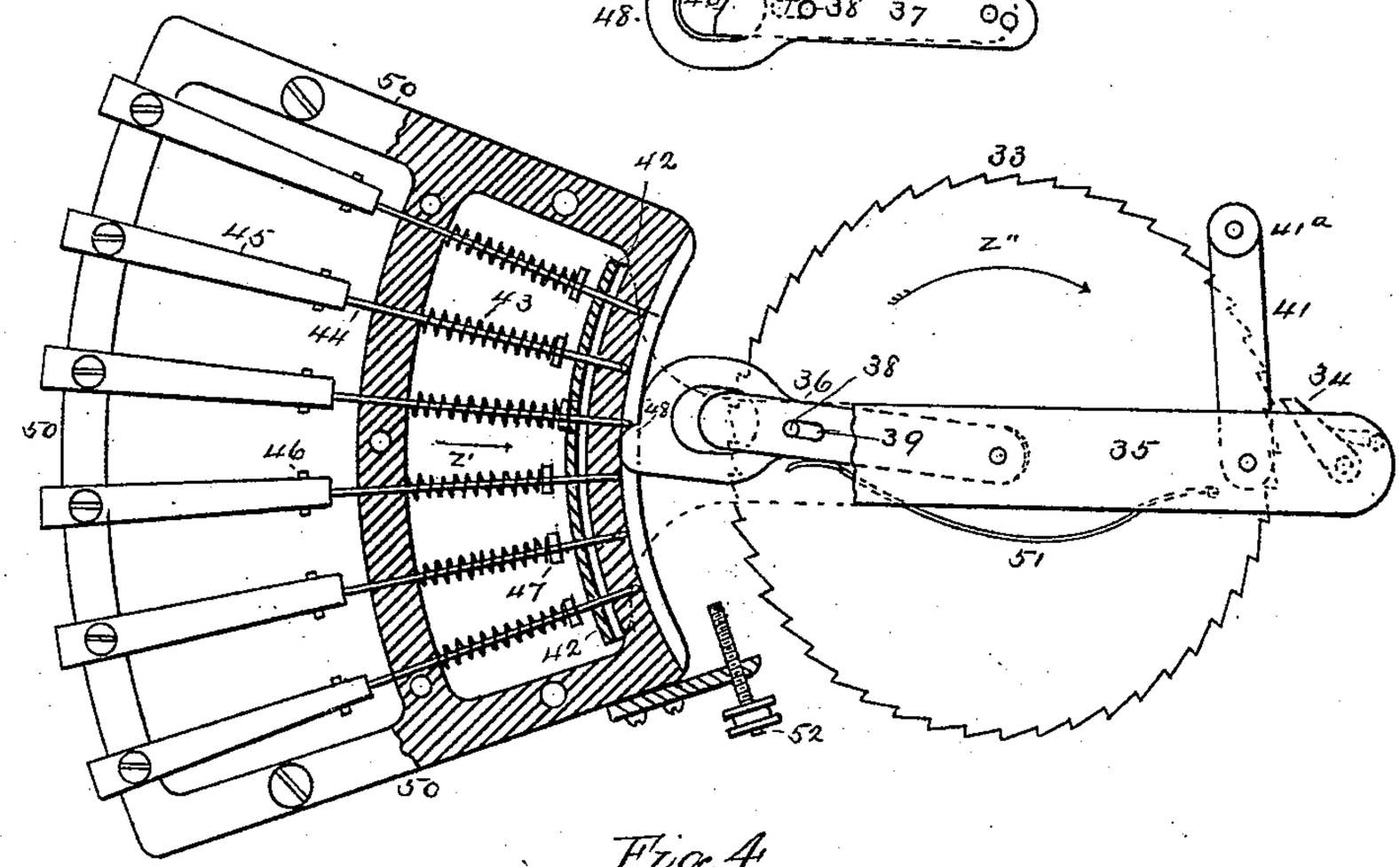


Fig. 4

Witnesses

E. M. Schumann

J. T. Chrisshilles

Inventor

Casper L. Redfield.

By his Attorney

P. H. Gunckel

(No Model.) 4 Sheets—Sheet 3.

C. L. REDFIELD.

MATRIX MAKING MACHINE.

No. 448,994. Patented Mar. 24, 1891.

Fig. 6

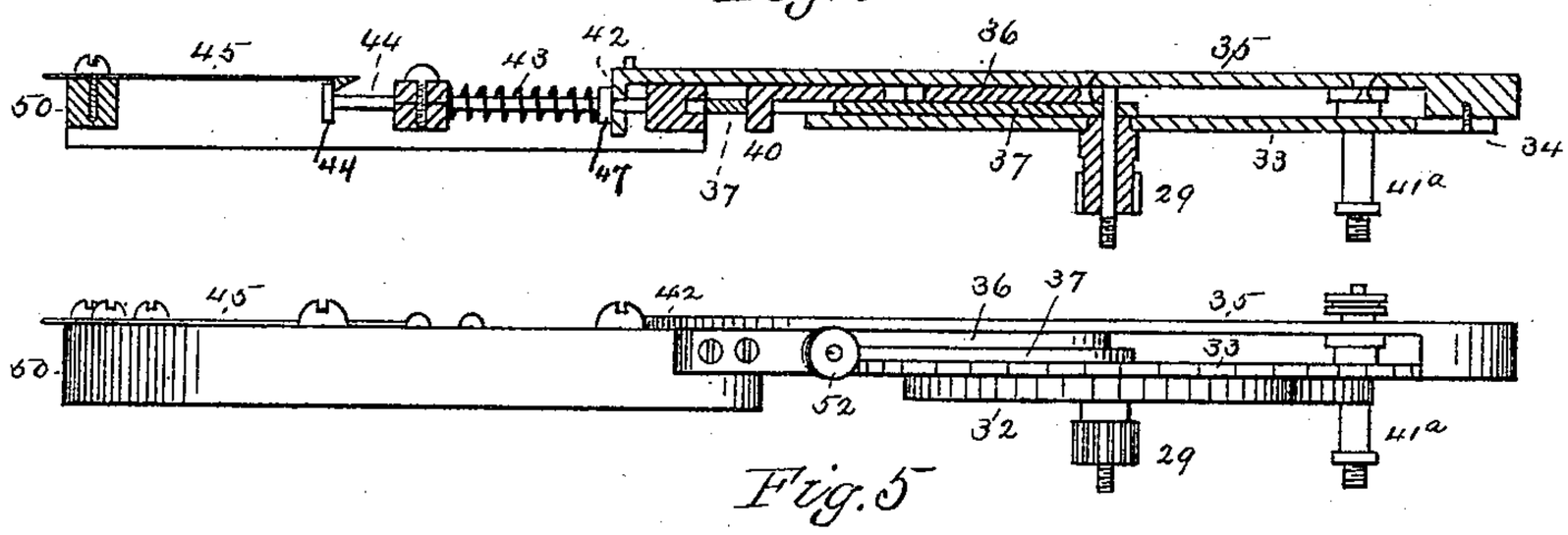


Fig. 5

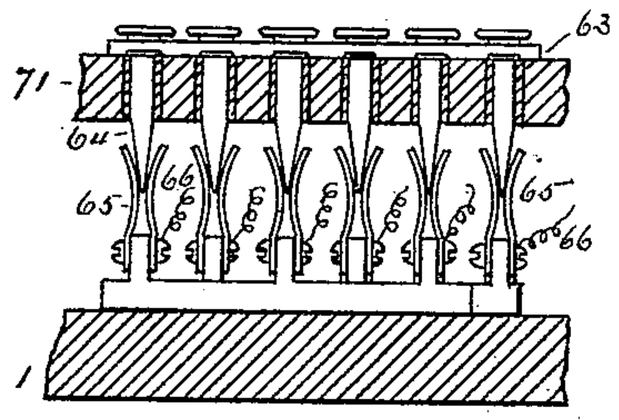


Fig. 7

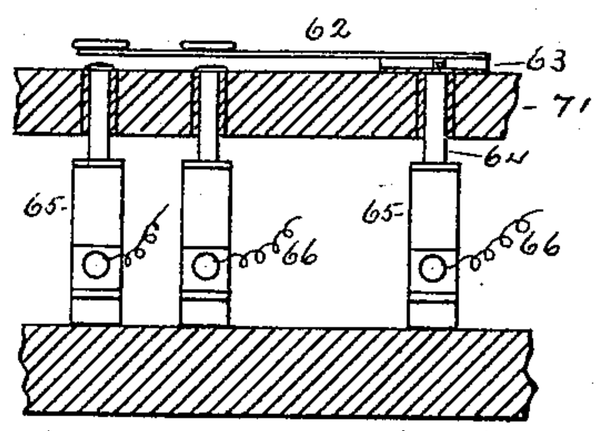
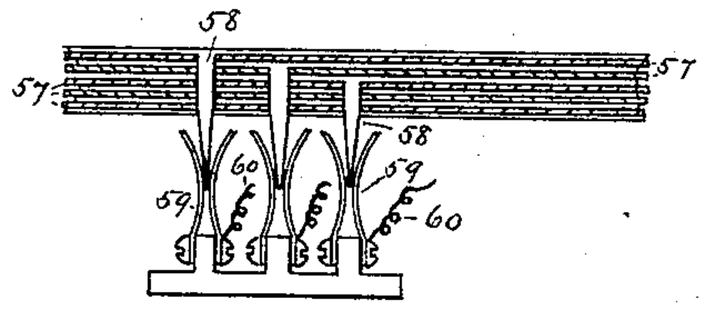


Fig. 8

Fig. 9



Witnesses

E. M. Schumann

J. J. Chrischilles

Inventor

Casper L. Redfield

By His Attorney

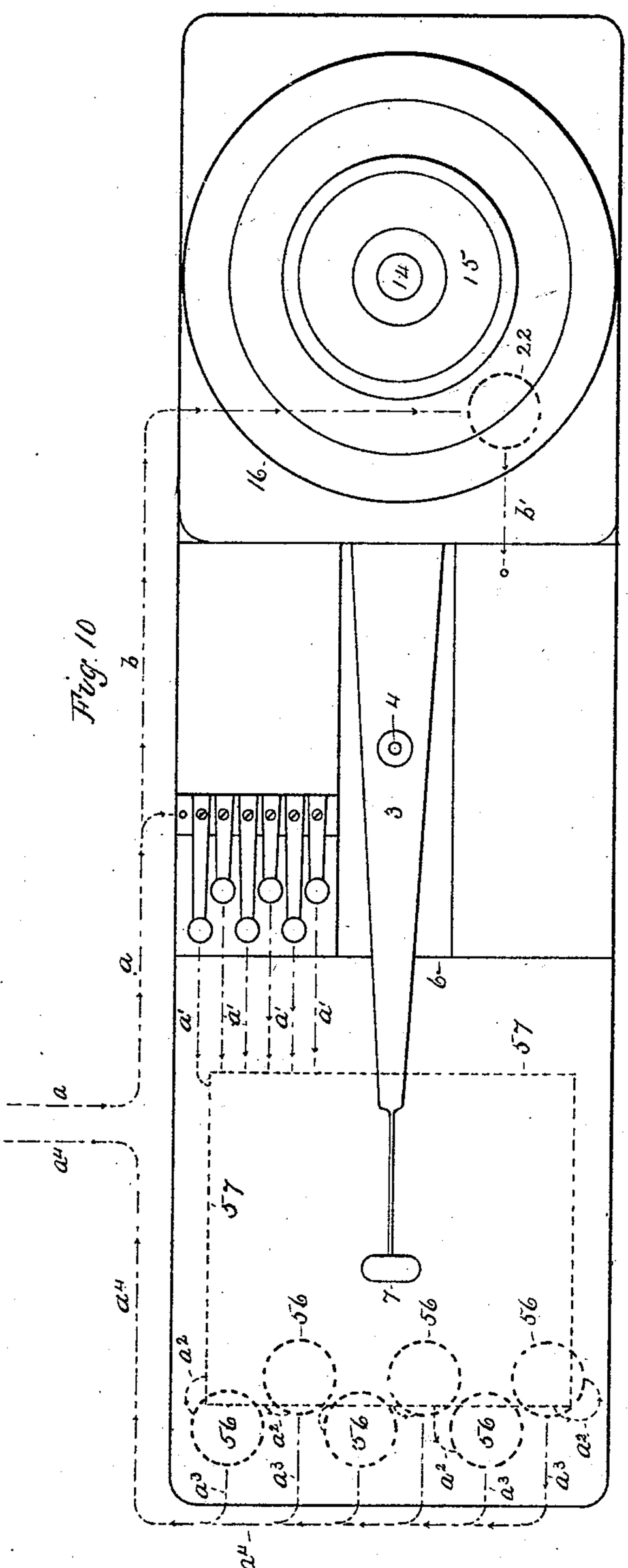
P. H. Gunckel

(No Model.) 4 Sheets—Sheet 4.

C. L. REDFIELD.

MATRIX MAKING MACHINE.

No. 448,994. Patented Mar. 24, 1891.



Witnesses

A. L. Jones

H. D. Broadbent

Inventor

Casper L. Redfield

By His Attorney

P. H. Gunckel

UNITED STATES PATENT OFFICE.

CASPER L. REDFIELD, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE CHICAGO MATRIX MACHINE COMPANY.

MATRIX-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 448,994, dated March 24, 1891.

Application filed February 13, 1890. Serial No. 340,323. (No model.)

To all whom it may concern:

Be it known that I, CASPER L. REDFIELD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Matrix-Making Machines, of which the following is a specification.

My invention relates to machines for forming stereotype-matrices by the successive impression of independent type-dies, and has for its object the improvement of the feed devices for the matrix-carriage and of the arrangement of the electrical devices by which variable amounts of feed are obtained for the varying sizes of letters.

In the accompanying drawings, in which my improvements are illustrated, Figure 1 is a longitudinal sectional view of the machine on the line *x x* of Fig. 2. Fig. 2 is a plan view of the same with portions of the casing broken away or removed to show the interior. Fig. 3 is a plan view, enlarged, of the escapement portion. Fig. 4 is also a plan of the same, a portion being shown in horizontal section. Fig. 5 is a side elevation of Figs. 3 and 4. Fig. 6 is a central longitudinal section of the same. Fig. 7 is a zigzag section transverse to the machine through the space-throwing keys shown in Fig. 2. Fig. 8 is a similar section at right angles to Fig. 7, showing the method of connecting the electric circuits; and Fig. 9 is an end view of the electric contact-plates, showing the manner of making electrical connections with the magnets. Fig. 10 is an outline plan of the machine, showing the course of the electric current.

In said drawings, 1 is the frame of the machine, the design of which is similar to that shown and described in a former application for patent made by me, but is smaller and modified to accommodate my later improvements.

2 is an upper portion of the frame provided for supporting the impression devices, and 3 is the die-carrying lever connected by a pivot-pin 4 to a cross-head 5 in the slides 6.

7 is the indicator-pin carried on the outer arm of the lever, 8 and 9 the die-carrying frame on the inner end of the lever, and 10 the type-dies carried therein.

11 is a reciprocating plunger for depressing the type-dies 10 into a matrix-body carried on the matrix-carriage 12. The plunger is operated by means of a clutch-box 13, carried on a vertical shaft 14, which is rotated by means of a pulley 15 and a fly-wheel 16. On the lower portion of the clutch-box is a pin 17, that is engaged by a spring-stop 18 to stop rotation and cause the inclined surfaces to move the lower portion of the clutch downward to produce a plunger-thrust. The stop 18 is carried on a rod 19, that has a head which is engaged by a spring-catch 20 to hold it away from the clutch, and the spring-catch 20 is freed from engagement by the blow of a spring-hammer 21, operated by an electro-magnet 22. This die-impressing mechanism is similar to that set forth in my patent, No. 429,737, of June 10, 1890.

It will be understood that operating the lever 3 for movement of the indicator 7 to coincidence with the desired letter indicated at one of the openings 23 in the index-plate 24 will move the appropriate die 10 to position immediately under the plunger 11 and over a guide-hole 25 in a plate 26 above the matrix-carriage, and that upon a reciprocation of the plunger being produced the selected die 10 will be thrust downward through the guide-hole to form an impression in the matrix-body on the carriage. Before another impression can then be made it is necessary to move the matrix-carriage laterally sufficient to space for the next letter. This is accomplished in the manner following: 27 is a rack having one end connected to the carriage 12 and its toothed portion engaged by pinions 28 and 29. To the shaft of the pinion 28 is connected one end of a spring 30, the other end of which is attached to a post 31, and the force of the spring tends to move the rack in the direction of the arrow *z*. On the post of the pinion 29 is also connected a spring 32, tending to turn the pinion and move the rack also in the direction of the arrow *z*. On the post of the pinion 29 is mounted a ratchet-wheel 33, and a dog 34 to restrain movement of the wheel

33 is connected to the under side of a bar 35. A lever 36 is pivoted at the under side of the bar 35 nearly over the center of the escapement-wheel 33, and to the under side of the lever 36 is a lever 37, pivoted on the post of the scape-wheel and having a pin 38 extending upward through a slot 39 in the lever 36, so that the lever 36 and the bar 35 may slide longitudinally. The lever 36 has at its under side a dog 40 for engaging the teeth of the escape-wheel when the bar has been moved longitudinally inward and the dog 34 released. The inner end of the bar 35 is guided in its movements by means of a bar 41, pivoted thereto and to a post 41^a. The outer portion 42 of the bar 35 is of downturned segmental shape, and the bar is moved inward to cause disengagement of one dog and engagement of the other by means of the pressure on its downturned end 42 of one of the springs 43 on the pins 44. These pins are held normally from engagement with the end 42 of the bar by spring-catches 45 engaging heads 46 on the pins. When one of the catches 45 is released, the force of its spring 43 thrusts the pin inward in the direction of the arrow z' and causes a collar 47 on the pin to engage the end 42 of the bar and carry the bar 35 inward. This movement causes the release of the holding-dog 34 and engagement of the dog 40 and permits the rotation of the scape-wheel in the direction indicated by the arrow z'' until an inclined surface 48 on the face of the lever 37 engages the end of the protruding pin 44 and returns it far enough to be re-engaged by its spring-catch 45. Thereupon a spring 49, attached to the frame 50, exerts its force to move the bar 35 outward and cause re-engagement of the holding-dog 34 with the scape-wheel, and then the rotation of the scape-wheel being stopped the force of a spring 51, one end of which is attached to the bar 35 and the other to the lever 36, returns the levers from the position shown in Fig. 4 to that shown in Figs. 2 and 3, the return movement being checked by a regulating-screw 52.

The spring-catches 45 are operated by the hammers 53, carried by the spring-levers 54, that are fulcrumed at 55 and carry armatures 61, that are operated by electro-magnets 56. The devices are arranged for six degrees of movement, each of which is controlled by a separate magnet, and the circuit is closed with the respective magnets by the depression of the indicator-pin 7 through the index-plate to contact with one of the conducting-plates 57, that are fixed beneath the index-plate. Each of the plates 57, of which there are six, has a pendent pin 58, that extends through the other plates and has a flattened end that passes between a pair of metallic clamping-arms 59, and to these clamping-arms are connected wires 60, that make the electrical connections between them and their respective magnets 56. The depression of the indicator-pin to contact with any of these plates (the construction and arrangement by which this may be done is the subject-matter of a prior patent, No. 416,742, granted to me December 10, 1889, and in the drawings for the present application there is shown nothing more than the flat conducting and insulating-plates) completes an electric circuit through a wire connected to the magnet 22, thence through a portion of the frame of the machine, and thence through the lever 3 and the engaged plate 57 and its contact devices to the appropriate magnet 56, and upon the completion of such circuit the armature 61, attached to the lever 54, is drawn to its magnet, causing the spring-hammer to strike a blow against the under side of the proper spring-catch 45 and release it from engagement and so permit the spring 43 on the disengaged pin to thrust it inward and engage the bar 35 to move it also to release the one dog and cause engagement of the other to permit rotation of the escapement in the manner heretofore described. These pins are arranged radially in a plane parallel to that of the escapement-wheel, and their positions determine the extent of movement of the levers 36 and 37 between the position at which they are at rest and that of the pin that has been operated and thrust inward. Thus the use of the first pin of the series would cause a movement of the escapement and consequent movement of the matrix-carriage equal to the unit of movement, the operation of the second pin that of a multiple of the unit of movement, that of the third pin a movement proportioned to the third degree of movement or multiple, and so on with each of the pins of the series; and so in operating the machine the movement of the lever 3 to bring the indicator-pin into coincidence with any of the openings of the index-plate moves a die corresponding with a selected character on the index-plate to the printing-point over the matrix-carriage. This movement, followed by the depression of the indicator-pin, completes the electric circuit through the appropriate magnet 56, and a consequent movement of the matrix-carriage the proper distance to space for a letter is produced, and the simultaneous completion of the circuit through the magnet 22 causes the depression of the plunger and the forming of a matrix-impression.

To enable spaces to be made without causing the impression devices to operate, there is provided a series of spring spacing-levers 62, fastened to a metal bar 63, that is insulated from the bed, and to which is connected a branch wire from the main electric wire, and beneath the ends of these levers is a series of pins 64, surrounded by suitable insulating material, and these pins, being pointed, are engaged between spring-arms 65, from which extend wires 66 to the magnets 56. The depression of any one of the levers 62 to contact with a pin 64 will complete an electric circuit, causing the operation of the escapement devices, as hereinbefore described, without completing the circuit through the magnet 22, which causes the operation of the im-

pression devices. Thus a spacing without impressions of the desired extent of measurement can be made.

The course of the electric current for the several operations of the machine is indicated in the plan diagram, Fig. 10. When the circuit is only for spacing without making impressions, as last above referred to, the course is through the dotted lines a' to the appropriate place 57, thence through one of the wires a^2 to its magnet 56, and thence through one of the wires a^3 to the return-wire a^4. If the circuit is through the magnet 22, operating the impression devices, then the course is through the wire a, thence through b to the magnet 22, thence through b' to a portion of the machine-frame, thence through the lever 3 and the indicator-pin to the selected plate 57, and thence to the appropriate magnet 56 and through one of the wires a^3 to the return-wire a^4.

To enable an operator to ascertain the position of the matrix-body and the number of units or measurements it has been fed, there is mounted on the spindle of the pinion 28 a disk 67, that turns with the spindle and has figures or graduations 68 in circular arrangement on its face to indicate the feed movements, and in the frame-cover is a slot 69, through which a portion of the indicator-marks can be viewed.

The operative parts of the machine are almost entirely concealed, as shown in Figs. 1 and 2, and access to them can be had by removing cap-pieces. The lever 3 and its die-frame can be readily withdrawn from its guides, after which a cap-piece 70, carrying the index 24 and conducting-plate 57, can be lifted off, exposing to view the escapement devices. The pins 58, being attached to the plates 57, lift out of the clamping-arms 59 and re-enter when the cap is replaced. A cap-piece 71 can likewise be lifted off the middle portion of the machine, exposing the disk 67 and a portion of the escapement. The spacing-levers 62 and their contact-pins 64 are removed with the cover, the pins sliding out of the clasps 65 to re-enter upon return of the plate. The upper portion 2 of the frame may also in like manner be lifted off, removing with it the impression device. These several cap-pieces may be secured to the base of the frame by dowel-pins or screws 72.

Patentable subject-matter herein disclosed and not claimed in the subjoined claims relative to means for carrying, presenting, and centering the dies, and means for operating the feed and impression mechanisms are reserved to be claimed in my pending applications, Serial No. 300,536, filed February 20, 1889; Serial No. 301,178, filed February 26, 1889; Serial No. 303,657, filed March 18, 1889; Serial No. 309,288, filed May 1, 1889, and Serial No. 339,644, filed February 8, 1890.

Having described my invention, what I claim is—

1. In a matrix-machine, a scape-wheel, a reciprocating bar carrying a holding-dog, a lever pivoted to the bar carrying a pawl and turning with the wheel, and plungers for engaging the bar to reciprocate it and to release the holding-dog.

2. A matrix-feed escapement comprising a scape-wheel, a holding-pawl, a reciprocating bar carrying it, a series of spring devices for reciprocating the bar to free its pawl, and a lever carrying the second pawl and arranged to be moved by the wheel to disengage the bar from the acting spring device and cause a re-engagement of the holding-pawl, substantially as set forth.

3. In a feed-escapement for a matrix-machine, a scape-wheel, a bar transverse thereto carrying a holding-pawl, a spring-plunger for engaging the bar to release the pawl, a second pawl, and a lever carrying the same adapted to turn with the wheel and to engage the acting spring-plunger and move it away to permit re-engagement of the holding-pawl, substantially as set forth.

4. In a matrix-feed escapement, a scape-wheel, a holding-dog, a reciprocating bar carrying it, spring-plungers in radial arrangement for reciprocating the bar to release the pawl, a lever carrying a second pawl and pivoted to turn with the wheel and arranged to move the engaging-plunger from the bar, and springs for returning both the bar and lever to their initial positions, substantially as set forth.

5. In a matrix-feed escapement, a scape-wheel and means for rotating it, a bar over the wheel carrying the holding-dog, a lever pivoted to the bar carrying a pawl and turning with the wheel, spring-plungers in radial arrangement for severally moving the bar to release the dog, means on the lever for engaging the acting plunger to return it, and springs for giving the bar a return reciprocation to engage its dog and return the released lever, substantially as set forth.

6. In a matrix-feed escapement, a scape-wheel, a reciprocating bar carrying a holding-dog, a rotating lever carrying a pawl, a series of radially-arranged spring-plungers for moving the bar to release its dog, catches for holding the plungers, and means for separately releasing such catches, substantially as set forth.

7. In a matrix-feed escapement, the combination, with the scape-wheel and a holding-dog and moving pawl, of a sliding bar for the former and a pivoted lever for the latter, spring-plungers for moving the bar to cause a release of the dog and engagement of the pawl, means for disengaging the plungers by the lever movement, and notches for holding the plungers from engagement, substantially as set forth.

8. The combination, with the scape-wheel, its pawls, and the reciprocating bar and pivoted lever, of the radially-arranged spring-plungers, the spring-catches therefor, and the spring-hammers for releasing them, substantially as set forth.

9. The combination, with the scape-wheel, of the reciprocating bar and its holding-dog, the spring devices for moving it to release the dog and the spring for returning it to cause the dog to re-engage the lever pivoted to the bar and the spring therefor, and the sliding portion of the lever having the inclined surface, for the purpose set forth.

10. The combination, with the matrix-feed escapement, of the radially-arranged spring-plungers for causing the engagement and release of the pawls, the spring-catches therefor, the releasing-hammers, and means for operating them, substantially as set forth.

11. In a matrix-feed escapement, the combination, with the reciprocating bar carrying the holding-dog, of the lever pivoted thereto, carrying the moving pawl, and the connected lever having the incline and pivoted to the scape-wheel spindle, substantially as set forth.

12. In a matrix-machine, a variable feed mechanism, radially-arranged releasing devices therefor, spring-hammers for operating them, a series of pivoted levers for actuating the hammers, and means, substantially as described, for operating the levers.

13. In a matrix-machine, the combination, with a variable matrix-feed mechanism controlled by releasing devices, of spring-hammers for operating the releasing devices, levers supported by and arranged to actuate the hammers, and devices, substantially as described, supported by the levers and adapted to operate them, substantially as and for the purpose set forth.

14. In a matrix-machine having a variable feed-escapement, a reciprocating detent-carrier carrying also a pivoted lever provided with a pawl and adapted to turn with the wheel when engaged, plunger devices for reciprocating the carrier to release the detent and limit the travel of the pivoted lever, and means for causing the pressure of the lever on the plunger to retract them and permit re-engagement of the detent, substantially as set forth.

15. In a feed-escapement for a matrix-machine, a scape-wheel, a holding-dog and its carrier, reciprocating devices for moving the carrier to release the dog, a pawl, and a swinging carrier therefor movable with the wheel and arranged to engage said reciprocating devices to retract them and permit re-engagement of the holding-dog with the wheel, substantially as set forth.

16. In a matrix-machine, a circuit-closing pin co-operating with an index-plate, a series of conducting-plates coinciding with the indexes, a variable feed-escapement, releasing devices therefor consisting of a series of plungers adapted to be separately projected to reciprocate the carrier of a holding-dog, and electro-magnets having circuit connections severally with said conducting-plates for operating said releasing devices, substantially as set forth.

17. In a feed mechanism for a matrix-machine, the combination, with mechanism for moving and holding the same, of electrically-operated releasing devices for engaging the same to permit variable feed movements, and means for causing the movements of the feed mechanism to return the releasing devices to normal position, substantially as set forth.

18. The combination, with a variable feed-escapement for a matrix-carriage, of a reciprocating detent-carrier, a series of reciprocating devices adapted to operate separately upon the carrier to free the detent, and devices operated by the scape-wheel movements to cause the retraction of such reciprocating devices to permit re-engagement of the detent, substantially as set forth.

19. In a feed-escapement for a matrix-machine, a scape-wheel, a detent for holding it, a series of plungers arranged radially in the plane of the wheel for separately releasing the detent, and a cam arranged to be carried with the scape-wheel when the latter rotates and to be free when it stops and adapted to engage the plungers to retract them and allow the detent to re-engage the wheel, substantially as set forth.

CASPER L. REDFIELD.

Witnesses:
R. C. OMOHUNDRO,
EDWARD B. SPRINGER.