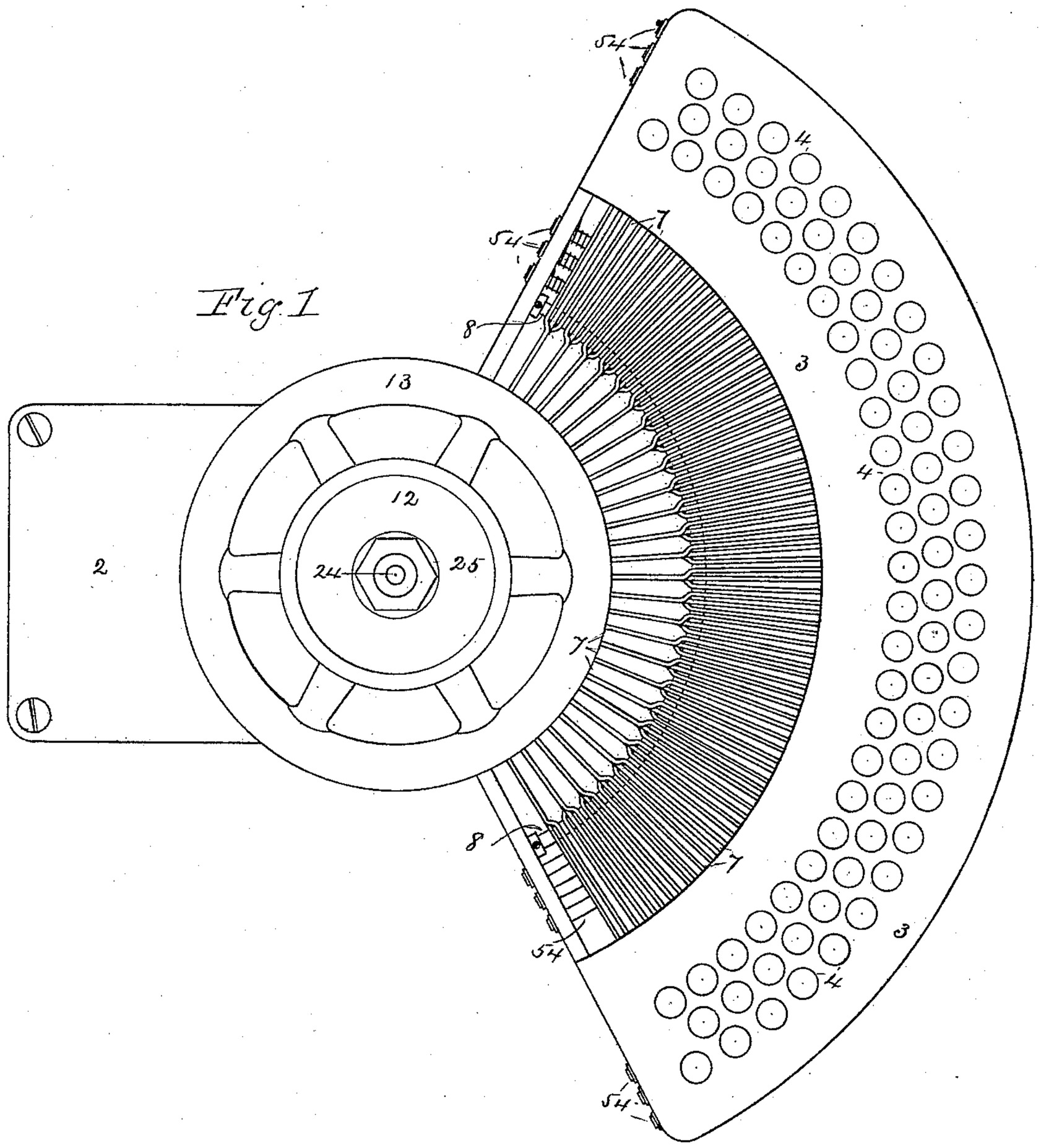
(No Model.) 5 Sheets—Sheet 1.

C. L. REDFIELD.

MATRIX MAKING MACHINE.

No. 429,740. Patented June 10, 1890.

Fig. 1



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(No Model.) 5 Sheets—Sheet 2.

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MATRIX MAKING MACHINE.

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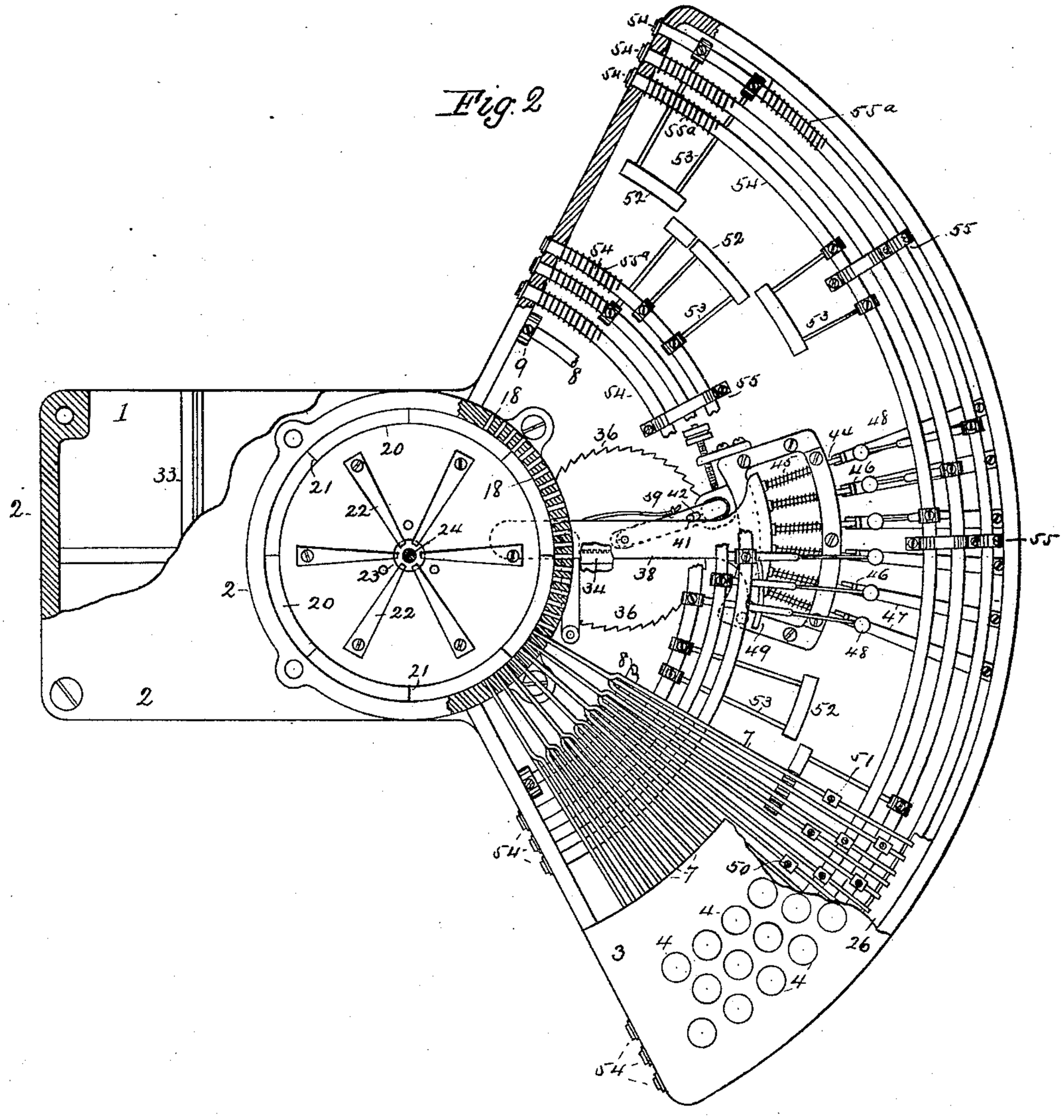
Fig. 2



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MATRIX MAKING MACHINE.

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Fig. 3

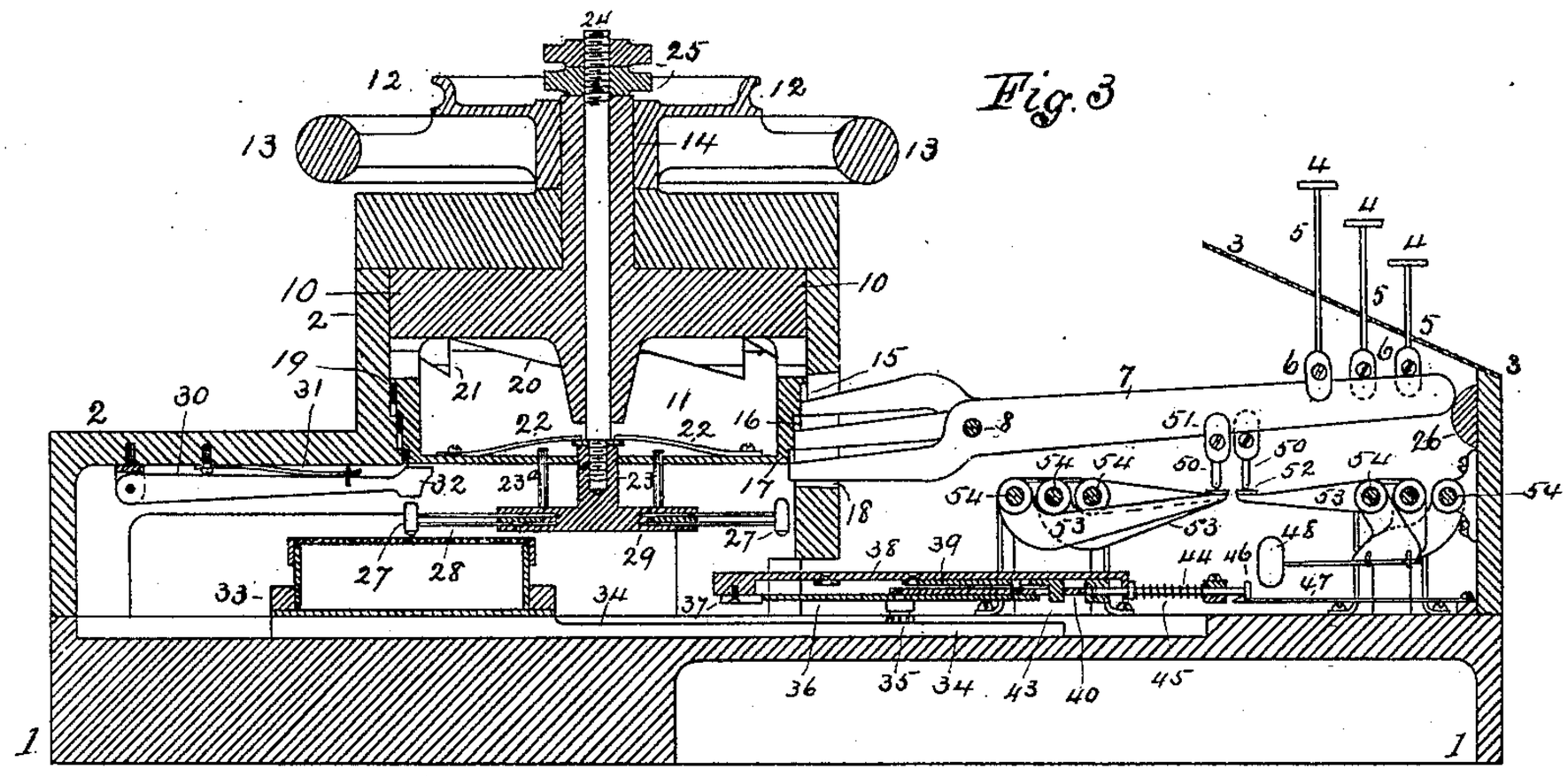
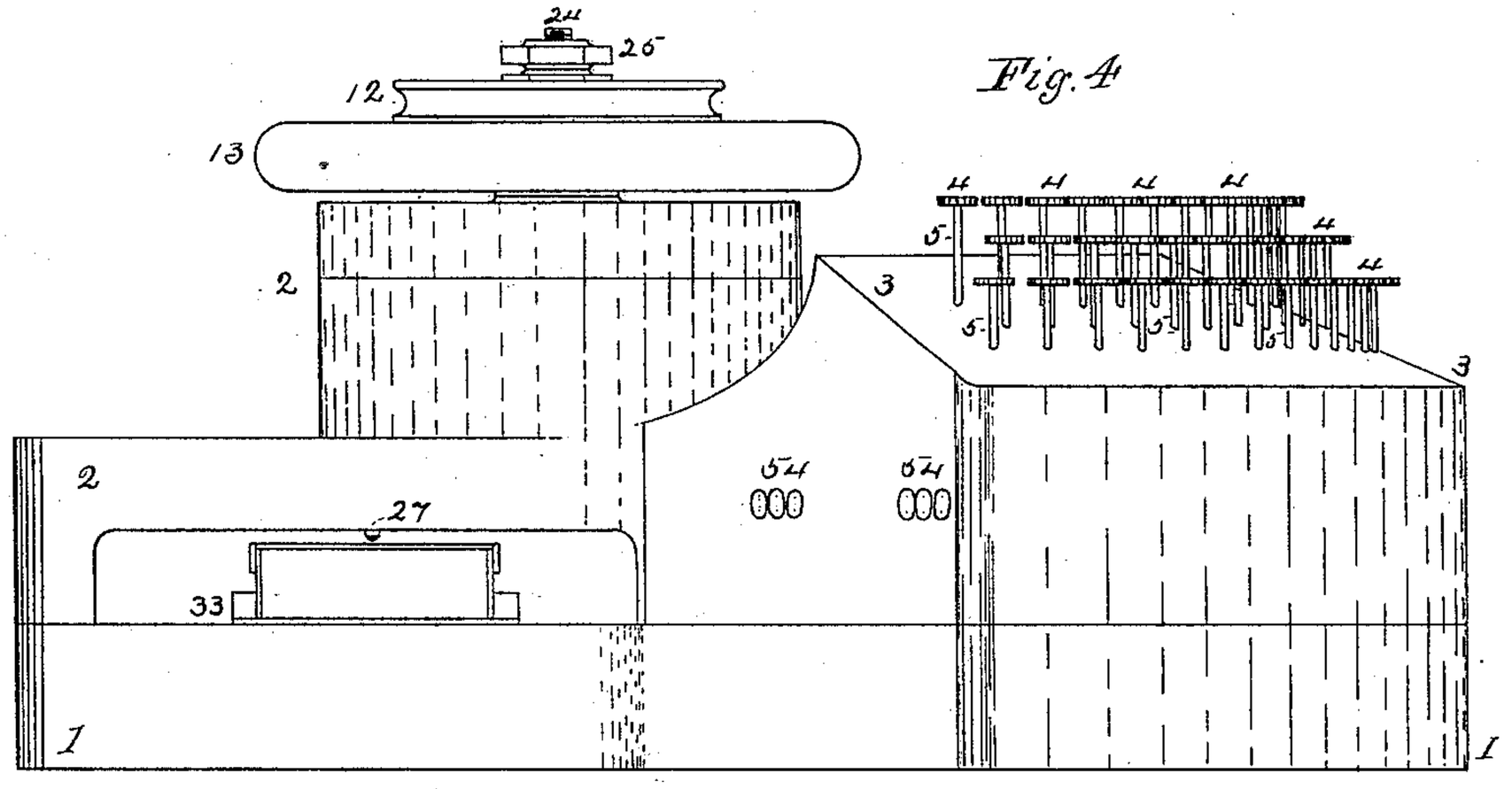


Fig. 4



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MATRIX MAKING MACHINE.

No. 429,740. Patented June 10, 1890.

Fig. 5

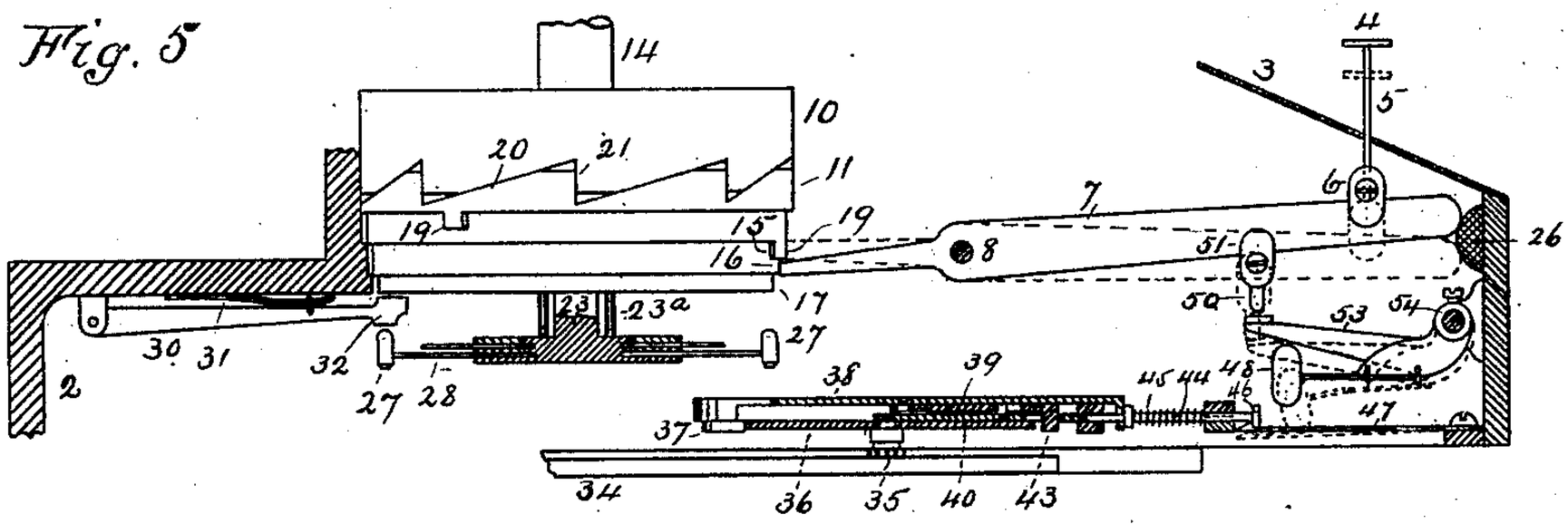


Fig. 6

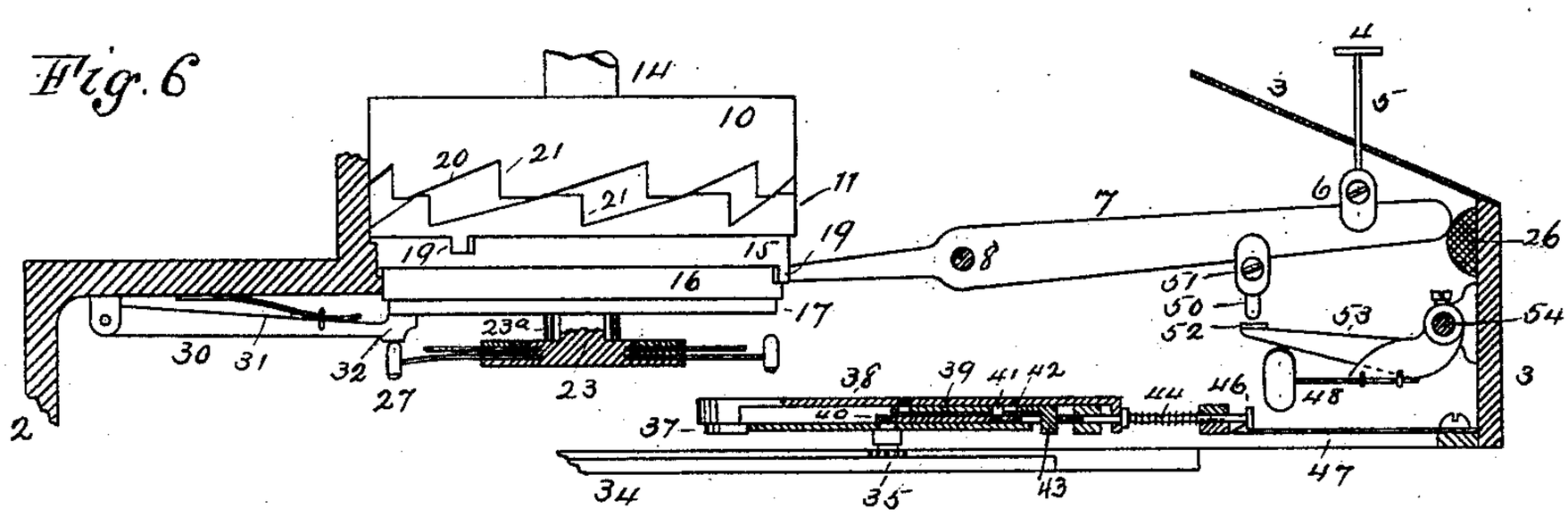
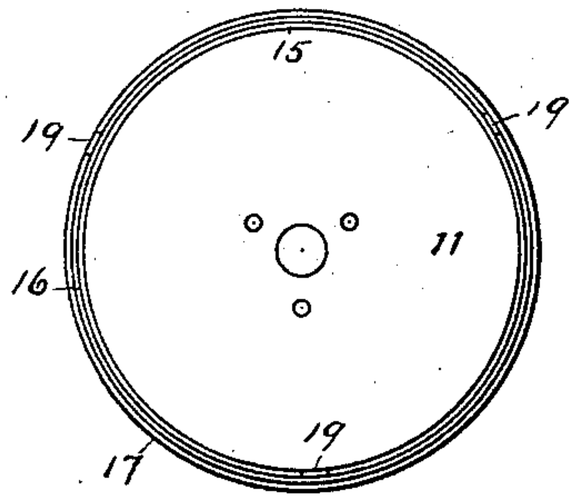


Fig. 7



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MATRIX MAKING MACHINE.

No. 429,740. Patented June 10, 1890.

Fig. 8

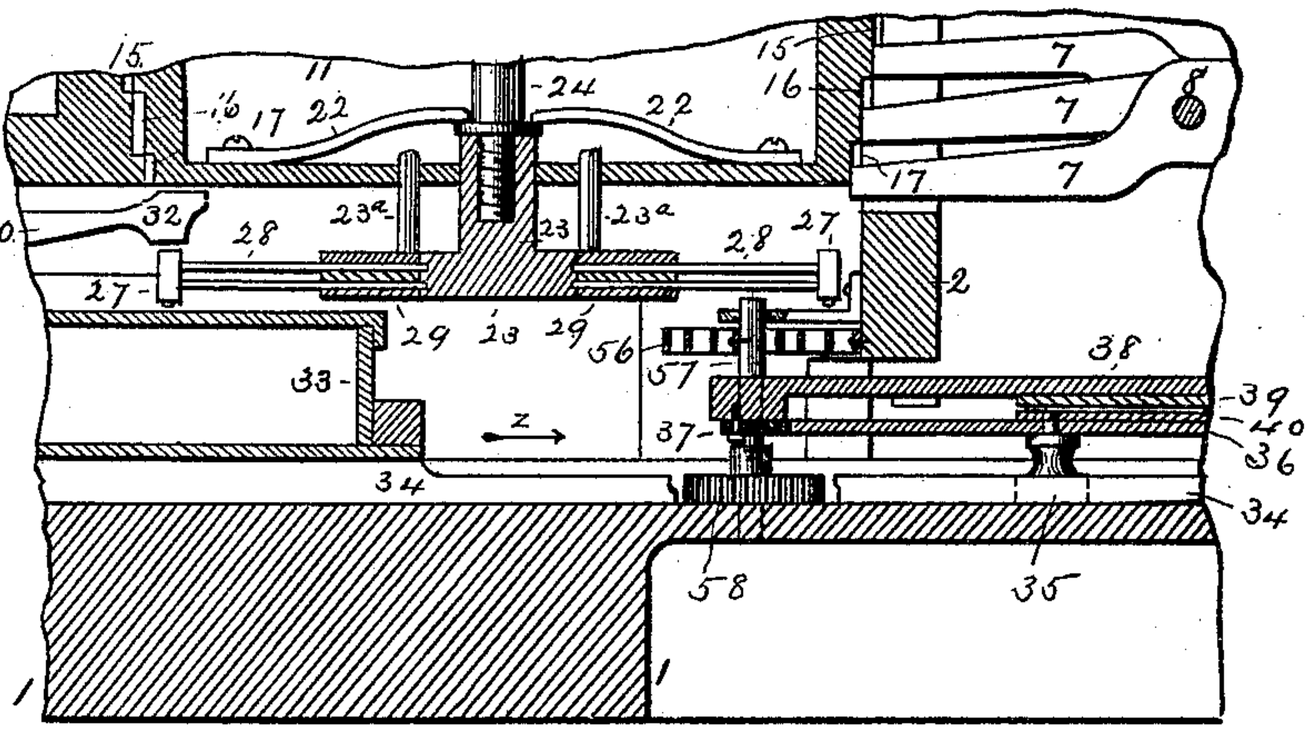

Fig. 10

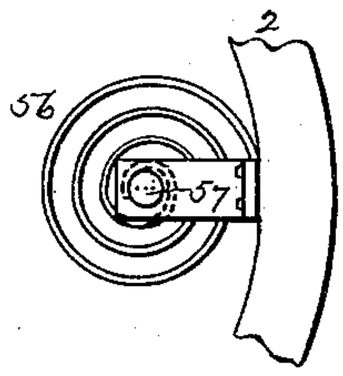

Fig. 9

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UNITED STATES PATENT OFFICE.

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

MATRIX-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 429,740, dated June 10, 1890.

Application filed May 27, 1889. Serial No. 312,319. (No model.)

To all whom it may concern:

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

My invention relates to the class of machines in which separate keys are employed for moving the type-dies to the printing-point.

The invention consists in the devices and combinations of devices hereinafter fully described, and particularly pointed out in the claims.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of the machine; Fig. 2, a similar view with portions broken away to show the interior construction of the machine. Fig. 3 is a central longitudinal sectional view; Fig. 4, a side elevation. Figs. 5, 6, and 7 are details. Fig. 8 is a central vertical section of the middle portion of the machine; Fig. 9, a plan view of the same with portions broken away to show the interior mechanism; and Fig. 10 is a detached view of the spring for moving the matrix-carriage.

In said drawings, 1 designates the bed of the machine-frame; 2, a casing for a portion of the operative parts, and 3 a partial cover for the front or key portion of the machine.

4 4 indicate the operating-keys, which consist of vertical stems 5, provided with disks on their ends, that are indexed with suitable characters. The lower ends of the stems 5 are attached by clamps 6 to the arms of levers 7, that are fulcrumed on a rod 8. The rod is bent in form of an arc and its ends are attached at 9 to the sides of the machine-frame. These levers 7 are placed in radial arrangement and occupy one-third the circumference of a circle. The levers are arranged in groups of three, the middle lever of each group being straight, and the two at its sides having their inner arms bent, respectively, downward and inward and upward and inward, so that their inner ends are in a vertical plane, and the upper arm is a little shorter than the middle one and the lower a little longer. These shorter arms of all of the levers are designed to engage the sides of the clutch-box to stop its rotation and cause depression of the engaged body to produce a depression of the proper type-die into a matrix-body.

The clutch-box, composed of an upper member 10 and a lower member 11, is continuously rotated by means of a pulley 12 and a fly-wheel 13 driving the stem 14 of the upper member of the clutch-box. On the face of the lower member 11 of the clutch-box are circumferential recesses 15, 16, and 17, respectively, of diminishing diameter in the order stated. The levers of a group of three have their shorter arms entering the slots 18 in the casing 2, and the length of the shorter arms is varied, so that the upper lever-arm will pass the two lower recesses 16 and 17 of the clutch-box and enter the upper recess 15. The middle lever-arm will pass the lower recess 17 and enter the recess 16, and the lower lever-arm will enter the recess 17.

At suitable points on the face of the clutch-box 11 in the recesses 15, 16, and 17 are lugs or projections 19, that are engaged by the lever ends when in their respective positions in the recesses 15, 16, and 17 and stop the further rotation of the lower clutch-box member. The contact-faces of the clutch-box members being provided with inclines 20 and shoulders 21, the stopping of the rotation of the lower member causes the downward reciprocation of that member by reason of the movement of the other member on its inclined faces 20. This downward reciprocation continues until the shoulder 21 has been reached in the incline movement, when, the two contact-surfaces being then separated, the springs 22, attached to the base of the lower member and pressing on the upper surface of the hub 23 of the type-wheel, lift the lower clutch-box member upward to its contact position. This downward thrust of the clutch-box depresses the inner lever-arms and lifts the outer arms to their initial position. The levers are shown to be held in their normal position by means of a spring-cushion 26, attached to the frame of the machine, against which the ends of the levers

rest. The manual depression of a key carries its lever beneath the cushion, and the clutch-box thrust returns it to its position above the cushion. The type-dies 27 are held in circular arrangement by flat spring-arms 28, that are attached to a disk 29 on the lower end of the hub 23, and the arrangement of the characters is such that the engagement of any selected lever 7 with the stop 19 on the clutch-box will stop the rotation of the type-wheel when the appropriate type-die is in position over the printing-point. The hub 23 of the type-wheel is screwed onto the lower end of a loose spindle 24, and the spindle is supported by adjustable nuts 25, that rest on the top of the clutch-box spindle 14. By adjustment of these nuts the type-wheel may be raised or lowered. The hub 23 is connected with the base of the clutch-box member 11 by pins 23^a or a feather, by means of which the type-wheel is rotated and vertical reciprocation permitted the clutch-box member 11. A lever 30 is pivoted at the under side of the frame-cover 2, and is supported by a spring 31 to hold its head 32 immediately over the printing-point. The descent of the clutch-box 11 presses the lever end 32 on the selected type-die 27 and depresses it into the matrix-body carried in the matrix-carriage 33. Upon the return of the clutch-box member the spring 31 lifts the lever 30, and the type-die is lifted to horizontal position by its spring-supports 28.

The matrix-carriage movements for spacing for impressions is produced by escapement devices that are the subject-matter of prior applications for patent made by me, and which are hereinafter specified, and a brief description of said devices is as follows: The matrix-carriage 33 is attached to a rack 34, that engages a pinion 35. On the shaft of the pinion is a scape-wheel 36. The holding-dog 37 is carried on the end of a bar 38, the opposite end of which extends beyond the opposite side of the scape-wheel and is downturned in segmental form. At the under side of the bar 38, near the axis of the scape-wheel, is pivoted a lever 39, and to the under side of the lever 39 is connected a second lever 40 by means of a pin 41 on the latter in an oblong slot 42 in the former lever, and on the end of the lever 39 is carried the engaging-dog 43, that projects downward through a slot in the lever 40. The axial movement of the bar 38 inwardly releases the holding-dog 37 and causes engagement of the opposite dog 43 and allows the scape-wheel to rotate and carry with it the levers 39 and 40. This axial movement of the bar 38 is produced by the thrust of one of a set of plungers 44, which pass through perforations in this downturned portion and have shoulders engaging it to carry it forward, and the plungers are operated by springs 45. These rods or plungers have heads 46, that are engaged by spring-catches 47 to hold them in normal position. To release this engagement, there are provided spring-hammers 48, that as the keys are depressed strike the appropriate catches 47 and release the rods 44 to produce the escapement movement. The amounts of movement are determined by the relative positions at which the rods 44 engage the segmental end of the bar 38, there being in the arrangement shown provision for six degrees of feed movement, the smallest of these movements being that of the rod 44 nearest the engaging-dog 43, the next in degree being that nearest the former rod, and so on, with the several rods in their radial arrangement along with the segmental face of the bar 38. The inward movement of the rods 44 carries their ends to position to be engaged by an inclined face 40^a on the lever 40, which by its advance movement as it is carried by the scape-wheel forces the engaged rod back to its position to be caught and held by its catch 47, thus releasing the bar 38 from the pressure of the rod 44 and permitting a spring 49 to carry the bar outward to position to release the moving dog and cause the holding-dog to re-engage the scape-wheel and stop its rotation. The extent of the throw of the levers 39 and 40 is limited by the engagement of the inclined face of the latter with the projected plunger 44, and upon the retraction of the plunger by the action of such inclined face on its end the levers 39 and 40 become disengaged from the scape-wheel and are returned to initial position by a spring that connects them to the bar 38. The hammers 48, which are spring-hammers, in order that they will rebound after striking blows, are operated upon the depression of the levers 7 by means of pendent pins 50, attached by clamps 51 to the under side of the levers, the pins serving to engage bars 52, which are carried on arms 53, that are attached to flexible shafts 54. The depression of the bars 52 turns the shaft to which they are attached on its axis to produce a downward blow of the hammer 48, which is also attached to the shaft. These shafts are six in number, corresponding with the number of movements for which the escapement is designed, and they have their end bearings in the sides of the machine-frame and are supported at suitable intervals in brackets 55 to sustain them in horizontal position. Springs 55^a are provided for returning the shafts when they have been partially turned. Three of the shafts 54 are grouped in an outer arc and three in a shorter inner arc, and the bars 52, with their supporting-arms 53, are arranged in the intervening space. The arrangement of the bars 52 and their connections with one or another of the shafts 54 are determined relative to the respective characters for which they are designed to cause escapement-movements, those requiring the shortest measure of feed movement all being connected to the one shaft 54, which operates the hammer for releasing the escapement to produce a minimum movement, and those for the second

measure of movement being likewise attached to the shaft for operating the hammer for the second measure of movement, and so on throughout the series.

The matrix-carriage may be actuated by means of a spring 56, attached to the machine-frame and to a spindle 57, on which is a pinion 58, the spring tending to move the carriage in the direction of the arrow *z*.

The operation of the mechanism is as follows: The operator having selected a key depresses it, depressing with it the outer end of the lever-arm 7 and causing a downward strike of the hammer 48 to release a rod 44 for operating the escapement to produce a feed movement corresponding with the measure required for the impression of the selected character, and thus producing a movement of the escapement device, as described, and an advance of the proper portion of the matrix-body to the proper distance to present the matrix-carriage to the die. The depression of the lever 7 lifts its inner arm to position to be engaged by the stop 19 in the appropriate recess 15 16 17 of the clutch-box, and the engagement serves to stop the type-wheel and present the proper type-die 27 to the printing-point. The continuance of the rotation of the upper clutch-box member causes the descent of the lower member and the forcing of the type-die downward by the pressure of the interposed lever end 32 upon it to form a matrix impression. This depression of the lower clutch-box member also depresses the inner lever-arm of the operated lever and carries its outer end upward past the cushion 26, where it is held by the cushion in position, when the lower clutch-box member is again lifted by the operation of the springs 22, and the devices are then in their initial position ready for a second operation. The extent of movement of parts and the time required for the matrix-carriage to make its advance movements to space for impressions being less than the extent of movement of parts and time required to impress a die into the matrix-body, the matrix-carriage will have completed its feed movement before the selected die will be caused to impinge upon the matrix-body.

Features of invention herein shown or described and not claimed herein relative to the mechanism for causing feed movements of the matrix-carriage and to the devices for impressing the dies into the matrix-body are the subject-matter of prior applications for patent made my me, No. 305,882, filed April 3, 1889; No. 309,288, filed May 1, 1889; No. 312,318, filed May 27, 1889, and No. 315,394, filed June 24, 1889, in which applications claim is made to such features of invention.

Having described my invention, what I claim is—

1. In a matrix-making machine, an impression device comprising a continuously-rotating member and an intermittingly rotating and reciprocating member, the two having coincident inclined and shouldered contact-faces, springs connecting them, circumferential recesses and lugs on the latter member, and key-levers for engaging the lugs to stop rotation, substantially as set forth.

2. In a matrix-making machine, an impression device comprising two rotating members, one of which is arranged to reciprocate, projections on the periphery of the latter, key-levers in radial arrangement for engaging the same, and a type-wheel rotated by the impression device, substantially as set forth.

3. In a matrix-making machine, a rotary impression device carrying dies in circular arrangement and consisting of two rotating bodies, one of which reciprocates, circumferential stepped recesses on the latter, projections therein at intervals, and key-levers in radial arrangement adapted to engage said projections to stop the die-carrier and reciprocating body, for the purpose set forth.

4. An impression device consisting of two rotating bodies having inclined and shouldered contact-faces for reciprocating them, a central loose stem serving as a die-carrier, a shoulder thereon, and springs bearing thereon and connected to said reciprocating body, for the purpose set forth.

5. In a matrix-making machine, a type-wheel having vertical dies in circular arrangement on spring-supports, a rotating and reciprocating impression device controlling the type-wheel movements, and a spring-supported body between the die at the printing-point and the reciprocating impression device, substantially as set forth.

6. In a matrix-machine, a continuously-rotating body, a second body arranged to rotate therewith and to make a single reciprocation when stopped, a type-wheel arranged to rotate and stop with the latter body, but prevented from reciprocating therewith, and means for stopping rotation and causing the reciprocating body to depress the dies at the printing-point, substantially as set forth.

7. In a matrix-making machine, a rotating and reciprocating impression device of cylindrical form, a slotted casing of corresponding shape, and key-levers having their ends operating in said slots, substantially as set forth.

8. The rotating and reciprocating impression device having the stepped circumferential recesses and projections and the key-levers radially arranged in sets, each lever of a set being adapted to engage a different projection, for the purpose set forth.

9. The combination, with the rotary impression device having stepped recesses and projections and its slotted casing, of the key-levers arranged in sets with their ends in vertical planes in said slots and of varying lengths to correspond with said recesses, substantially as set forth.

10. The combination, with the rotating impression device, of the key-levers arranged in radial series and grouped into sets, the common pivotal rod, the laterally and vertically

bent lever-arms, and the casing having vertical slots to guide said bent lever-arms, substantially as set forth.

11. The combination, with the cylindrical impression device and the type-wheel rotating therewith, of the radially-arranged key-levers and the peripheral projections on the impression device arranged to be engaged by the levers to stop rotation when the die for the selected character is at the printing-point, substantially as set forth.

12. In a feed-escapement for a matrix-carriage providing variable feed movements, rocking shafts carrying hammers for releasing the escapement, key-levers, and devices connected therewith for rocking said shafts, substantially as set forth.

13. The combination, with a matrix-material carriage having variable feed movements, of separate releasing devices for each of the feed movements, rocking shafts carrying such releasing devices, a series of key-levers corresponding in number with the releasing devices, and connections for rocking the shafts by the depression of the levers to produce the desired feed movements, substantially as set forth.

14. The combination, with a matrix-carriage variable-feed escapement, of releasing devices therefor carried by rocking shafts arranged in concentric arcs and radially-arranged key-levers for operating the same, substantially as set forth.

15. In combination with a variable-feed escapement for a matrix-carriage, a set of releasing devices for each degree of movement, a separate curved rock-shaft for operating each of said sets of devices, a system of key-levers radially arranged above the same, projections on the shafts engaged by the levers to turn the shafts, and springs for reversing the movement, substantially as set forth.

16. In a matrix-machine, the combination, with the matrix-feed mechanism and the operating-keys, of the flexible rocking shafts, substantially as set forth.

17. In a matrix-machine having a variable-feed mechanism and operating-keys, a series of flexible rock-shafts co-operating therewith and each arranged to produce a different amount of feed, substantially as set forth.

18. A revolving die-carrier having dies supported in circular order, a rotating and reciprocating impression device, means for stopping a selected die at the printing-point, and a spring-supported body intermediate the impression device and the die at the printing-point for transmitting the thrust to the die, substantially as set forth.

19. A rotating impression device adapted to reciprocate when stopped and provided with stepped circumferential recesses having projections at suitable intervals, and devices co-operating with the character-selecting devices for engaging said projections to stop rotation, substantially as set forth.

20. In a matrix-machine, a feed mechanism and its releasing devices, in combination with the bent rocking rods and means for actuating the releasing devices, substantially as set forth.

21. The combination, with the devices for controlling a matrix-feed mechanism, of bent rocking rods provided with means for operating them and arranged to return by torsion to normal position, substantially as set forth.

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