(No Model.) 2 Sheets—Sheet 1.

C. L. REDFIELD.

VARIABLE FEED MECHANISM FOR MATRIX MAKING MACHINES.

No. 418,295. Patented Dec. 31, 1889.

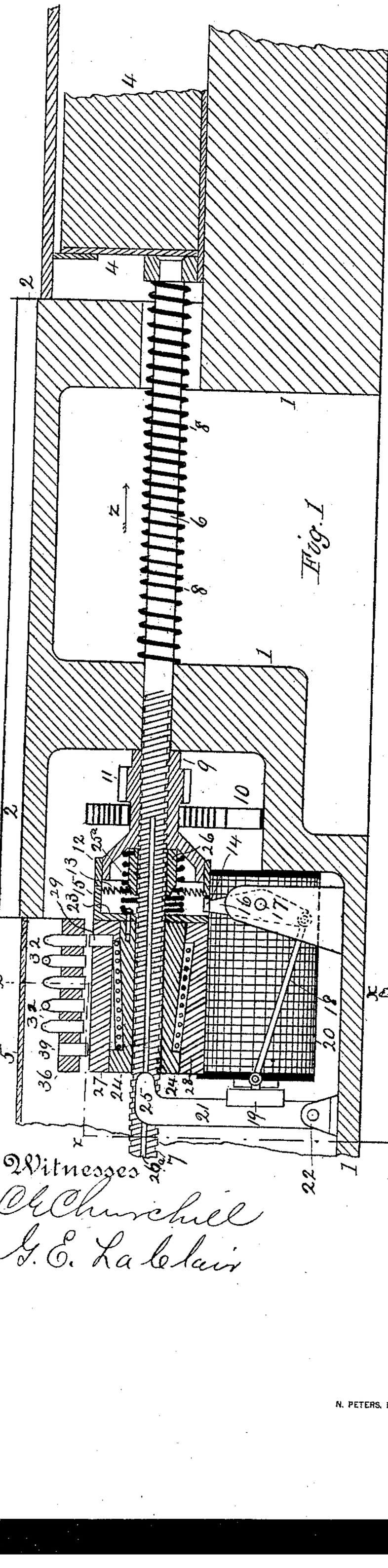

Fig. 1

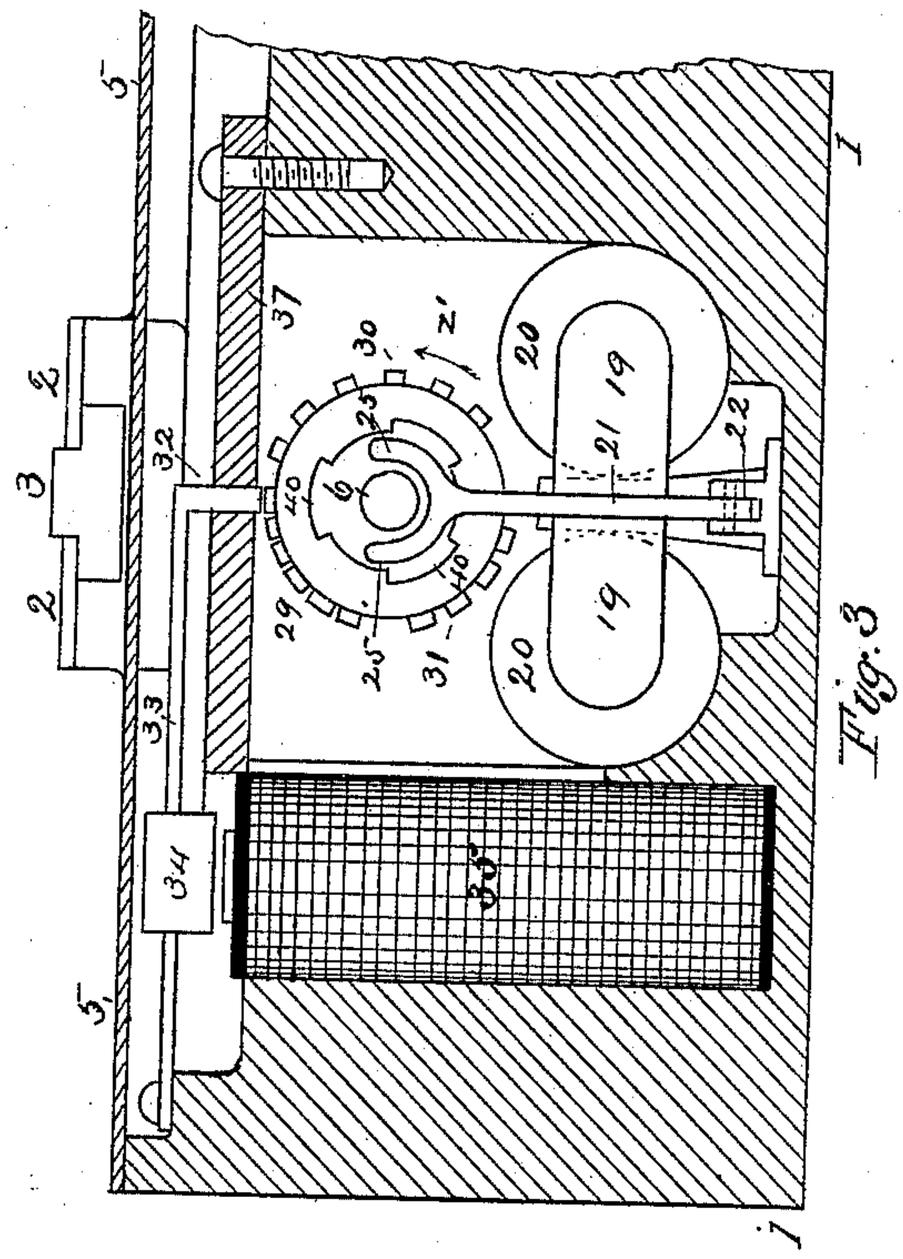

Fig. 3

Fig. 2

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(No Model.) 2 Sheets—Sheet 2.

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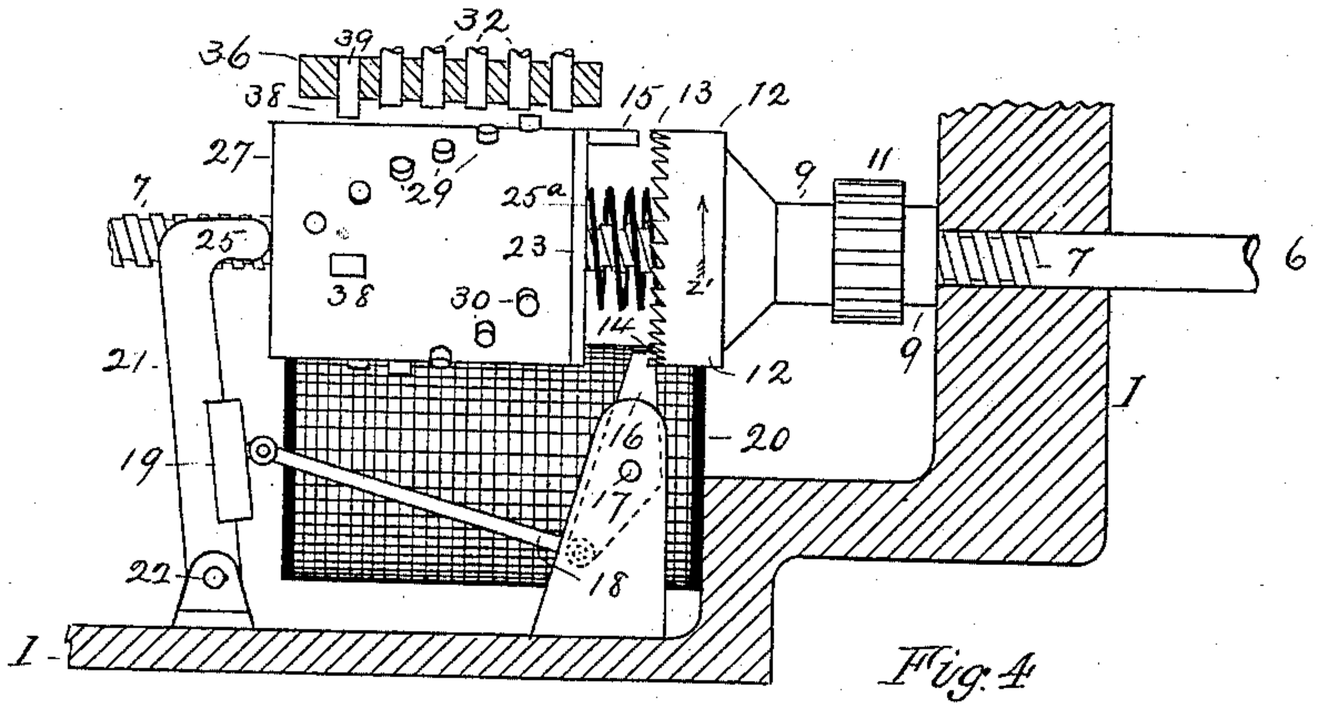

Fig. 4

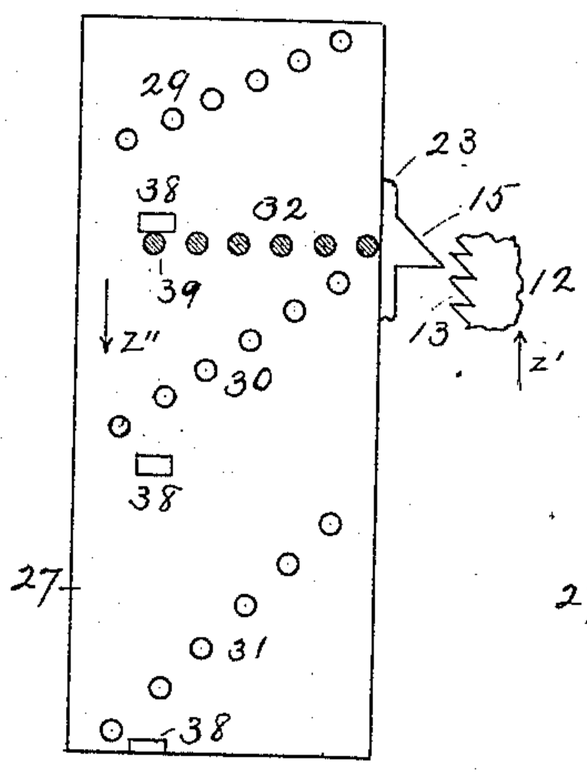

Fig. 5

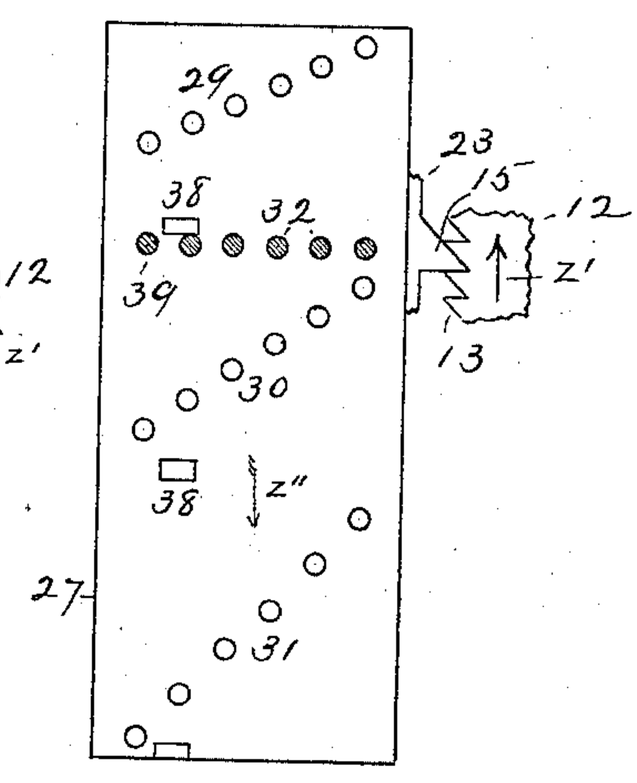

Fig. 6

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UNITED STATES PATENT OFFICE.

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

VARIABLE-FEED MECHANISM FOR MATRIX-MAKING MACHINES.

SPECIFICATION forming part of Letters Patent No. 418,295, dated December 31, 1889.

Application filed April 6, 1889. Serial No. 306,171. (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 Variable-Feed Mechanism for Matrix-Making Machines, of which the following is a specification.

My invention relates to the mechanism in matrix-making machines for producing movements of a matrix-carriage to feed the matrix-body forward proportionately to the varying sizes of the dies to be impressed.

It is the object of the invention to produce an organization of devices that will operate automatically to properly space the impressions of a given scale of measurement on the matrix, and by an easily-made adjustment of a part serve likewise to space impressions of a different scale of measurement; and the invention, generally stated, consists in a spring-actuated matrix-carriage fed forward by means of a screw, the movements of which are controlled by an escapement that in turn controls a rotary barrel provided with sets of spirally-arranged pins adapted to be engaged by stops that are moved to position when a matrix-impression is to be made to limit the extent of rotation of the barrel and so determine the measure of the matrix-carriage feed; and it further consists in the devices and combinations of devices hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a portion of a matrix-machine containing my improvements. Fig. 2 is a plan view of the devices, the frame being removed. Fig. 3 is an end view, partly sectional on the plane of the irregular lines *x x* of Figs. 1 and 2. Fig. 4 is a side elevation of a portion of the operative devices; and Figs. 5 and 6 show the barrel-surfaces extended on a plane and in its two positions of reciprocation relative to the escapement-wheel.

The frame of the machine is indicated in the said drawings by the numeral 1, the guides and cross-head for the die-carrier by 2 and 3, respectively, the matrix-carriage by 4, and a cover for the escapement by 5. The matrix-carriage is connected to a rod 6, the outer portion 7 of which is screw-threaded. A spiral spring 8 around the rod tends to move it and the carriage in the direction indicated by the arrow *z*. On the threaded portion 7 of the rod is a nut 9, to which is attached one end of a helical spring 10, the other end of which is fast to the frame 1, which spring exerts its force to turn the nut in the direction indicated by the arrow *z'* to move the rod in the direction of the arrow *z*. A pinion 11 is formed on the nut, by means of which, with the aid of a rack or gear-wheel, (not shown,) the nut can be turned in direction opposite to the spring-tension to retract the rod and carriage after a line of matrix-impressions has been completed. The forward portion of the nut is recessed, and on its rim, or on a sleeve 12 secured thereon, are formed face-teeth 13, that are engaged alternately by dogs 14 and 15. The dog 14 is formed on one arm of a lever 16, that is pivoted at 17 and has its other arm connected by a rod 18 to an armature 19, that is actuated by electro-magnets 20. The armature 19 is attached to a lever 21, fulcrumed at 22, and adapted to fall back from the magnet by gravity, or to be retracted by the action of a spring. The movement of the armature away from the magnet causes the engagement of the dog 14 with the teeth 13, and a movement of the magnet in the opposite direction releases the dog. The dog 15 is carried on a plate 23, that is attached to the end of a loose cylinder or sleeve 24 on the threaded portion 7 of the rod 6. The lever 21, carrying the armature, has forked arms 25 on its free end, that bear against the end of the cylinder or sleeve 24 to hold the dog 15 in engagement with the teeth.

Within the recessed portion of the nut 9 is a spiral spring 25^a, having one end attached to the plate 23 and the other to a loose sleeve 26, having an interior feather arranged to slide in a groove 26^a, formed in the rod 6. The spring 26^a is designed to move the cylinder 24 outward when not engaged by the lever-arms 25, to free the dog 15 from engage-

ment, and also to turn the cylinder 24 in the direction indicated by the arrow z'', and so return it to its initial position.

On the cylinder 24 is an outer cylinder 27, that is held in place on the former by means of a spiral spring 28 in an annular space between the two cylinders, which spring bears against an outward shoulder on the inner cylinder and an inward shoulder on the outer cylinder, the two connected cylinders thus constituting a barrel. On the exterior of this barrel are series of pins 29, 30, and 31 in spiral arrangement, and designed to be engaged by stops 32, operated by electro-magnets. Each of the stops 32 is carried on the arm of a lever 33, that is connected to an armature 34, and operated, respectively, by the magnets 35. These stops are arranged in a plate 36 in a row and in line with the axis of the barrel 27. They are held normally away from the pins 29, &c., in the position shown in Figs. 1 and 4, and when designed to engage one of the pins 29 the proper stop is depressed by the action of its magnet, and as the barrel rotates in the direction of the arrow z' the pin engages the stop and the motion of the barrel is arrested.

The extent of the barrel movement, and hence the screw movement and carriage-feed, is determined by the distance between the pin 29 and the depressed stop 32.

The spiral trend of the row of pins of a set is arranged with reference to the quantities of matrix movement required for the impression of different-sized dies of a given scale of measurement. The spiral inclination from the axial line is made greater or less, as may be required, to produce longer or shorter movements of the carriage.

The arrangement of the mechanism is such that when a feed movement is desired to be made and a circuit is completed through the magnets 20 the lever 19 will be drawn toward the magnet and thrust the barrel inward, so that the dog 15 it carries will engage one of the teeth 13. Simultaneously the dog 14 is released from engagement, and the rod 6, being then free, is turned by the tension of the spring 10 and causes the barrel to rotate until the appropriate pin 29 strikes the stop-pin which has been depressed by its magnet. Further movement being thereupon arrested, the parts are held stationary until the lever 19 is released from its magnet and retracted, causing the dog 14 to re-engage the teeth 13, and permitting the barrel 27 to be moved outward by the spring 25^a, to free the dog 15 from engagement and at the same time turn the barrel in reverse direction until it is stopped by a lug 38 on its face engaging a stationary stop-pin 39. The stop-pin 39 serves the further purpose of engaging the last pin of a set, and, as will be obvious, need not be movable, but may remain constantly in the one position. By these means the proper feed of the matrix-body for receiving impressions of dies cut upon a given scale will be automatically produced, and when it is desired to use dies of a different scale of measurement the outer cylinder 27 of the barrel can be drawn out and given a partial turn and replaced, bringing a different set of pins, as 30 or 31, into position to engage the stops 32 by movements proportioned to the measurements of the substituted dies. The cylinder 27 is locked upon the cylinder 24 by means of projecting portions 40 on the latter engaging corresponding grooves in the former.

Patentable matter herein disclosed and not claimed relative to the means for operating the die-carrier, the matrix-carriage and its feed movement, and the stops and means for operating them for controlling the feed, is reserved to be claimed in pending applications made by me, Serial No. 300,536, filed February 20, 1889, Serial No. 301,178, filed February 26, 1889, and Serial No. 303,657, filed March 18, 1889.

What I claim is—

1. In a matrix-carriage feed, a screw, a feeding-nut thereon having ratchet-teeth, a holding-dog, a reciprocating barrel carrying a dog for engaging the teeth to rotate the barrel, and adjustable stopping devices for determining the extent of the barrel rotations, substantially as set forth.

2. In a screw-feed for a matrix-carriage, a screw, a nut having teeth, power for turning the nut, a locking-dog, a barrel, a dog thereon for engaging the nut to turn the barrel, spirally-arranged projections on the barrel, movable stops therefor, and mechanism for reciprocating said barrel and holding-nut simultaneously in opposite directions, substantially as set forth.

3. In a matrix-feed mechanism, the combination, with the screw and a feeding-nut having teeth, of a barrel, means for connecting the nut and barrel to rotate in unison, stops for regulating the extent of rotation, and a spring for disengaging the barrel and returning it to its initial position, substantially as set forth.

4. In a matrix-feed mechanism, the combination, with the screw and means for turning it and a feeding-nut having teeth, of a barrel, a dog for causing the barrel to rotate in unison with the nut, spirally-arranged projections on the barrel, stops operated to cause varying measures of rotation, and a spring for freeing the barrel from the nut and returning it to initial position.

5. In a matrix-feed mechanism, a screw, means for turning it, a feeding-nut having teeth, a barrel, a dog thereon, a locking-dog, means for alternately engaging said dogs, a sliding sleeve on the screw, and a spring connecting the same to said barrel, for the purpose set forth.

6. In a feed mechanism for a matrix-carriage, a screw, means for turning it, a feeding-nut having teeth, a holding-dog and a turning-dog therefor, a barrel carrying the

latter dog, a spring for disengaging it and rotating the barrel, and a compound-lever device for throwing the one dog into engagement when freeing the other, substantially as set forth.

7. In a screw-feed for a matrix-carriage, a screw and means for turning it, a feeding-nut, teeth thereon, a locking-dog, a barrel carrying a second dog and designed to turn with the nut, a spring for moving the barrel from engagement and rotating it to initial position, and magnets, armature, and levers for operating said locking-dog and barrel, substantially as set forth.

8. In a screw-feed for a matrix-carriage, a screw and means for turning it, a feeding-nut having a recessed end and a flange provided with teeth, a holding-dog therefor, a reciprocating barrel having a dog engaging with the nut, an intermediate sleeve sliding on a feather, and a spring connecting it with the barrel, for the purpose set forth.

9. The combination, with a matrix-carriage, of a screw-rod, a spring for moving the same to feed the matrix-carriage forward, a nut on the rod, a spring for turning the nut to advance the rod, teeth on the nut, a locking-dog and a rotating-dog, a sleeve carrying the latter dog, and stops for determining the rotation of the sleeve, substantially as set forth.

10. In a screw-operated feed for a matrix-carriage, a screw and means for turning it, a feeding-nut having teeth, a sleeve on the screw having a dog, a removable exterior sleeve connected therewith and provided with projections, and stop-pins operated successively to vary the sleeve rotations.

11. The combination, in a screw-operated feed for a matrix-carriage, of a screw, a feeding-nut thereon having ratchet-teeth, means to turn said nut, a holding-dog, a reciprocating sleeve carrying a dog, a spring for holding the latter dog from engagement, an electro-magnet, an armature, and compound levers for causing alternate engagement of said dogs, substantially as set forth.

12. In a screw-operated feed for a matrix-carriage, the combination, with a screw, the feeding-nut, and the rotating barrel carrying a dog, of the spirally-arranged sets of projections on the said barrel, and the stop-pins adapted to be successively presented for engagement, substantially as set forth.

13. In a screw-operated feed for a matrix-carriage, the combination, with the feeding-nut, of the reciprocating rotary barrel provided with projections arranged in series and having different spiral inclinations to the axis, and means for causing engagement of the barrel with the nut.

14. In a matrix-feed mechanism, a barrel having spiral projections in rows of different inclination to the axis, and means for adjusting its position to bring into use projections of a different series.

15. In a matrix-feed mechanism, the combination, with the feeding-nut, of a rotating barrel composed of interlocking inner and outer sleeves, the latter carrying projections arranged in spiral rows, and means for causing engagement of the barrel with the nut.

16. The combination, in a screw-feed mechanism, with a screw and the feeding-nut having teeth, of a barrel carrying a dog and provided with spirally-arranged projections, stop-pins, armatures, and electro-magnets for separately depressing the stop-pins, and means for causing engagement of the barrel with the nut.

17. In a screw-feed for a matrix-carriage, a screw, a spring-actuated feeding-nut, a rotating and reciprocating barrel carrying a dog and provided with spirally-arranged projections, a stationary stop for the last projection, and movable stop-pins for the other projections, magnets for operating said stop-pins, a spring for releasing the dog and returning the barrel, and a stop on the barrel to limit the return rotation, substantially as set forth.

18. In a screw-operated feed for a matrix-carriage, a turning nut having teeth, a locking-dog and a rotating-dog, a reciprocating and rotating barrel carrying the latter dog, spirally-arranged pins on the barrel, electrically-operated stops therefor, a spring for disengaging and returning the barrel, a stationary stop-pin and a projection on the barrel for limiting return movement, and an electro-magnet, armature, and levers for operating said locking-dog and reciprocating said barrels.

19. In a screw-feed mechanism for a matrix-machine, a feeding-nut having teeth, a barrel carrying a dog and composed of an outer sleeve having projections in spiral arrangement, and an inner sleeve with which it engages by means of projections on the one sliding in grooves in the other, and means for causing engagement of the barrel with the nut.

20. In a screw-feed mechanism for a matrix-machine, in combination, a screw and means for turning it, the feeding-nut having teeth, a dog, an interior sleeve carrying the same, an exterior sleeve provided with spirally-arranged projections, longitudinal grooves in the one sleeve corresponding to projections on the other, and a locking-spring in an annular space intermediate the sleeves, substantially as set forth.

21. In a screw-feed mechanism, a spring-actuated feeding-nut having teeth, a holding-dog therefor and means for operating the same, a second dog turning with the nut, a barrel carrying the same, stop mechanism for limiting the barrel rotation, means for sliding the latter dog to engagement, a sleeve intermediate the nut and the barrel sliding in a keyway into the screw, and a coil-spring attached to said barrel and to said sleeve and exerting both torsional and expansive force on the barrel, for the purpose set forth.

22. In a matrix-machine, the combination, with a matrix-carriage and a power for ad-

vancing it, of a feed-screw connected thereto, a nut and a spring for turning it on the screw, ratchet-teeth on the nut, a dog to prevent rotation and a dog carried with the teeth when in engagement therewith, means for moving said dogs to engagement in alternation, and means for variably limiting the degrees of revolution of the latter dog, substantially as set forth.

23. In combination, in a matrix-machine, a matrix-carriage, a feed-screw, a spring for turning it, a nut thereon having ratchet-teeth and a spring for turning it, a dog for holding it at rest, a second dog engaging it upon release of the former and rotating with it, and a series of stops for the carrier of the revoluble dog and means for presenting them successively to vary the extent of movement, substantially as set forth.

24. The combination, with a screw-feed for a matrix-carriage having a screw and a power for turning it, of a turning nut provided with teeth, a locking-dog and a dog carried on a reciprocating and revolving carrier, and a series of stops in axial line with the screw, adapted to be successively presented to limit the revolutions of such carrier, substantially as set forth.

25. In a screw-operated feed for a matrix-carriage, a screw, means for turning it, a barrel rotated thereby, spirally-arranged projections thereon, and a corresponding series of stops arranged parallel to the screw and held normally free from said projections, and means for projecting the stops separately to positions for engagement with said projections, substantially as set forth.

26. In a feed mechanism for a matrix-carriage, a screw, a spring for turning it, a nut having teeth and a spring for turning it on the screw, a dog for holding the nut at rest, a second dog adapted to turn with the nut, means for alternately engaging the dogs, and adjustable stops arranged to be separately presented to stop the latter dog and vary the limit of the nut rotations, substantially as set forth.

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