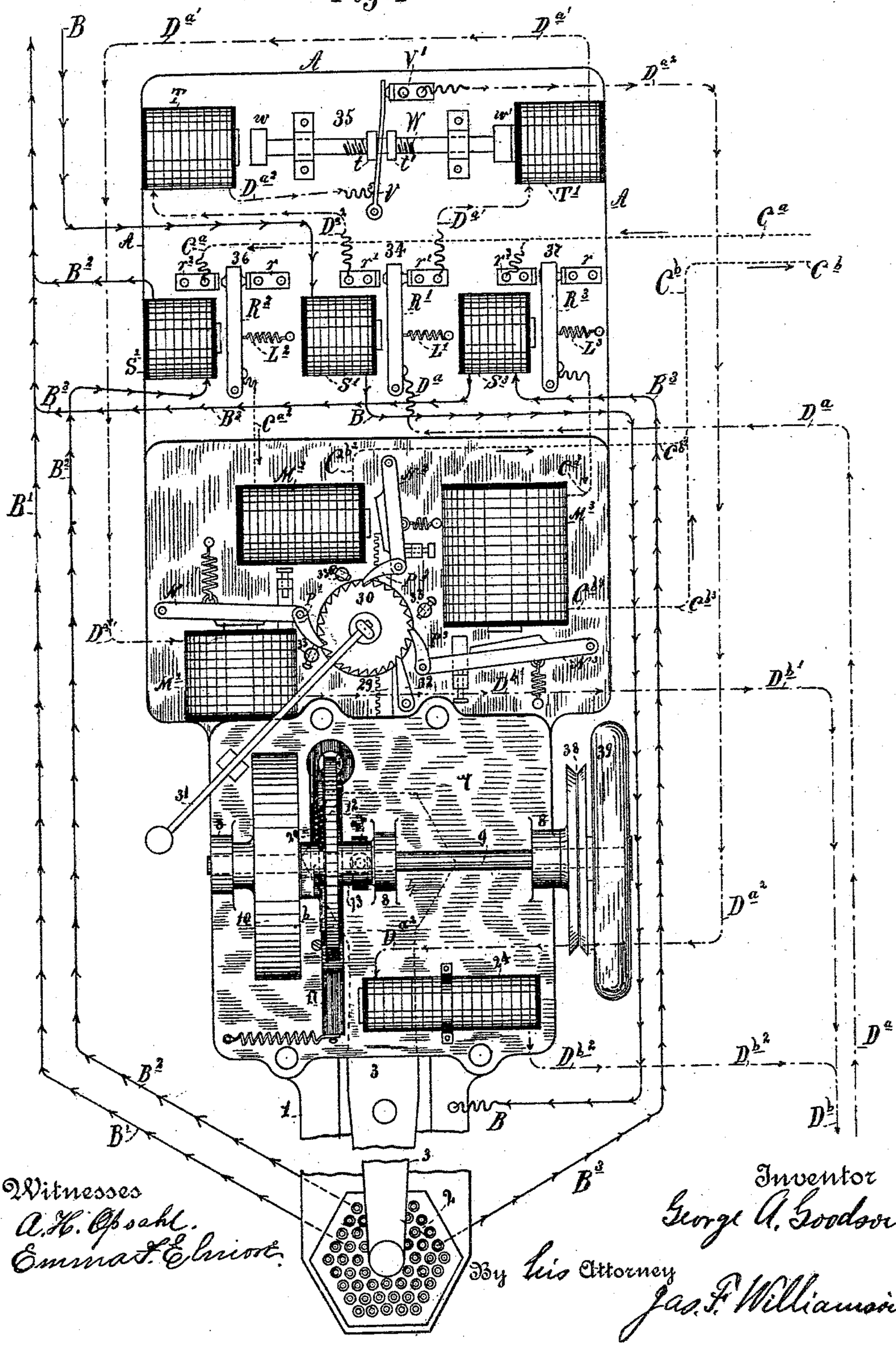
(No Model.) 3 Sheets—Sheet 1.

G. A. GOODSON.

MATRIX MAKING MACHINE.

No. 414,399. Patented Nov. 5, 1889.

Fig. I



Witnesses
A. H. Opsahl.
Emma F. Elliott.

Inventor
George A. Goodson

By his Attorney
Jas. F. Williamson

(No Model.) 3 Sheets—Sheet 2.

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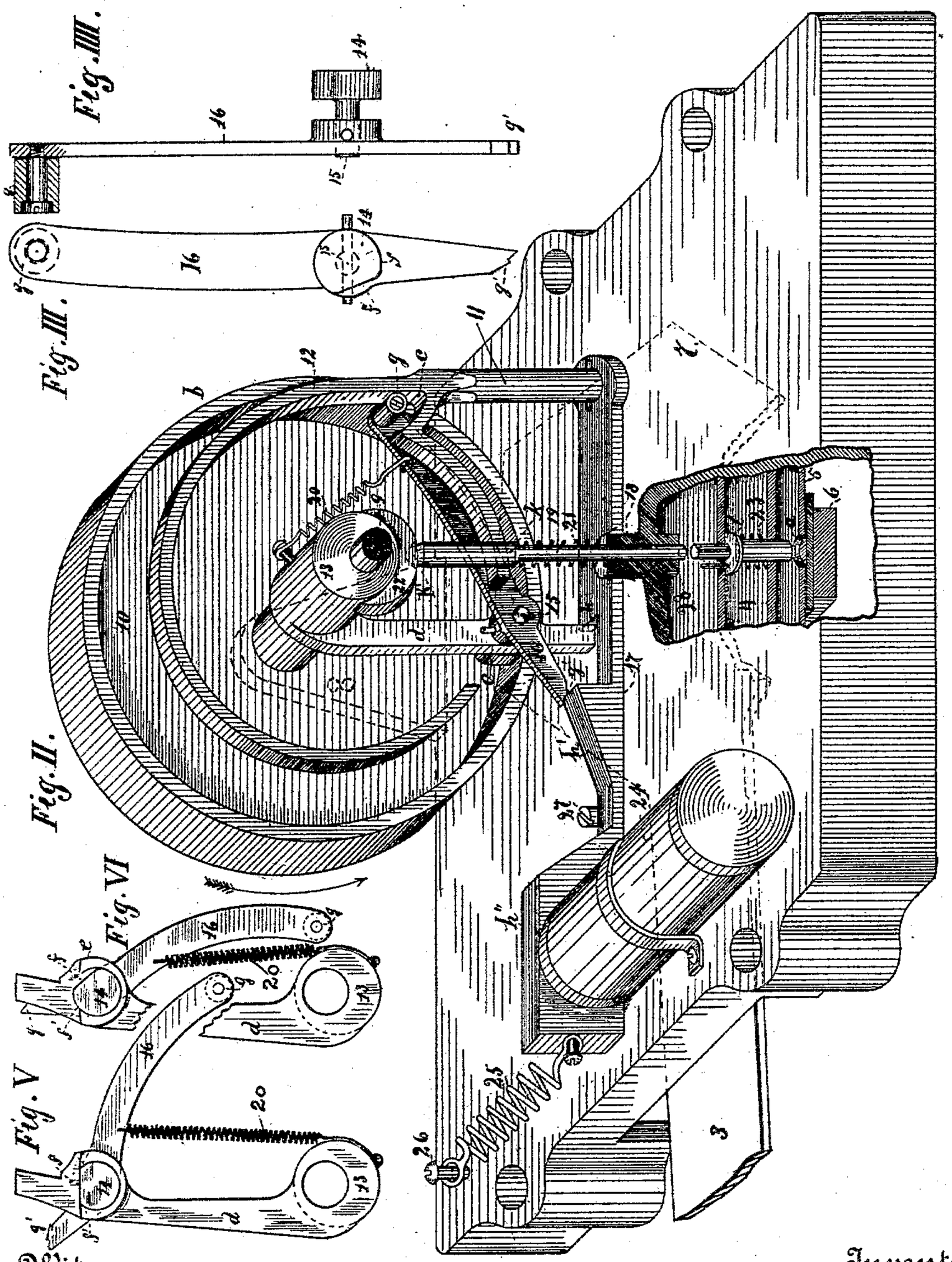

Witnesses
A. H. Opsahl.
Emma F. Elmore.

Inventor
George A. Goodson
By his Attorney
Jas. F. Williamson.

(No Model.) 3 Sheets—Sheet 3.

G. A. GOODSON.

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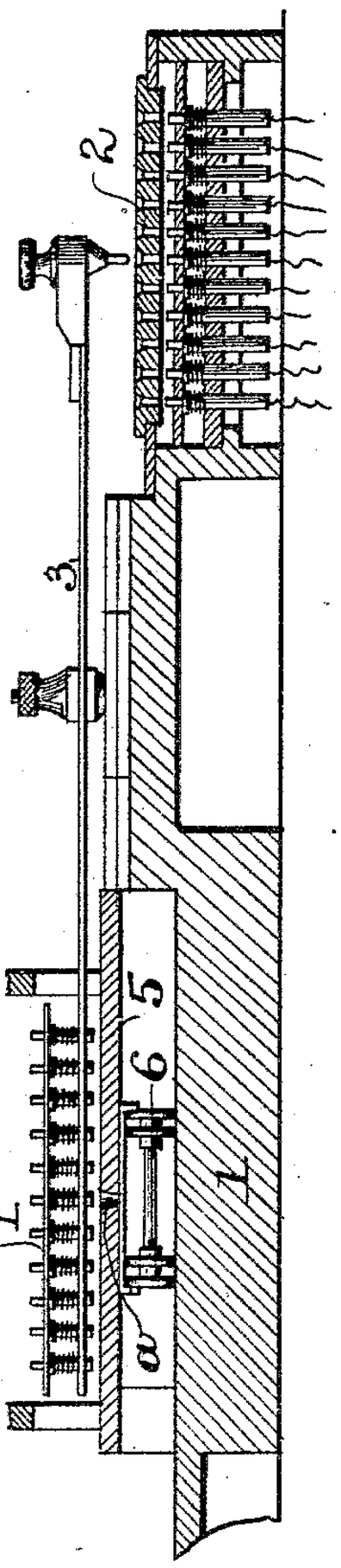

Fig. 1.

Witnesses

L. A. Taubenschmidt,

L. B. Whitaker.

Inventor

George A. Goodson

By his Attorneys

Whitaker & Prevost

UNITED STATES PATENT OFFICE.

GEORGE A. GOODSON, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO THE MINNEAPOLIS ELECTRO MATRIX COMPANY, OF SAME PLACE.

MATRIX-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 414,399, dated November 5, 1889.

Application filed December 28, 1887. Serial No. 259,257. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. GOODSON, a citizen of Canada, and a resident of the city of Minneapolis, county of Hennepin, State of Minnesota, have invented certain new and useful Improvements in Matrix-Making Machines, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to matrix-making machines; and it consists in certain improvements on the invention set forth in an application filed May 31, 1887, Serial No. 239,735, of which I am joint applicant with Alexander S. Capehart, the claims of which cover generically the invention herein set forth.

My present invention has for its object to provide a more perfect feed mechanism for the matrix-material carriage and contemplates certain improvements in the electrical features, whereby the parts are made to co-operate more perfectly.

I have illustrated my invention in the accompanying drawings, and it is fully disclosed in the following specification and claims.

In the drawings like notations refer to like parts throughout.

Figure I is a plan of the entire machine, part of the bed-plate being broken away and some of the parts being out of proportion in size, designed more especially to illustrate the electrical features Fig. II is a perspective view of the mechanism for depressing the type-dies, parts being broken away. Figs. III, IIII, V, and VI are details of the same detached. Fig. VII is a longitudinal vertical section of the front portion of the machine, showing the index-plate, die-alignment bar, and die-carriage.

In the drawings, 1 is the bed-plate of the machine.

2 is the index-plate; 3, the combined key-lever and die-alignment bar; 4, the die-carriage; 5, the die-carriage seat provided with a countersunk hole *a*, constituting the common center; 6, the matrix-material carriage, and 7 the cap-plate, substantially as in the application hereinbefore referred to.

Upon the cap-plate 7, in suitable bearings 8, is mounted a constantly-running shaft 9, provided with a balance-wheel 10, having a friction-flange *b*. Upon the shaft 9 is also loosely mounted an eccentric-cam 13, which by a rotation will depress a rod 19 and force the type-die, which may be beneath it, through the central aperture *a* in the die-carriage seat and into the matrix material. The operation of this cam 13 is intermittent. An arm *d* extends from the cam 13 to a point beyond the periphery of the wheel 10, and is rigidly secured to said cam. Upon this arm, at a point almost at the end of the radius of the said wheel, is a cam-case *e* and cam 14, adapted to engage the friction-flange *b*. A cam-ring 12 is supported by a suitable post 11 in the cap-plate, and for the greater portion of its circumference is concentric with the shaft 9, but is provided at one side with a notch *c*. A lever 16 is connected by a pivot-pin 15 to the cam 14, and has one end provided with a friction-roll *g*, lying in the notch *c*, and is connected to cam 13 by a spring 20. The other end is provided with a notched foot *g'*. A trip-lever 17 is pivoted to the foot of the post 11, and is provided with a shoulder *h*, which engages the foot of the arm *d*, and this lever is also provided with the raised or thickened portions *h'* and *h''*, the former of which engages the notched foot *g'* of lever 16 and the latter forms the armature of a magnet 24, secured to the cap-plate. When the pointer of the die-alignment bar 3 is placed upon one of the characters of the index-plate, the corresponding die of the die-carriage is brought directly over the central aperture *a*, and at the same time the circuit through magnet 24 is closed, which causes armature *h''* to move laterally, thereby releasing the foot *g'* of lever 16. As soon as this lever is released, the spring 20 will raise the end of the lever 16 and cause the cam 14 to engage the friction-flange *b*, thereby causing the cam 13 to make one revolution, which will depress the die through a driving rod or pin 19, mounted in a guide 18 and having crescent-shaped head engaging the cam 13. A spring 25 retracts the armature *h''*, and when the cam has completed a revolution the tripping-lever 17 will engage the arm *d* and lever 16 and hold them from further rotation

until another character has been engaged by the pointer of the alignment-bar.

This apparatus for depressing the dies forms the subject-matter of another application filed by me October 25, 1888, and given Serial No. 289,090, and will not be more particularly described or claimed in this application.

29 is the rack-bar, attached to the matrix-carriage, and 30 the cylindrical ratchet-wheel, provided with a pinion engaging with said rack-bar.

M′ M² M³ are a series of independent magnets; N′ N² N³, their respective armatures; P′ P² P³, their respective pawls; 32, the locking-pawl, and 31 the lever for lifting the ratchet-cylinder out of engagement with the pawls. The armatures N′ N² move through like distances, and the armature N³ moves double the distance of the other two.

A series of pawl-stops 33, consisting of small posts fixed in the bed-plate, are added for an especial purpose. Inasmuch as the attractive power of an electro-magnet is greatly increased as the armature approaches the magnet, it was found in the working machine that the pawls would be given an accelerated movement near the end of their travel, the effect of which was to carry the ratchet-cylinder forward by its momentum beyond the throw of the pawl, taking the matrix-carriage with it and giving improper spacing to the impressed characters. The stops 33 end that trouble, limiting the movement of the cylinder as well as the pawls.

The supporting-table for the machine is composed of wood. On a rearward extension A of this wooden table and on the front of the cap-plate 7 are certain electrical features.

34 is a three-point switch for opening an electric circuit through the one-unit magnet M′ and closing a circuit through an automatic circuit opener and closer 35 and the trip-lever magnet 24; and it consists of a pivoted armature-lever R′, having contact-points on its free end, and electro-magnet S′, contact-strips r' r', and a retraction-spring L′, fixed to the armature-lever and the table and acting in opposition to the magnet S′.

36 is a two-unit circuit-closer, closing an electric circuit through magnet M², and consists of a pivoted armature-lever R², having a contact-point on one side of its free end, contact-strip r^2, a stop r, an electro-magnet S², and retraction-spring L². 37 is a similar three-unit circuit-closer, closing an electric circuit through the magnet M³, and consists of armature-lever R³, having a contact-point on its free end, contact-strip r^3, and a stop r, electro-magnet S³, and retraction-spring L³, all similar to 36.

The circuit opener and closer 35 is peculiar in this respect, that it is a device for automatically opening and closing its own circuit; and it consists of a pair of electro-magnets T and T′, a metallic slide W, mounted in suitable bearings between the two magnets and provided at its extremities with the armature-heads w w', adjacent each to its respective magnet and within the field of the same, a pair of adjustable collars t t' or equivalent device on said slide, a pivoted metallic lever V, and a contact-strip V′. This lever V is pivoted at one side of the slide W, and lies on the same between the collars t t', and the parts are all located so that when the armature w' is drawn to the magnet T′ the free end of V is forced into contact with V′, and when w is drawn to T it is forced out of contact with V′. By adjusting the collars t t' the times of contact between V and V′ may be lengthened.

Looking now to the electrical circuits and connections, it may be stated generally in explanation of the figure that the currents move in the direction of the arrow-heads and that the solid arrow-head lines, the broken arrow-head lines, and the dotted lines, respectively, represent distinct and different circuits.

The full arrow-head lines represent a local circuit and its branches through the index-plate and the electro-magnets S′, S², and S³. Of these circuits there is a common outgoing conductor B from a source of electricity (not shown) through the magnet S′ to the bed-plate 1, and through the bed-plate to the platinum point on the key-lever 3, and as many return-wires as there are groups or classes of type-dies, every character connecting with one or the other of these return-wires, according to the number of units of space required by each. In the drawings three return-wires are shown, of which B′ represents the return-wire for the one-unit group of dies, and passes directly from the index-plate back to the source. B² represents the return-wire of the two-unit group, and leads from the index-plate to the magnet S², closing a circuit through the two-unit magnet M², and thence to the source, and B³ passes from the index-plate through the magnet S³, closing a circuit through the three-unit magnet M³, and thence back to the source.

The dotted lines represent the above-noted circuits closed through the two and three unit magnets M² and M³ by the circuit-closing magnets S² and S³ on the index-circuits. Of these dotted lines C^a represents the common outgoing wire, and C^b the common return-wire from and to the source of electricity, and C^{a2} and C^{b2} the branches through the two-unit magnet M², and C^{a3} and C^{b3} the branches through the three-unit magnet M³.

The broken-arrow lines represent a main circuit always passing through the three-point switch 34, and which in the normal position of the switch is closed through the magnet T′ and the one-unit magnet M′, but which, when an index-circuit is closed and the switch-lever R′ is drawn to the magnet S′, forms a closed circuit through the magnet T, the automatic circuit opener and closer 35, and the trip-lever magnet 24. Of the wires making this cir-

cuit D^a is the outgoing and D^b the common return-wire. $D^{a'}$ and $D^{b'}$ are the branch wires from the switch 34, through T′ and M′, and back to source, and D^{a2} and D^{b2} are the branch wires from the switch, through T, the lever V, contact-strip V′ of the automatic circuit opener and closer 35, and thence through the trip-lever magnet 24 and back to source. Now, the normal position of this broken-arrow main or switch circuit is closed, as stated, through T′ and the one-unit magnet M′; hence the slide W is drawn to its limit toward T′ and the pawl P′ is held tight at its limit against the ratchet-cylinder 30; but an index-circuit through S′ is closed every time a character is selected on the index-plate, and the switch-circuit is shifted for an instant through the automatic circuit opener and closer 35 and the trip-lever magnet 24; but the switch-circuit passes through V V′ and the trip-lever magnet 24 only while the armature *w* is moving from its normal position to the magnet T, for by that movement contact is broken between V and V′. This instant, however, is long enough to operate the trip-lever 17 and lock the eccentric 13 to the shaft 9 for a single revolution or die-impression. The index-circuit remains closed until the contacts are broken on the index-plate by withdrawing the key. When the key is withdrawn, the switch 34 is restored to its normal position, the main or switch circuit being again closed through T′ and the one-unit magnet M′, and the effect is to actuate the pawl P′ and the ratchet-cylinder 30, moving the matrix-carriage along the line the proper distance for one space-unit. The matrix material is therefore always moved one unit of space after any character is impressed. This is so much clear gain, as it is done while the operator is getting ready to select the next character. Now, the magnet M^2 only throws the cylinder 30 forward one unit of space and the magnet M^3 moves it only two units of space. Hence the system is complete, the matrix material having been already advanced one unit, as a matter of course, at least one unit being always required, while any desired multiples of the same are simply matters of addition through bringing into play the two and three unit magnets as required, according to the character selected. There is, therefore, a very material gain, something over one third, in speed beyond my former machine. The necessary sequence in the time of tripping the lever 17 relatively to the movements of the two and three unit feed-magnet armatures is secured by making the space through which the armature-lever R′ of the switch 34 must move slightly greater than the space through which the armature-levers R^2 or R^3 of the two and three unit circuit-closers must move.

38 is a driving-pulley on the shaft 9, which is coupled to any suitable source of power, (as, for example, a dynamo,) and 39 is a fly-wheel on the outer end of said shaft.

Modifications may be made in the electric connections and their controlling devices and in the minor features of the mechanism herein described without departing from the spirit of my invention.

What I claim, and desire to secure by Letters Patent, is—

1. The combination, with a matrix-material carriage, of feeding devices for the same, consisting of independent electric motors, each adapted to feed said carriage a certain distance, electric connections for said feeding devices, electrical circuit-controllers for said electric connections, a local circuit through said circuit-controlling devices, and a circuit-controlling device or devices for said local circuit, substantially as described.

2. The combination, with a matrix-material carriage, of feeding devices for said carriage, consisting of two or more electric motors, each adapted to feed said carriage a certain distance, a character-board having character-selecting devices classified according to the space required for each character, circuit-controlling devices for said electric motors, one of said circuit-controlling devices being connected with those characters of the character-board requiring the least space, and two or more of such controlling devices being connected with the characters of the character-board requiring a larger space, substantially as described.

3. The combination, with a matrix-material carriage, of feeding devices for said carriage, consisting of one main and one or more auxiliary electric motors, each adapted to move said carriage a certain distance, a character-board having character-selecting devices classified according to the space required for each character, a closed circuit through said main motor, open circuits through said auxiliary motors, a circuit-breaker in the closed circuit, a circuit-closer in each of the other circuits, the characters of the character-board requiring least space being connected with said circuit-breaker, and the characters requiring greater space being connected with said circuit-breaker and one of the circuit-closers, substantially as described.

4. The combination, with a matrix-material carriage, of electric feeding devices for the same and electric connections for said feeding devices, including one closed circuit, a die-carriage, a die-depressing device, an electric trip for said die-depressing device located in a branch of said closed circuit, a switch for shifting the current from said closed circuit to the branch circuit, and an automatic circuit-breaker in said branch circuit, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE A. GOODSON.

Witnesses:

L. P. WHITAKER,

G. A. PREVOST.