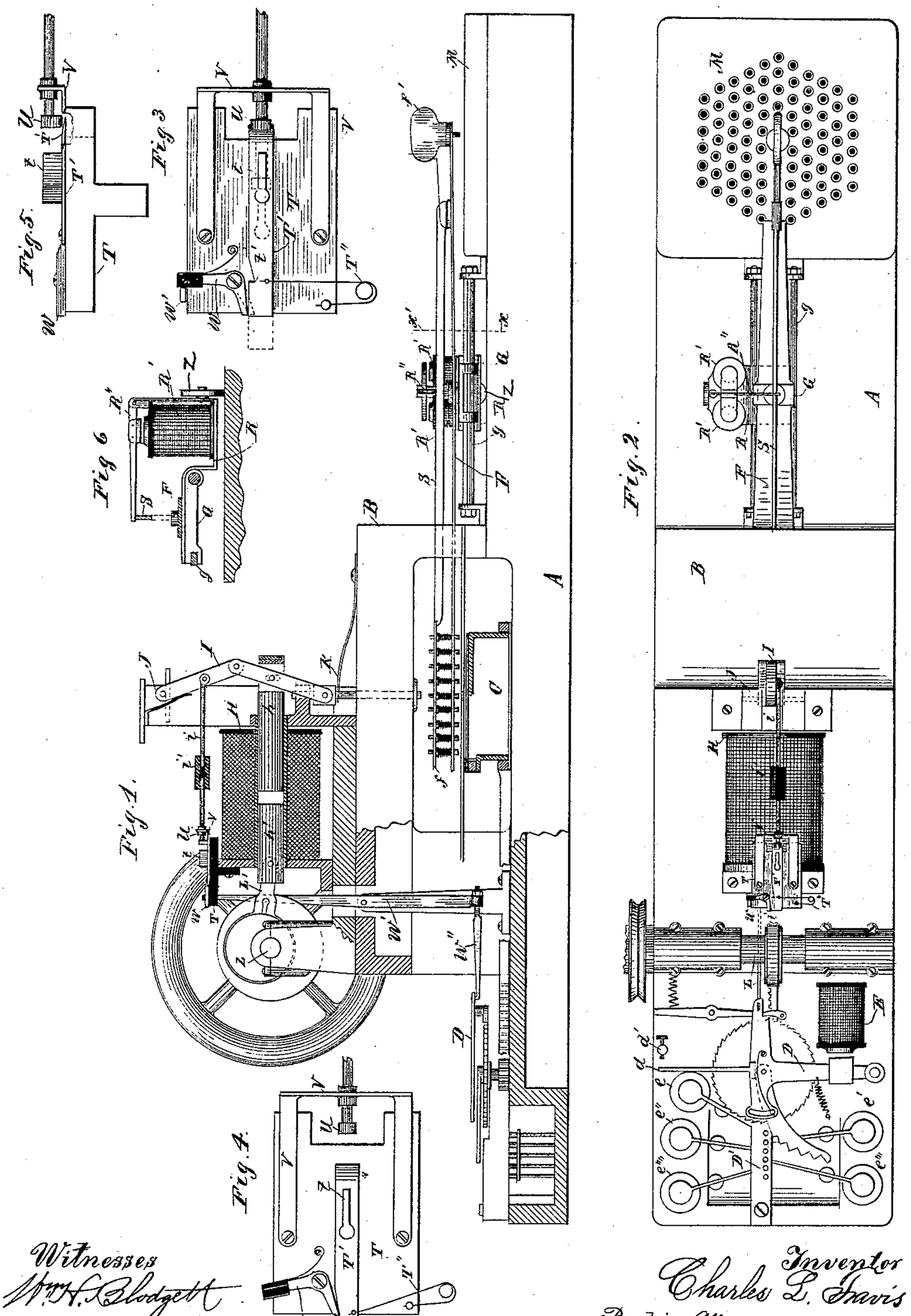
(No Model.)

2 Sheets—Sheet 1.

C. L. TRAVIS.

MATRIX MAKING MACHINE.

No. 479,539. Patented July 26, 1892.



Witnesses
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A. H. Opsahl

Inventor
Charles L. Travis
By his Attorneys
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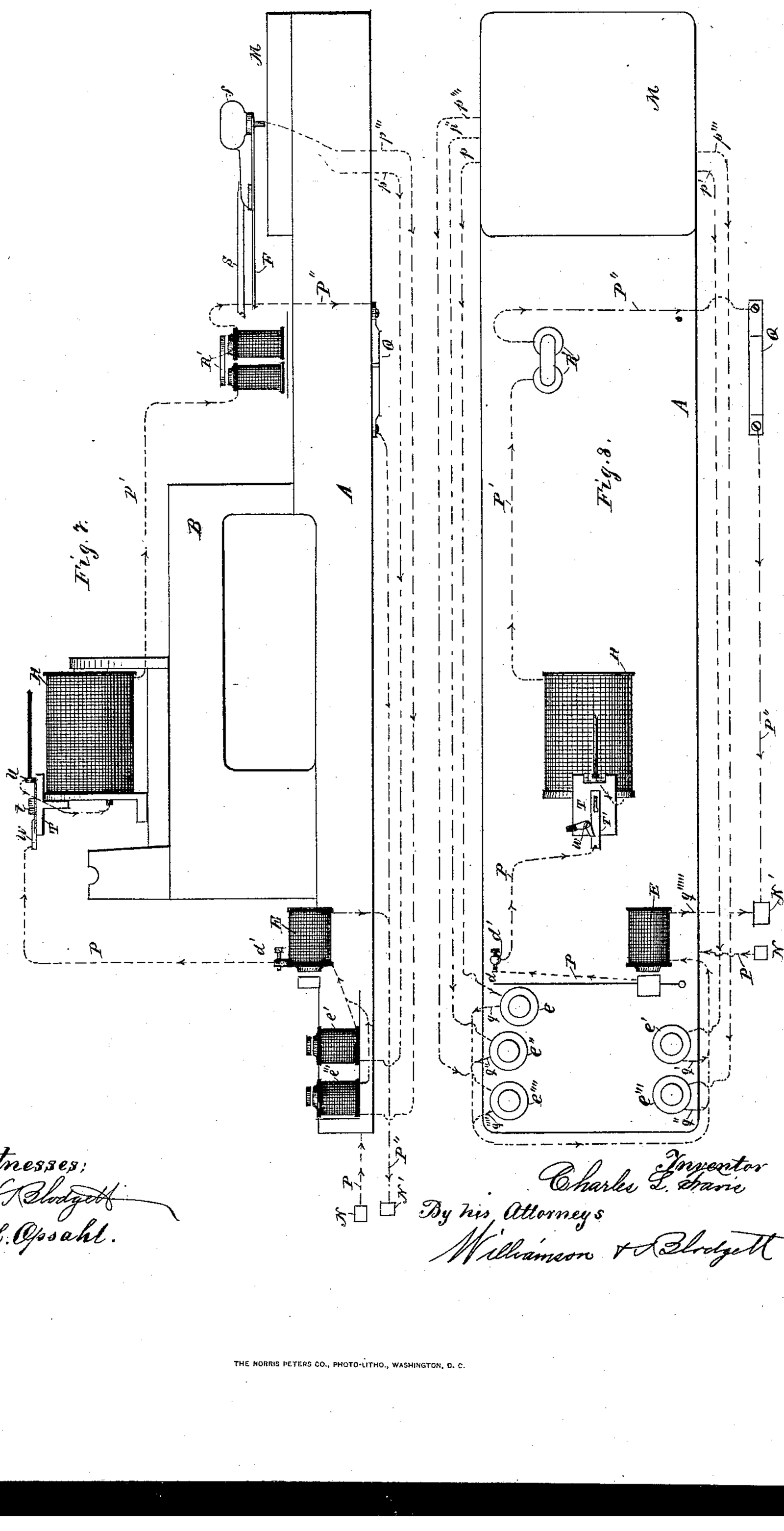

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UNITED STATES PATENT OFFICE.

CHARLES L. TRAVIS, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO THE MINNEAPOLIS ELECTRO MATRIX COMPANY, OF SAME PLACE.

MATRIX-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 479,539, dated July 26, 1892.

Application filed January 16, 1890. Serial No. 337,093. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. TRAVIS, 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; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to matrix-making machines in which there is employed as the character-selecting device a key or lever mounted on a horizontally-movable pivot, or, in general, to machines of the general character shown in patent to Goodson, No. 427,681, dated May 13, 1890. In machines of the kind exhibited in said patent the impressions in a matrix material are made singly by a series of dies brought one after the other to a common printing-point under a depressing device. The spacing of the characters corresponding to hand-set type is produced by a variable-feed mechanism for actuating the matrix-material carriage. The dies and the key-lever or character-selecting device are on the opposite ends of a common bar pivoted in a sliding block. The characters are selected from an index-plate or character-board and the act of selecting the characters by the hand-key brings the corresponding dies to a printing-point. The character-selecting device is also a circuit-closer, and when the particular character is selected on the index-plate a circuit is closed, controlling the matrix-feed and the die-depressing device. In other words, all the operations of the machines are initiated and controlled by the character-selecting device. The feed movements of the matrix-material carriage comes after the alignment of the die and precedes the action of the depressing device.

Difficulty was at first experienced with the above-described construction by a possibility of opening the circuit at the index-plate, before the depressing device had made or completed its stroke on the proper die. This was remedied by a separate supplemental circuit on the feed-magnets and the die-depressing device, independent of the key-lever, of sufficient power to actuate the respective armatures, but sufficiently strong to hold the same after the main circuit had been closed at the index-plate, until opened at the die-depressing device. The effect of this supplement circuit, however, was to introduce a new difficulty, viz. Inasmuch as the die-depressing device could continue to act after the main circuit could be opened at the index-plate, strokes would be produced on the dies when away from the printing-point, thus quickly destroying the faces of the dies. The object of my invention is to overcome all these difficulties and to render it impossible for a stroke to be made upon the dies in any other position than at the printing-point and to make it necessary that every die shall be driven to its limit in a matrix material before it can be removed from that position, no difference how many strokes of the depressing device may be required to accomplish this result. A perfectly-uniform depth of impression is thus secured for all of the characters and injury to the dies is entirely avoided. At the same time I simplify the construction of the machine, increase its speed, and lighten the work of the operator. To this end I lock the die-carriage and the matrix-material carriage in a stationary position at the printing-point beyond the possibility of disturbance by the operator until after the die-depressing device has driven the die to its limit and ceased to act, when all the parts are set free, enabling the operator to select and align the next die. Any construction, mechanical or electrical, which will perform these functions is within the scope of my invention. In my preferred construction I provide an electro-magnet in circuit with the die-depressing device located in a proper position to hold the key-lever in contact at the index-plate until after the die-depressing device has completed its work and broken the circuit at that point. I also provide an improved form of automatic circuit-breaker for the die-depressing device of such nature that the circuit must be maintained through the magnet controlling the depressing device until the die has been forced down to the limit of its stroke, at which time the circuit will be broken and the contacts held widely apart un-

til after the circuit is opened at some other point.

Referring to the drawings, wherein I have shown my preferred construction, therein like letters referring to like parts throughout, Figure 1 is a view, partly in elevation and partly in section, of a machine embodying my invention. Fig. 2 is a plan view of the same. Figs. 3 and 4 are detail views in plan, and Fig. 5 in elevation, of the automatic circuit-breaker detached. Fig. 6 is a cross-section of Fig. 1 on the line X X′; and Figs. 7 and 8 are diagrammatic views, in elevation and plan, illustrating the electric circuits.

A is the main bed of the machine.

B is the seat for the die-depressing mechanism.

C is a part of the matrix-material carriage under tension.

D D′ is the escapement mechanism for giving a variable feed to the matrix-carriage, and E, *e*, *e′*, &c., are the magnets for controlling the same.

F is the alignment-bar having the die-carriage *f* at one end and the character-selecting key *f′* at the other and pivotally mounted in the sliding block G, which is movable lengthwise of the guides *g*.

H is the solenoid with divided armatures *h h′*.

I is the toggle-lever supported in a standard J and connected to the armature *h*.

K is the die-plunger connected to the lower arm of the toggle.

L is the constantly-running eccentric-shaft having its eccentric-rod L′ connected to the other armature *h′*.

M is the index-plate or character-board covering the groups of contacts. (Not shown.)

N and N′ represent the positive and negative binding-post of a generator. (Not shown.)

P P′ P″ represent the course of the main circuit, charging the entire bed of the machine with branches *p p′ q q′*, &c., leading from the various groups of contacts at the index-plate to the respective magnets *e e′*, &c., controlling the escapement-stops and returning through the main escapement-magnet E to the negative binding-post of the generator.

Q is a hand circuit-breaker on the main circuit P P′ P″ for use in operating a spacing device. (Not shown.)

It should be noted that the circuit to the solenoid H is made from the bed over the escapement D with its contact *d* to the binding-post *d′*.

The construction so far described is, with the exception of the branches P′ P″ of the main circuit, all similar to the machine described in the said patent, No. 427,681, to George A. Goodson.

I will now note my improvements. To the sliding block G, in which the alignment-bar F is mounted, I attach a small carriage R, and on the same I place electro-magnets R′ in circuit with the solenoid H, having a pivoted armature R″. To the top plate of the die-carriage *f* I pivotally attach a bar S of sufficient length to reach the key-lever portion of the alignment-bar. This bar S when in working position lies directly under the armature R″ and when the circuit is closed through the magnets R′, the armature R″, and the lever S locks the key-lever into contact at the index-plate.

The guides *g g*, along which slides the block G, are parallel bars rigidly secured or mounted on the bed of the machine and serve to maintain the to-and-fro movement of the block exactly in a straight line. The carriage R, which is attached to the block G, carries an anti-friction roller Z, which runs on the bed A and which is designed to sustain the weight of the said carriage, the block G, and the devices or parts carried thereby.

Turning now to the circuit-breaker on the die-depressing device, on the top of the solenoid-frame I place a bed of insulating material, preferably of hard rubber. On this hard-rubber bed I mount a sliding contact-plate T′ under tension of a spring T″ and electrically connected to the binding-post *d′*. This shifting contact T′ is provided with a raised lug *t* back of its forward end and with a notch *t′* at its rear end for the purpose hereinafter stated. To the upper arm of the toggle-lever I attach by a connecting-rod *i* and an insulating-nut *i′* a contact-head U, connected to solenoid-wire, the outer end of which is supported by a spring-yoke V, secured to the rubber bed T. The contact-head U is rounded on its under side and the front end of the shifting-plate T′ is beveled on its upper surface, (see Fig. 5,) insuring perfect contact.

W is a spring-pawl adapted to catch into the notch *t′* on the shifting contact-plate T′ when at the limit of its rearward movement.

W′ W″ is the pawl-tripping device, of which the part W′ is pivoted to any suitable part of the frame and has its upper arm projecting into a position to strike the pawl W and has its lower arm connected by the part W″ with the escapement D.

It is evident that contact U will be moved back and forth, with the movement of the depressing device, over the top of the shifting plate T′, working against the lug *t* and moving the plate T′ at the rearward limit of the stroke. The spring-tension on the contact-plate T′ tends to throw it to the limit of its forward movement toward the die-depressing device. Hence the head U and the plate T′ are always in contact, except when the plate T′ is retained by the pawl W. Even when so retained, the contact continues until the toggle-lever has moved forward beyond its center. The circuit will then be broken, permitting the key-lever *f′* to be removed out of contact at the index-plate, setting free the escapement D, opening the solenoid-circuit at the binding-post *d′* through the device W′ W″, tripping the pawl W, permitting the shifting plate T′ to fly forward into its normal position in con-

tact with the head U. The part of the tripping device connecting with the escapement is made adjustable. It may, therefore, be so set that the contacts *d* and *d'* must be widely separated before the pawl W is tripped and the plate T' set free to unite with the contact-head U.

The fact that the pawl W can only catch and retain the contact-plate T', when at the rearward limit of its movement, makes it necessary for the toggle-lever to make its complete stroke, forcing the die into the matrix material to its limit before the contacts can be separated and the circuit broken. In case the magnetism of the solenoid should be insufficient to hold the divided armatures *h h'* together and pull the toggle over the center on the first revolution of the eccentric-shaft, the toggle will continue to make a partial stroke at every revolution until a complete stroke is made and the die is driven home.

The general operation may be readily understood from the description already given. The operator selects the desired character on the index-plate with the key-lever *f*. The act of doing so aligns the corresponding die under the depressing device and closes first the feed-circuit and then, by the movement of the escapement, the solenoid-circuit, starting the depressing device and tying down the key-lever. The operator can then do nothing more until the depressing device has completed its work and released the key-lever. The great improvement in the matrix itself resulting from this construction is uniform depths of perfect impressions regardless of the width of the face of the dies or the character of the matrix material. Wide and thin dies, coarse lines, and hair-lines must all go to exactly the same depth. The value of this result cannot be overestimated, as it is the only way in which a stereotype-plate can be cast from the matrix having all its type of exactly uniform height, which is absolutely necessary in order to get a perfect impression on the printed page. As the dies can never be driven against anything else than the matrix material, their faces are kept sharp and perfect, thus preventing a mutilated impression.

Perfection of impression and uniform depth of impression are the improved results shown on the matrix. To the machine itself the improved results are durability, economy of cost, and lightness of operation. The dies are the most costly part of the machine. By preventing their injury from pounding one font will last indefinitely. By dispensing with the supplemental circuit before used the electric connections are simplified. By poising the alignment-bar on an anti-friction carriage the key-lever is rendered lighter and more easily and more quickly operated.

The lock-lever magnet assists the operator in making contact at the index-plate, relieving him from any continued depression of the key. In other words, it lightens the touch, rendering it only necessary for the operator to make the slightest contact, the lock-lever magnet sustaining the same as long as may be required. The operator is thus enabled to gain considerable in speed.

It will be understood that the lock-lever magnet might be otherwise placed. It could take any position permitting it to lock the die-carriage and key-lever by any suitable connections. The index-plate itself might be made the magnet and the key-lever the armature. It will be also understood that the electric circuits and connections might be differently arranged.

I claim—

1. In a matrix-making machine, the combination, with the character-selecting key, a die-carriage, and die-depressing device, of a locking device for said die-carriage adapted to be brought into operation to lock said carriage in a given position by the depression or manipulation of the key and to be unlocked by the operation of the depressing device, as set forth.

2. In a matrix-making machine, the combination, with the combined die-carriage and character-key, of the matrix-feed mechanism controlled by said key, the die-depressing device controlled by said feed mechanism, and a locking device for retaining the matrix and the selected die at the printing-point, the said locking device being dependent for such operation upon the action of the character-key and for its release upon a movement of the depressing device necessary to make a completed impression.

3. In a matrix-making machine, the combination, with the combined die-carriage and character-key, of the matrix-feed controlled from said key, the die-depressing device controlled from said matrix-feed, and a common automatic lock for securing the matrix and the selected die at the printing-point until a completed impression is made controlled to lock from said key and to unlock from said die-depressing device.

4. In a matrix-making machine, the combination, with the die-carriage, of an electrically-controlled lock for said carriage, electrically-controlled feed and impression devices, electric connections for said electric devices, and circuit-controlling mechanism for said connections.

5. In a matrix-making machine, the combination, with the die-carriage, of an electrically-controlled lock for said carriage, electrically-controlled matrix-feed and die-impression devices, electric connections for said electric devices, a hand circuit-controller for initiating the movement of said electric devices, and an automatic circuit-breaker operated from the die-impression device for breaking the circuit at the completion of the impression.

6. In a matrix-making machine having electrically-controlled feed and impression devices, the combination, with the die-aligning

and character-selecting key-lever controlling the feed and impression device circuits, of an electro-magnet in circuit with the die-depressing device adapted to lock said key-lever in contact, and an automatic circuit-breaker operated by the die-depressing device for releasing the lock, substantially as and for the purpose set forth.

7. In a matrix-making machine, the combination, with the electrically-controlled impression device, of an automatic circuit-breaker under the control of the impression device comprising a pair of contacts inseparable until the impression device has made a complete stroke and returned to its normal position, substantially as and for the purpose set forth.

8. In a matrix-making machine, the combination, with the die-depressing device and an electro-magnet for controlling the same, of an automatic circuit-breaker comprising a pair of shifting contacts controlled by the impression device normally in circuit with said magnet and inseparable until the depression device has made a complete stroke and returned to its normal position, substantially as and for the purpose set forth.

9. In a matrix-making machine, the combination, with the electrically-controlled feed and impression devices, of an automatic circuit-breaker in the impression-device circuit, comprising a pair of shifting contacts under the control of the impression device normally in contact, a retaining device for engaging one of said contacts at the limit of the die-stroke, and a trip actuated from the feed for releasing said plate after the circuit is opened elsewhere.

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

CHARLES L. TRAVIS.

Witnesses:
WM. H. BLODGETT,
JAS. F. WILLIAMSON.