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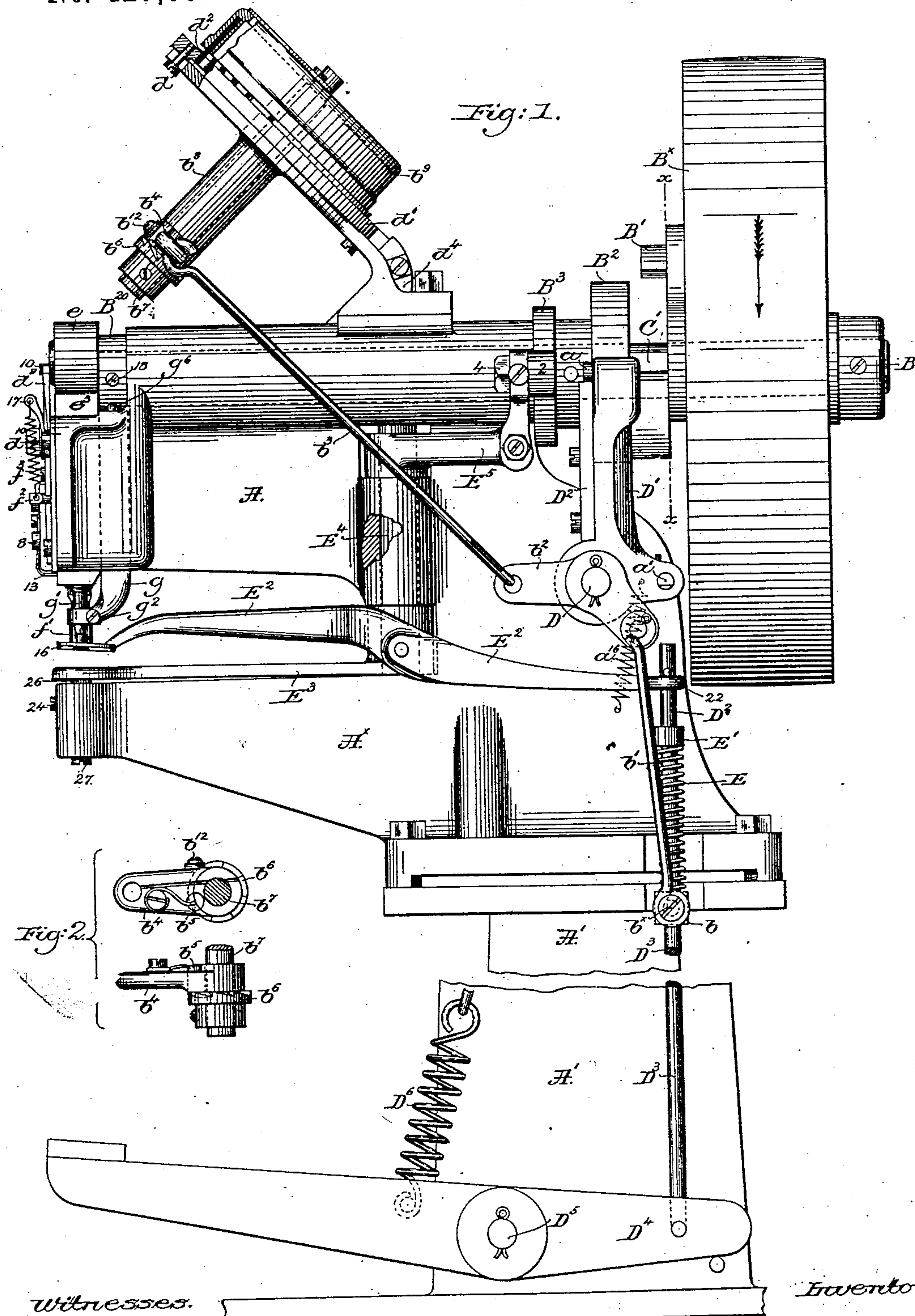
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3 Sheets—Sheet 1.

H. H. CUMMINGS.  
RIVET SETTING MACHINE.

No. 427,557.

Patented May 13, 1890.



Witnesses.

Induct L. Emory  
Edgar A. Goddin

Inventor.

Henry H. Cummings,  
by Henry H. Cummings  
attys.

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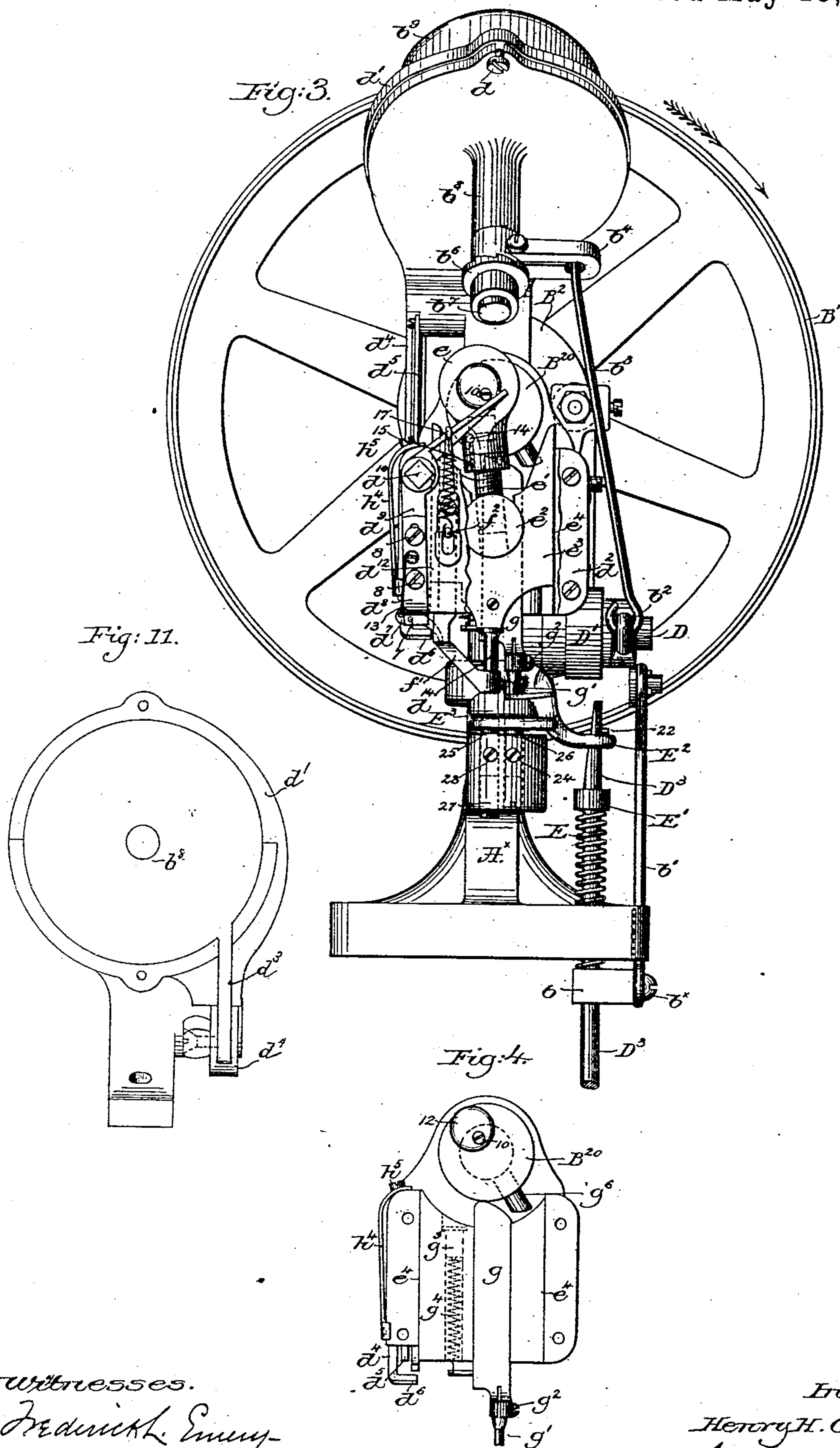
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*Erueitor.*

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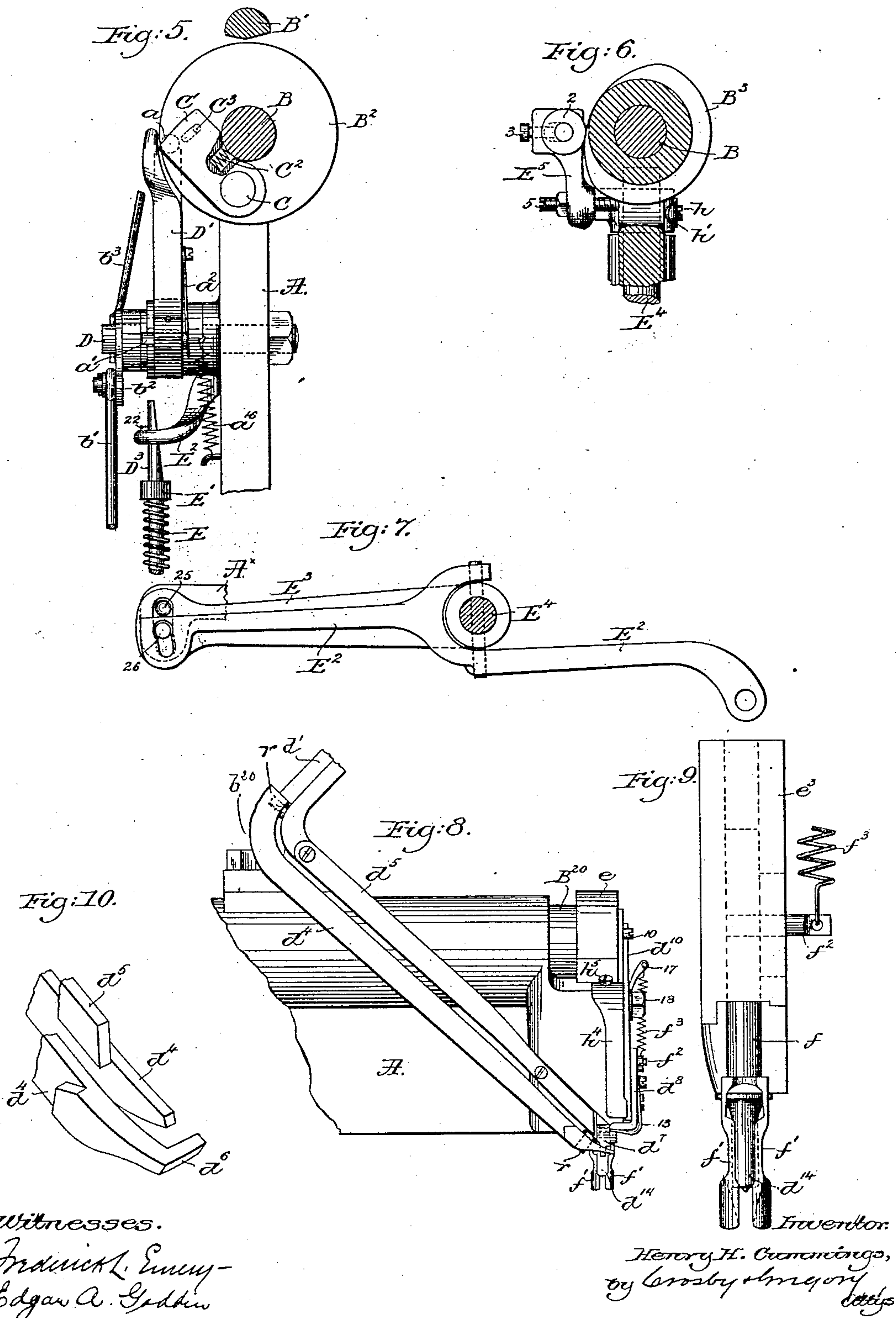
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# UNITED STATES PATENT OFFICE.

HENRY H. CUMMINGS, OF MALDEN, MASSACHUSETTS.

## RIVET-SETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 427,557, dated May 13, 1890.

Application filed August 9, 1889. Serial No. 320,198. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY H. CUMMINGS, of Malden, county of Middlesex, State of Massachusetts, have invented an Improvement in Machines for Setting Rivets, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

10 This invention has for its object the production of an improved machine for setting rivets made tubular or countersunk at one end.

15 My improved machine contains a raceway and a conductor, and between them a pick-off to place the rivets one at a time in the conductor, the latter being made as a bifurcated arm, provided at its lower end with a pocket for the reception of the rivet, the top set in 20 its descent striking the head of the rivet and forcing it out of the said pocket into a hole previously made in the material. The material to receive the rivet is held between a feeding-clamp, and is punched in one position and removed into another position to receive the rivet. The devices for actuating the feeding-clamp have combined with them devices to control the stopping and starting of 25 the machine, and also, preferably, the movements of the agitator used in the hopper to insure the feeding of the rivets into the raceway.

35 The particular features in which my invention consists will be hereinafter described, and pointed out in the claims at the end of the specification.

40 Figure 1, in side elevation, shows a machine embodying my invention, the standard being broken out to save space upon the drawing; Fig. 2, details of the pawl and ratchet and friction device to be described co-operating with the hopper. Fig. 3 is a front elevation of the main part of the machine shown in Fig. 1, the face-plate of the head being 45 broken out to show the top set and its carrier and the means for actuating it. Fig. 4 is a detail showing the punch and means for actuating it, the punch-carrier being shown as sliding in the head of the machine. Fig. 5 is a partial section in the line  $x$ , Fig. 1. Fig. 6 is a partial section in the line  $x'$ . Fig. 7 is a detail in plan view of the feeding-clamp with

the lower set and the cutting-block. Fig. 8 is a detail chiefly to show the raceway, the conductor, and the pick-off. Fig. 9 is a detail showing the punch-carrier and the conductor, the shank of which is vertically movable in the said carrier. Fig. 10 is a detail view of the lower end of the raceway and its cap, and Fig. 11 is a detail to be referred to 60 of the curb  $d'$ .

The head A of the machine, of suitable shape to contain the working parts, is shown as securely mounted upon a standard A'. The main shaft B has loosely mounted upon it a fly-wheel B<sup>x</sup>, which is driven constantly by a suitable belt. (Not shown.) The wheel B<sup>x</sup> at its inner side has fast to it a pin or projection B'. (Shown in Fig. 1 and in section, Fig. 5.) The shaft B has fast upon it a cam-hub having at one end a disk B<sup>2</sup> and at its other end a cam B<sup>3</sup>. (See Figs. 5 and 6.) The disk B<sup>2</sup> at its side next the wheel B<sup>x</sup> has pivoted upon it at C a starting-dog C', normally pressed outwardly by a spring C<sup>2</sup>, the extent of outward movement of the said starting-dog being determined by a stop C<sup>3</sup>, (herein shown as a pin on the disk B<sup>2</sup>), entering a slot (see dotted lines, Fig. 5) in the said dog. The disk B<sup>2</sup> at its inner side has a stop projection  $a$ . (Shown by full lines, Fig. 1, and by dotted lines, Fig. 5.) The head has a stud D, on which is mounted loosely a switch-lever D', provided at one side with an adjustable bunter D<sup>2</sup>. The switch-lever carries a loose pin  $a'$ , (see Fig. 5,) acted upon by a spring  $a^2$ , which normally keeps the pin out, as in said figure, so as to be struck by the rod D<sup>3</sup>, connected at its lower end to the treadle D<sup>4</sup>, pivoted at D<sup>5</sup> and acted upon by a spring D<sup>6</sup> to normally keep said rod depressed. 85

Fig. 1 shows the working parts of the machine at rest.

To start the shaft B, the operator will depress the outer end of the treadle D<sup>4</sup> to lift the rod D<sup>3</sup>, and it will act on the pin  $a'$  and turn the switch-lever D' aside from the position Fig. 1 far enough to cause the upper end of the same to pass laterally away from the end of the dog C' and the bunter to pass laterally away from and so as to release the pin  $a$  in the disk B<sup>2</sup>. This done, the spring C<sup>2</sup> throws the dog C' out, so that in the further rotation of the wheel B<sup>x</sup> the pin or projection B' strikes the 100



end of the dog C' and starts the shaft B. The rod D<sup>3</sup> has an adjustable collar b, having a stud-screw b<sup>x</sup>, to which is connected a rod b', jointed to one end of a lever b<sup>2</sup>, mounted loosely on the stud D. The opposite end of lever b<sup>2</sup> is connected by link b<sup>3</sup> to an arm b<sup>4</sup>, provided with a spring-pressed pivot-pin b<sup>5</sup>, which engages the teeth of a ratchet-wheel b<sup>6</sup>, loosely mounted on the shaft b<sup>7</sup>, extended through the bearing b<sup>8</sup>, and having fast to its upper end the cup-shaped brush-wheel b<sup>9</sup>, to be described, in which are placed in mass the rivets to be set.

The arm b<sup>4</sup> is herein shown as split (see Fig. 2) to embrace the shaft b<sup>7</sup> and exert some friction thereon, the amount of friction being determined by a clamp-screw b<sup>12</sup>, so that as the arm b<sup>4</sup> is moved back after having started the shaft and brush in rotation it will move the shaft backward slightly, thus assisting in the delivery of the rivets into the raceway.

The rod D<sup>3</sup> has a spring E, and above it a loose collar E', which as the rod is lifted, as described, acts upon the inner end of the lever E<sup>2</sup> of the feeding-clamp, the other part of the clamp being shown as an arm attached to a vertical rock-shaft E<sup>4</sup>, having at its upper end a second arm E<sup>5</sup>, having a roller-stud 2, the stud carrying the said roller being extended through a slot, (see Fig. 6,) the effective length of which is controlled by an adjustable screw 3, the nut 4 on the said stud (see Fig. 1) clamping it in adjusted position, adjustment of the roll aiding in determining the feed stroke, the screw 5 in the arm E<sup>5</sup>, by coming against the head A, determining the extent of feed stroke in the other direction.

When the feed-clamp is moved to feed the material from the punch to be described to the set to be described, the rear end of the lever E<sup>2</sup> moves the rod D<sup>3</sup> laterally away from the pin a' and permits the spring a<sup>16</sup> to turn the switch-lever back into the position Fig. 1, so that as the dog C' comes in contact with the said lever the dog is released from the pin or projection B', and at the same time the stop a meets the bunter, thus stopping the machine automatically.

The bearing b<sup>8</sup> has secured to it by suitable screws d a curb, as d', which makes a sort of box or chamber, in which are placed the rivets to be set, they being kept in motion by the brushes d<sup>2</sup>, a series of which are set into the edge of the cup-shaped wheel b<sup>9</sup>.

The curb d' referred to has a mouth or outlet d<sup>3</sup>, (see Fig. 11,) out through which the rivets r, one of which is shown in the raceway in Fig. 8, enter head down and shank up into the upper end of the raceway, composed of two like bars d<sup>4</sup>, the shape of which is best shown in the detail, Fig. 10, the raceway having above its top a cap-bar, as d<sup>5</sup>, the said rivet being overturned as it passes the bend b<sup>20</sup> of the raceway. The lower end of the raceway is provided with a stop, as d<sup>6</sup>, (see Fig. 10,) against which the endmost rivet stops, the said rivet being acted upon by a

pick-off d<sup>7</sup>, which removes it from the raceway. This pick-off d<sup>7</sup> (best shown in Fig. 3) is pivoted at 7 at the lower end of an adjustable bar d<sup>8</sup>, attached by suitable set-screws 8 to the lever d<sup>9</sup>, pivoted at d<sup>10</sup> on the face-plate d<sup>12</sup> of the head of the machine, the said lever having an arm at its upper end which is extended diagonally upward and is acted upon by a crank-pin 10, (shown in Figs. 3 and 4 as a screw set eccentrically to the shaft B,) the said pin being represented as set into an eccentric crank-pin 12. The rear end of the pick-off receives the free end of a spring 13, which normally acts to keep the front of the pick-off down in the position shown in Fig. 3.

The crank-pin 12 is surrounded by an eccentric-strap e, forming part of an adjustable link or connecting-rod, the other part being a screw e', which is screwed into a cylindrical nut e<sup>2</sup>, fitted loosely into a nearly-cylindrical opening in the set-carrier e<sup>3</sup>, fitted to slide between guideways (marked e<sup>4</sup>) of the head. The upper end of the screw e' is inserted loosely into the socket part of the strap e, and a pin 14, (see Fig. 3,) extended through the socket part, enters an annular groove in the said screw, so that the latter may be rotated when desired by a spanner or pin of some sort inserted in one of the holes in a collar 15 fast on the said screw, rotation of the said screw adjusting the length of the connecting-rod, and consequently varying the position to which the top set d<sup>14</sup>, attached to the set-carrier e<sup>3</sup>, may descend when upsetting or riveting one of the rivets.

The set-carrier e<sup>3</sup> has a hole to receive (see Fig. 9) the shank f of the conductor f', herein shown as composed of two parallel spring-arms located between the lower end of the raceway and the path of movement of the set d<sup>14</sup>.

The upper edges of the conductor are inclined downwardly from the lower end of the raceway down to the path of movement of the set, where the said arms are provided with a shoulder upon which may rest the head of the rivet, the inner faces of the said arms being concave or beveled, as shown by dotted lines in Fig. 9, to thus form a sort of conical pocket in which the rivet hangs, so that when the top set is thrown down against the head of the rivet it forces the same down from the pocket between the said arms, which yield to the passage of the rivet, the set driving the rivet from between the said arms into the stock or material held clamped between the presser-like jaw 16 at the outer end of the lever E<sup>2</sup> and the outer end of the arm E<sup>3</sup>. The shank f has a stud f<sup>2</sup>, extended downwardly through the slot in the set-carrier e<sup>3</sup>, which pin has attached to it a spiral spring f<sup>3</sup>, the upper end of which is connected to a stand 17, so located on the face-plate and held by a set-screw 18 as to act as a stop, the lower end of the said stand determining the upward movement of the said shank, the spring holding and preventing the shank descending when



the set  $d^{14}$  acts upon the rivet to set the same, the strength of the spring being less than the strength of the spring-arms of the conductor, so that the said conductor grasps as a thumb and finger and holds upon the rivet until the lower end of the conductor arrives in contact with the presser-foot, and thereafter in its further descent the set drives the rivet out from the pocket of the conductor.

At the rear of the set-carrier the head of the machine is grooved for the reception of the punch-carrier  $g$ , it having at its lower end the punch  $g'$ , the punch being suitably held by a clamp-screw  $g^2$ . The punch-carrier  $g$  is normally kept elevated by a spiral spring  $g^4$ , the upper end of which is fixed to a plug  $g^5$ , dropped into a hole made in the head of the machine, the said plug being shown by dotted lines in Fig. 4. The upper end of the punch-carrier is beveled and is acted upon during each rotation of the shaft B by a beveled projection  $g^6$ , inserted through the head or disk  $b^{20}$ , forming part of the outer end of the shaft B, the said stud  $g^6$  being held in adjusted position by a suitable set-screw 18.

The arm  $e^5$  described has attached to it by a screw  $h$  (see Fig. 6) one end of a flat steel spring  $h'$ , the free end of the said spring acting against one side of the head A of the machine, the said spring serving to normally keep the roll 2 against a cam B<sup>3</sup>. The rod D<sup>3</sup> has a pin or projection 22, (see Figs. 1 and 5,) which, when the rod descends, acts upon the rear end of the lever E<sup>2</sup> and lifts the presser-like jaw 16 of the feeding-clamp, as represented in Fig. 1, to permit the material to be unclamped, so that it may be removed from the feeding-clamp. A part of the head below the said feeding-clamp has secured to it by suitable set-screws, as 23 24, the shanks of, respectively, the lower set 25 and the cutting-block 26, the latter supporting the material when the punch descends upon it to punch a hole therein for the reception of the rivet. The face or acting end of the top set and of the lower set 25 may be of any usual shape.

To prevent the displacement of the cutting-block and the lower set 25, I have provided suitable screws, as 27, (shown by dotted lines in Fig. 3,) which are screwed into the head, so as to support the lower ends of the said set and cutting block. The forward end of the lever E<sup>2</sup> and of the arm E<sup>3</sup>, forming the feeding-clamp, are slotted, as best shown in Fig. 7, the slot in the arm E<sup>3</sup> permitting it to vibrate to a certain distance outside of the under set and the cutting-block.

The material having been clamped between the two parts of the feeding-clamp, the punch will descend and punch a hole therein, and the punch will be elevated, and then the feeding-clamp will be moved to carry the material far enough to place the hole made therein under the top set, when the latter will descend and act upon the rivet held in the pocket at the lower end of the conductor, driving it therefrom into the hole made in the material.

While the driver descends, the pick-off is moved backward or to the left in Fig. 3 until the forward downturned end of the pick-off comes back of the head of the rivet, the top of which then rests against the stop  $d^6$ , and as the top set rises the lever  $d^9$  is moved, causing the pick-off then in contact with the head of the rivet to move to the right, thus pushing the rivet in front of it into position between the spring-jaws of the conductor, the rivet descending along the said conductor into the said pocket by the time that the top set completes its ascent. While the pick-off moves forward, as described, the rivet next to the one engaged by the pick-off comes by gravity against the stop  $b^6$ . A spring  $h^4$ , connected by a screw  $h^5$  to a fixed part of the head, acts against the lever  $d^9$  to normally keep its upper end against the eccentric crank-pin 10, before described. The forward movement of the pick-off is produced by the said spring  $h^4$ .

By the term "rivet" I mean to include any like device containing a tubular or partially-tubular shank, and it is immaterial what is the shape of the head part or that part of the rivet which is left outside of the material.

I claim—

1. In a setting-machine, the following instrumentalities, viz: a raceway, a set-carrier, a top set, as  $d^{14}$ , an under set, a conductor fitted to slide vertically in the said set-carrier, and composed of spring-jaws having a pocket located in the path of movement of the set and inclined, as described, and provided with shoulders upon which may slide the head of the rivet, and located between the said raceway and the path of movement of the top set, and a pick-off, the latter moving the rivet from the raceway into position between the jaws of the conductor, to operate substantially as described.

2. The combination, in a setting-machine, of the cutting-block, the punch-carrier, the lower set, the top set, and the rotating shaft having an adjustable projection  $g^6$  to actuate the punch-carrier, substantially as described.

3. In a setting-machine, the following instrumentalities, viz: a cutting-block, a punch-carrier, a punch, means to actuate the punch-carrier, a raceway, a conductor to receive the rivets from the raceway and having a pocket to retain the rivets in the line of movement of the top set, a top set independent of the punch, a set-carrier, means to actuate it, a lower set, and a laterally-movable feeding-clamp to clamp and hold the material while being punched and transfer it into position to have the rivets driven into the hole formed by the punch, substantially as described.

4. In a setting-machine, the lower set, the top set, the feeding-clamp composed of the arm E<sup>3</sup>, the lever E<sup>2</sup>, and means to move the same horizontally, combined with the rod D<sup>3</sup>, a pin or projection thereon to open said clamp, and a spring to close the clamp with a yielding pressure when the said rod is elevated, substantially as described.



5. In a setting-machine, the shaft B, the top-set carrier actuated thereby, the top set, the lower set, the hub having a disk B<sup>2</sup>, provided with a pin  $\alpha$  and a pivoted dog C', and the wheel or pulley B<sup>x</sup>, having a projection B', combined with a switch-lever and with means to move the same to place it in and out of range of the said dog, to operate substantially as described.
- 10 6. In a setting-machine, the shaft B, the top-set carrier actuated thereby, a top set and lower set, and hub fixed to the said shaft and having a stop  $\alpha$  and a pivoted dog C', combined with the switch-lever and with the
- 15 bunter and with means to actuate the said switch-lever, substantially as described.
7. In a setting-machine, the lower set, the

top set, the switch-lever having the spring-pressed pin  $\alpha'$  and the bunter  $g^2$ , and the shaft B, having a disk provided with a stop  $\alpha$ , and the feeding-clamp and means to move it horizontally, combined with the sliding rod D<sup>3</sup>, moved by the feed-clamp to release the sliding pin and permit the switch-lever to be turned by its actuating-spring to place the bunter in the range of the stop  $\alpha$ , to operate substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY H. CUMMINGS.

Witnesses:

GEO. W. GREGORY,  
FREDERICK L. EMERY.