No. 705,433. Patented July 22, 1902.

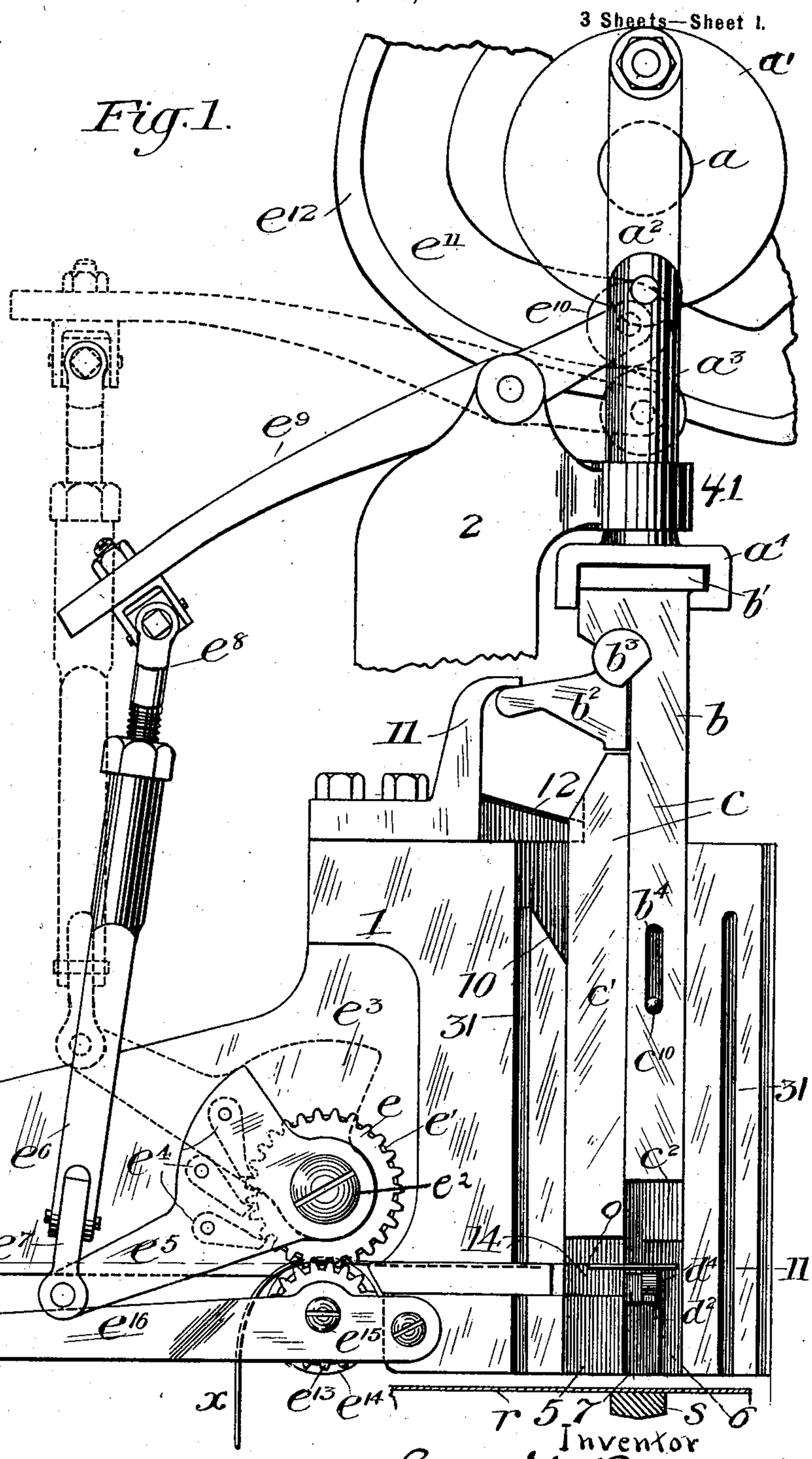
G. W. PACKER.

STAPLE FORMING AND DRIVING MACHINE.

(No Model.) (Application filed Oct. 19, 1900.)

3 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

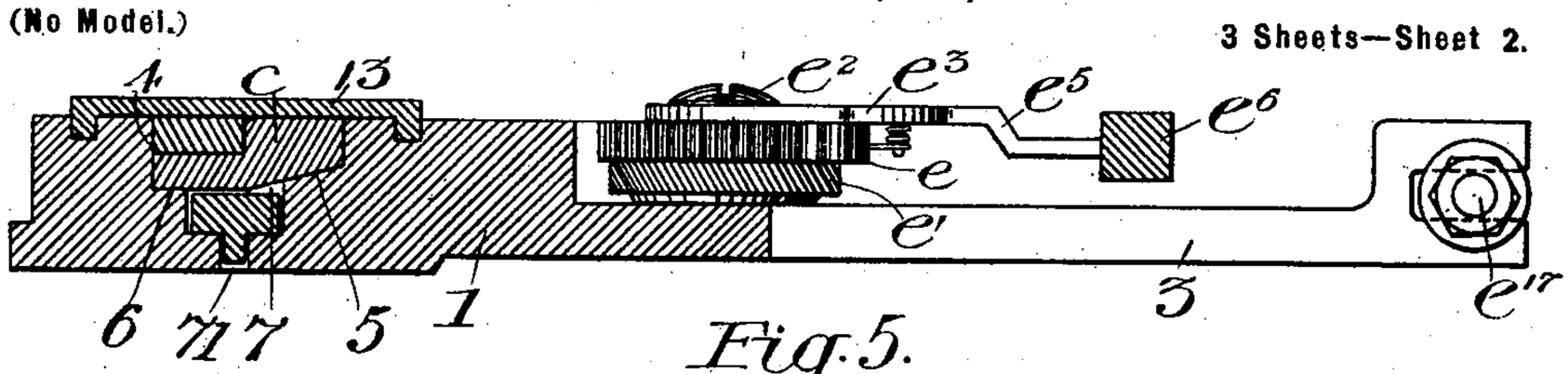


Fig. 5.

Fig. 11.

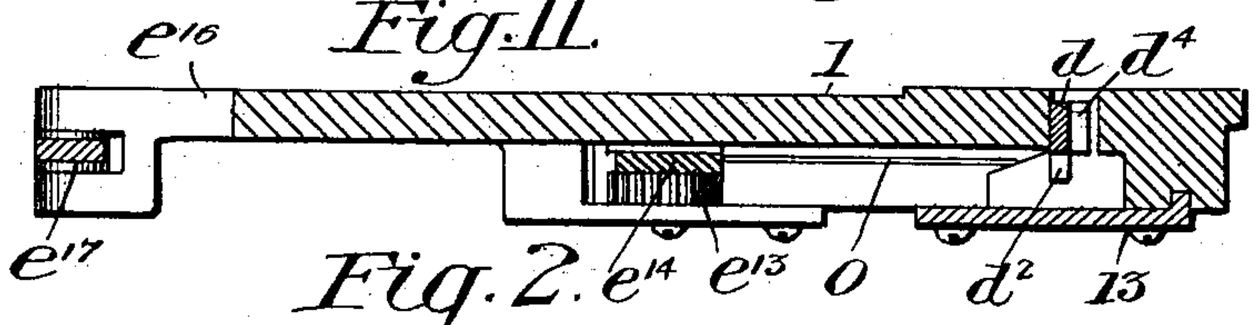


Fig. 2.

Fig. 4.

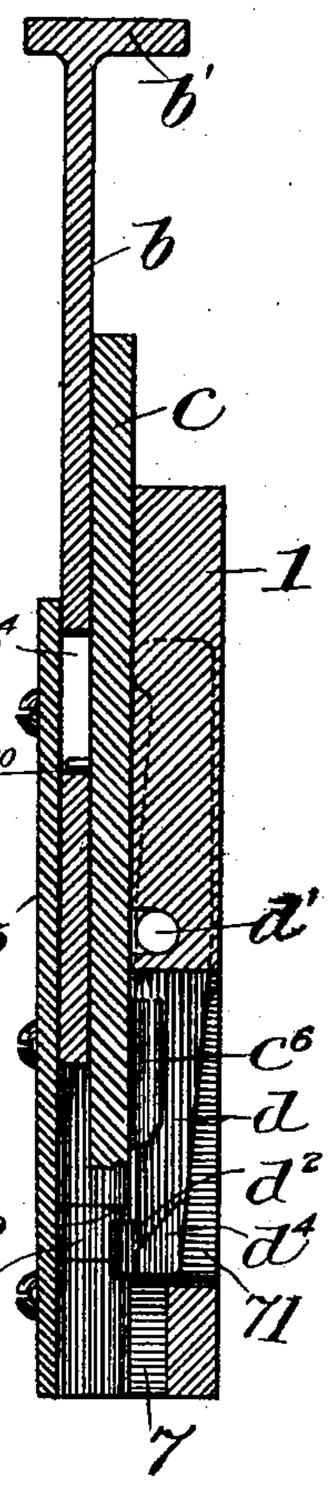
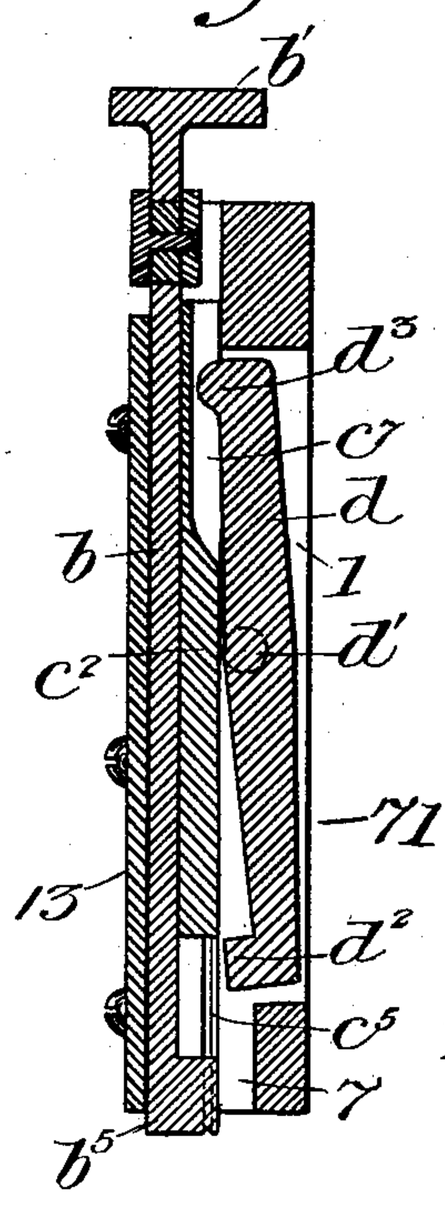


Fig. 3.



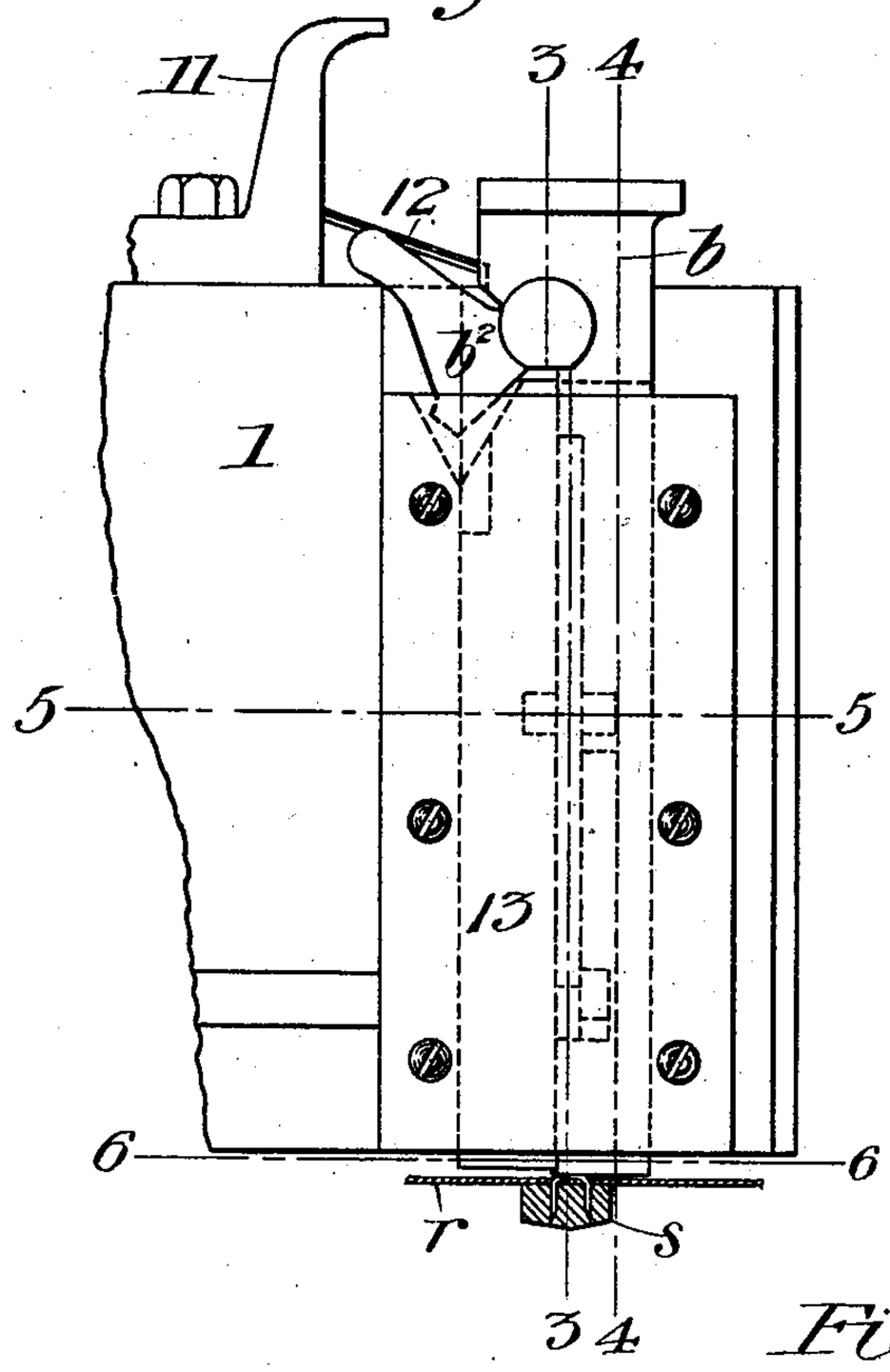
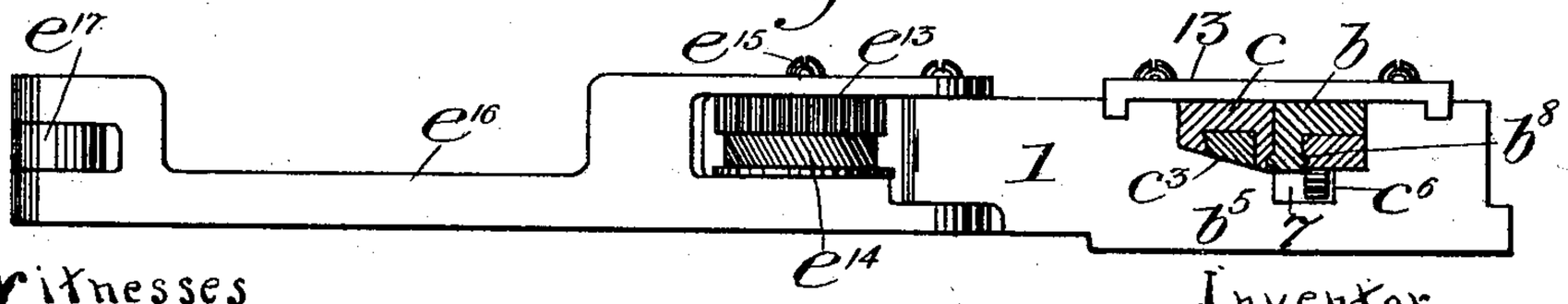


Fig. 6.



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(No Model.) 3 Sheets—Sheet 3.

Fig. 8.

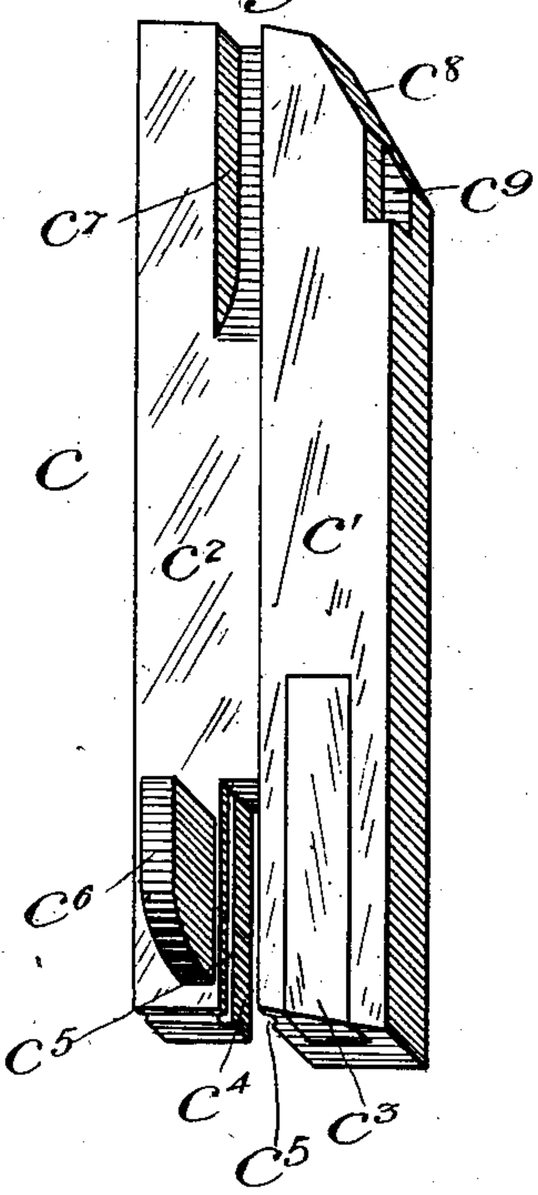


Fig. 9.

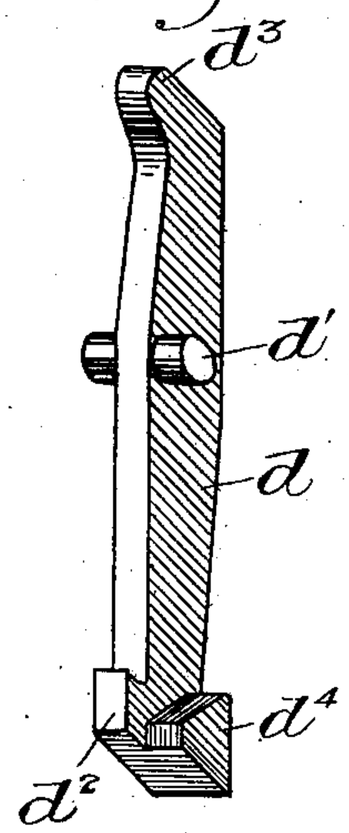


Fig. 10.

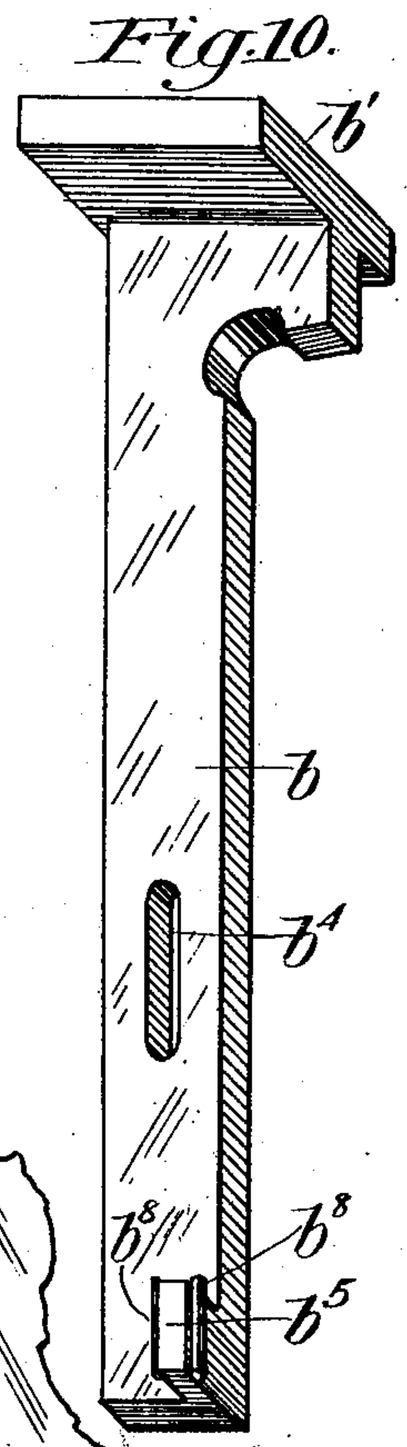
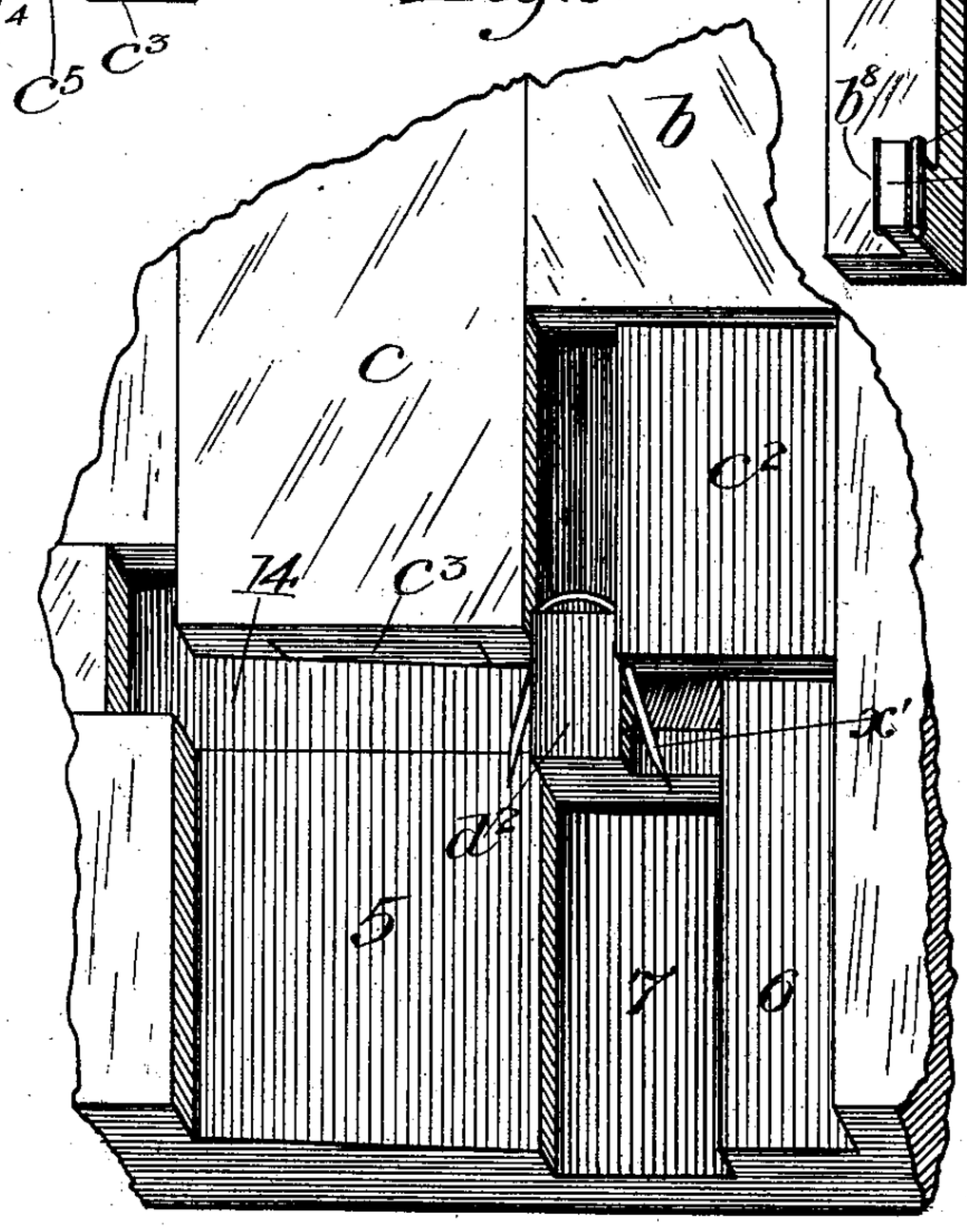


Fig. 7.



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UNITED STATES PATENT OFFICE.

GEORGE W. PACKER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE DEERING HARVESTER COMPANY, OF CHICAGO, ILLINOIS.

STAPLE FORMING AND DRIVING MACHINE.

SPECIFICATION forming part of Letters Patent No. 705,433, dated July 22, 1902.

Application filed October 19, 1900. Serial No. 33,595. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. PACKER, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Staple Forming and Driving 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.

The invention has for its object to provide an improved automatic machine for forming staples from a continuous wire and setting or driving the staples so formed into the parts to be united thereby. These objects I obtain by means of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of my improved machine. Fig. 2 is a fragmentary side elevation representing the parts in driving position. Figs. 3 and 4 are vertical sections on lines 3 3 and 4 4, respectively, of Fig. 2. Fig. 5 is a horizontal section on the line 5 5 of Fig. 2. Fig. 6 is an inverted plan view with a section through slides on line 6 6, Fig. 2. Fig. 7 is an enlarged perspective view of the operative mechanism, showing the staple in process of formation. Fig. 8 is a perspective view of the cutting and forming slide viewed from the rear. Figs. 9 and 10 are detail views in perspective of the anvil and driver-slide. Fig. 11 is a horizontal section on line 11 11 of Fig. 1.

Referring to Fig. 1 of the drawings, 1 represents a supporting-frame, having a vertical bracket 2 and a rearwardly-projecting arm 3. Vertically disposed in the frame 1 is a guide-groove 4, having a rear wall provided with a face 6, parallel with the face of the frame, and a beveled face 5, adjacent thereto. To the rear of the groove 4 is a groove 7 and a slot 71, extending through the frame. Fitting snugly in a suitable recess in the frame is a block 14, of steel or other hard metal, having a beveled face lying in the plane of the face 5 of the groove 4. A longitudinal groove *o* in the top of said block placed at an acute angle to the beveled face forms a wire-guide.

A slide *c*, reciprocating in the groove 4, is formed with a beveled rear face *c'* and an offset face c^2 to form a rabbet or recess. The inner beveled face *c'* has a steel block c^3 set therein, which block, coöperating with block 14 and groove *o*, forms a cutter for the wire. The lower end of slide *c* is bifurcated to form a fork c^4, the inner walls or throat of which are channeled, as at c^5, for purposes to be described later. The rear face of the slide *c* has a kerf or channel c^7 and a recess c^9 at its upper end, while the lateral face is beveled or chamfered, as at c^8. Projecting rearwardly from face c^2 is a cam c^6.

Mounted in the recess of slide *c*, which will hereinafter be designated the "cutting and forming" slide, is a reciprocatory driving-slide *b*, which has an elongated slot b^4, engaged by a suitable pin c^{10}, projecting from slide *c*, whereby a slip or sliding connection between the respective slides is provided. Projecting rearwardly from the lower end of slide *b* is a driving-head b^5, which fits within the throat of the fork c^4 and is accurately guided therein by lateral ribs b^8, which engage channels c^5.

Mounted on a suitable pivot-pin b^3 under the head *b'* of slide *b* is a dog b^2, having a flat under face and a lateral finger. When in operative position, said dog is engaged by a stop 11 on the frame, which forces it against the side of slide *b* in position to engage the upper end of slide *c*, as shown in Fig. 1. The upper end of slide *b* is provided with a T-head *b'*, which engages the fork end a^4 of the cross-head a^3, reciprocating in a suitable guide 41 on the bracket 2. A power-shaft *a* has mounted thereon a crank-disk *a'*, which is connected by a link a^2 with said cross-head a^3.

Pivoted in the slot 7 by means of a pin *d'* is an anvil-bar *d*, provided with a forwardly-projecting toe or anvil d^2, which normally lies below and in alinement with the throat of fork c^4, with its upper face substantially in the plane of groove *o*, whereby the wire projected from said groove by the feeding mechanism will be supported in proper position to be operated upon. The lateral face of the bar *d* has an inclined lug d^4, which is adapted to be engaged by cam c^6 on slide *c* when said slide is depressed, thereby rocking the bar *d* on its pivot and retracting anvil d^2 from its posi-

tion in front of the fork. The upper end of bar d is provided with a projection d^3, which engages kerf c^7 in the rear face of slide c when the bar is retracted and which rides out of said kerf onto the rear of the slide, thereby again projecting anvil d^2 under the fork when said slide c is elevated. The relative arrangement of these parts in the upper and lower positions of the plungers is clearly shown in Figs. 3 and 4.

In order to secure a regular and automatic feeding of the wire to the cutting and forming mechanism, the following means is provided: A combined ratchet and gear wheel e is mounted upon a suitable stud e^2, secured to the frame 1, on which stud is also secured a knurled feed-roller e'. Loosely mounted on stud e^2 is a segmental plate e^3, to which is pivoted a series of spring-pressed pawls e^4, arranged in differential relation to the teeth on wheel e. Plate e^3 has a projecting arm e^5, which is operatively connected with a rock-lever e^9, pivoted to the bracket 2, by means of a rod e^6, having connecting-links e^7 and e^8 at the respective ends thereof. Rock-lever e^9 is actuated by means of a suitable cam-groove e^{11} in a disk e^{12}, mounted on shaft a, which groove is engaged by a bowl e^{10} on the end of said lever. Pivoted to the frame 1 is a lever e^{16}, carrying a gear e^{13}, meshing with gear e, and a knurled roller e^{14}, opposite the corresponding roller e', said gear and said roller being rotatably mounted on stud e^{15}. The outer end of lever e^{16} is connected to a link e^{17}, which fits in the forked end of arm 3 of the frame. A spiral spring e^{18} surrounds the link and is held under tension by means of a nut e^{19}, between which nut and the fork of arm 3 said spring is adjusted.

The slides are held in proper position in the groove 4 by means of a face-plate 13, which is bolted to the frame, and plate 13 is provided with flanges fitting corresponding grooves 31 in the face of the machine.

As illustrated, the machine is designed to apply the formed staples in fastening the slats s to the canvas apron r of a harvester, and although so shown it must be understood that the application of the device is not limited to such use, but is susceptible of employment in the various arts where analogous machines or operations are required.

My improved staple forming and driving machine, constructed as above described, operates as follows: A length of wire, preferably of half-round section, is drawn from a suitable reel (not shown) and forced between the feed-rollers e' and e^{14} through the guide-slot o in block 14, with its projecting end resting on the top face of anvil d^2 and abutting the opposite side wall of groove 4. Power is then applied to shaft a and the mechanism started, all subsequent operations of the machine being entirely automatic. The canvas apron r, having the slats properly placed thereon, is fed by hand or suitable automatic means over a table or support (not shown) to bring the slats successively under the staple-driving slide. Starting from the position shown in Fig. 1, shaft a, crank a', and link a^2 reciprocate cross-head a^3 and connected driving-slide b. The initial movement of slide b causes a corresponding movement of slide c through the connecting pivoted dog b^2, the lower end of slide c being somewhat in advance of the corresponding end of slide b. As slide c descends the beveled cutting-block c^3 thereon meets the wire x, projecting from the slot o in the correspondingly-beveled face of block 14, with the result that a suitable length of wire to form a staple is sheared off with a tapering point corresponding to the amount of bevel on the cutting-block. The sheared wire-section is then forced by the sides of the fork c^4 over the anvil d^2, thereby bending the wire into form and forcing it up into the throat of the fork, where it is held in the channels c^5 by the anvil. Further motion of the guides causes cam c^6 to engage lug d^4 on the anvil-bar, rocking said bar on its pivot and retracting the anvil from the throat of the fork. On the continued movement of the slides the projecting finger on dog b^2 engages the upper corner of frame 1, as shown in Fig. 2, and swings said dog out of contact with the upper end of slide c, which is thus disconnected from the reciprocating means as it reaches the lower limit of its stroke, with its lower face in juxtaposition to the canvas r and slat s. Slide b continues its downward movement independently of slide c by virtue of the pin-and-slot connection between them, and the driving-head b^5, following the staple in the fork c^4, strikes said staple a sharp blow, forcing it out of the throat of the fork through the canvas into the slat. On the reverse movement of the cross-head plunger b is first moved upward alone until the bottom of slot b^4 engages the pin c^{10} in slide c. Meanwhile dog b^2 has dropped back into position to engage the end of slide c. Slides b and c now move to the upper limit of their stroke and until c is arrested by a projection 12 on the frame engaging recess c^9 in said slide. As the crank rotates to move the plungers downward the cam-groove e^{11}, engaging the bowl of lever e^9, rocks said lever and moves the pawl-plate e^3 into the position shown in dotted lines in Fig. 1, the pawls meanwhile slipping idly over the teeth of the gear e. As the plungers are retracted lever e^9 is rocked in the opposite direction, ratchets e^4 engage gear e and rotate it, thereby causing a corresponding rotation in gear e^{13} and feed-rollers e' and e^{14}, feeding forward a new length of wire to form another staple. The tension of the feed can be adjusted by spring e^{18} and the amount of feed regulated by the screw adjustment in rod e^6.

Having thus described my invention, what I claim is—

1. In a stapling-machine, the combination of a supporting-frame having a beveled-face guiding-groove in its face and a wire-guiding

slot terminating in said beveled face, a recessed cutting and forming slide operating in said guiding-groove, said slide having a cooperating beveled cutting-face and a grooved forming-fork, a driving-slide mounted in the recess in said forming-slide and having a rearwardly-projecting ribbed hammer-head operating in said grooved fork, a pin-and-slot connection between said forming and driving slides, a pivoted dog carried by the driving-slide and adapted to be engaged with and disengaged from said forming-slide, an anvil-bar pivoted in said frame and having a toe projecting in the path of said forming-fork, coöperating lugs on the forming-fork and anvil-bar to retract the latter when the staple has been formed, and operating means connected with the driving-slide whereby the several parts are successively operated to cut the wire, form the staple and drive the latter when formed, substantially as described.

2. In a stapling-machine, the combination of a supporting-frame having a beveled-face guiding-groove, a recessed cutting and forming slide opening in said groove, said slide having a forming-fork and a beveled cutting-face coöperating with the beveled face of the groove, a driving-slide mounted in the recess in said forming-slide and having a rearwardly-projecting hammer-head provided with lateral ribs engaging corresponding slots in said forming-fork, an anvil-bar pivoted to said frame and adapted to engage the throat of said forming-fork, coöperating lugs on said forming-slide and anvil-bar to retract the latter from engagement with the fork, means to actuate the driving-slide, means to successively connect and disconnect the driving and forming slides, and a wire-feeding device operated by the slide-actuating means, substantially as described.

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

GEORGE W. PACKER.

Witnesses:
WM. A. DREFFEIN,
MARVIN CRAMER.