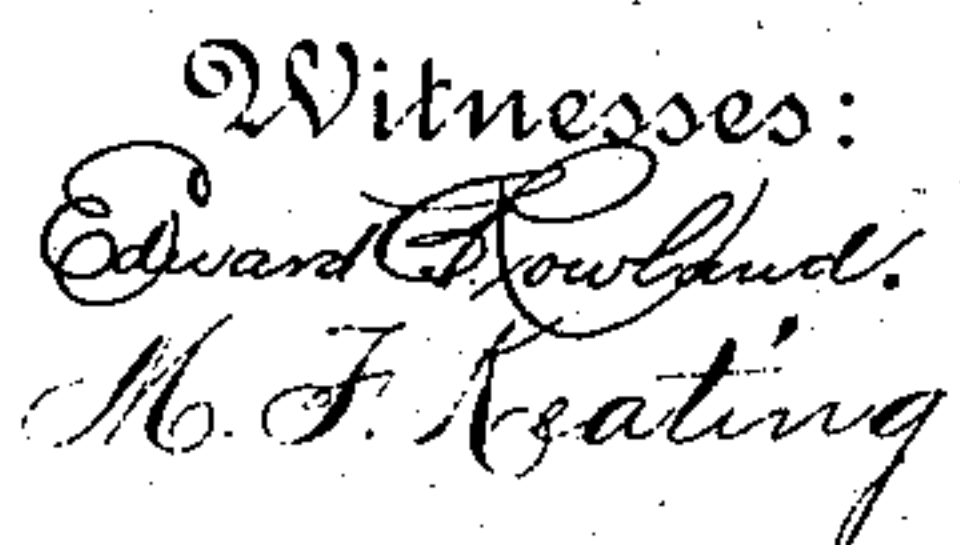


E. T. GREENFIELD.
STAPLING MACHINE.
APPLICATION FILED DEC. 8, 1908.

2 SHEETS—SHEET 1.



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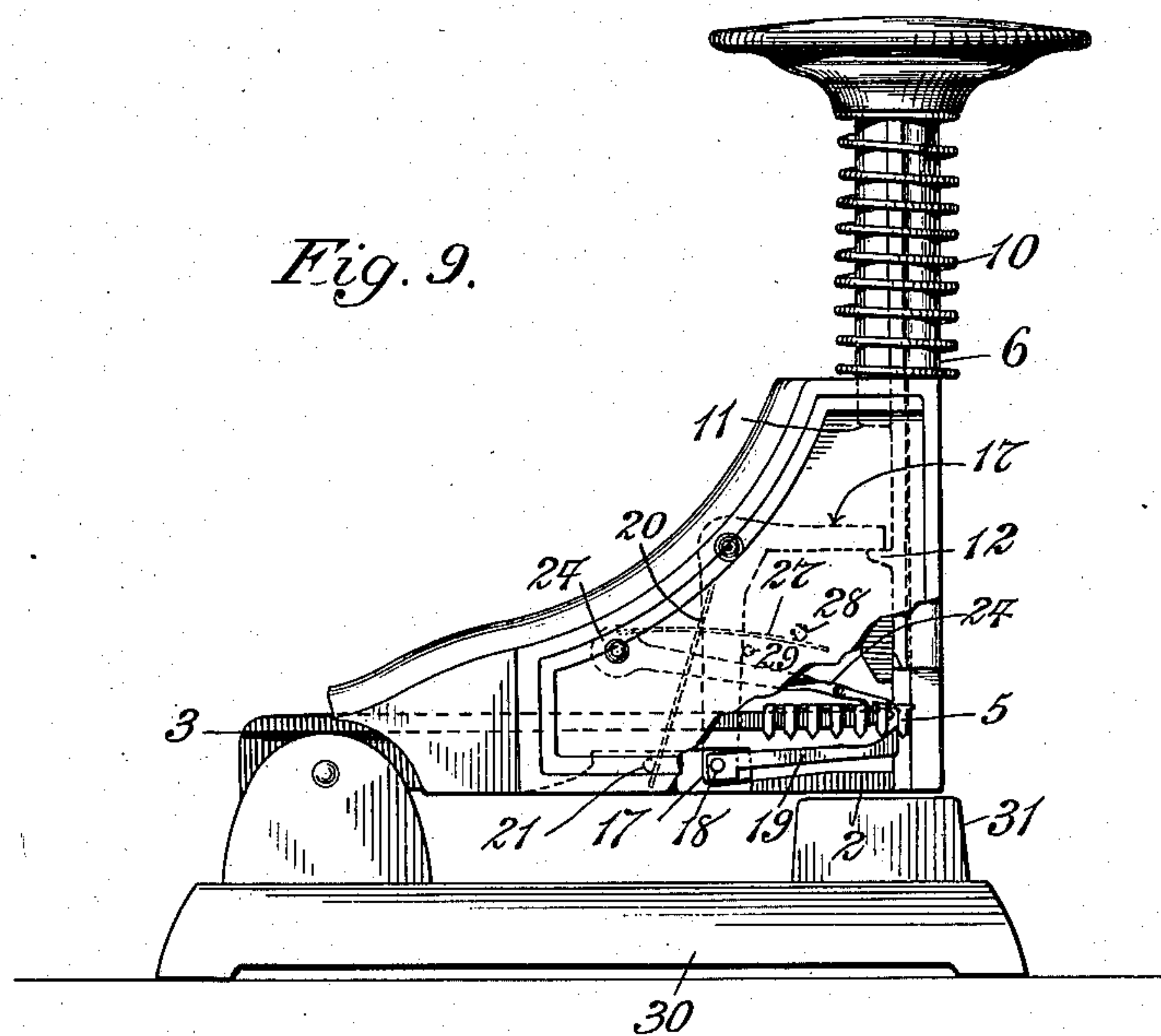
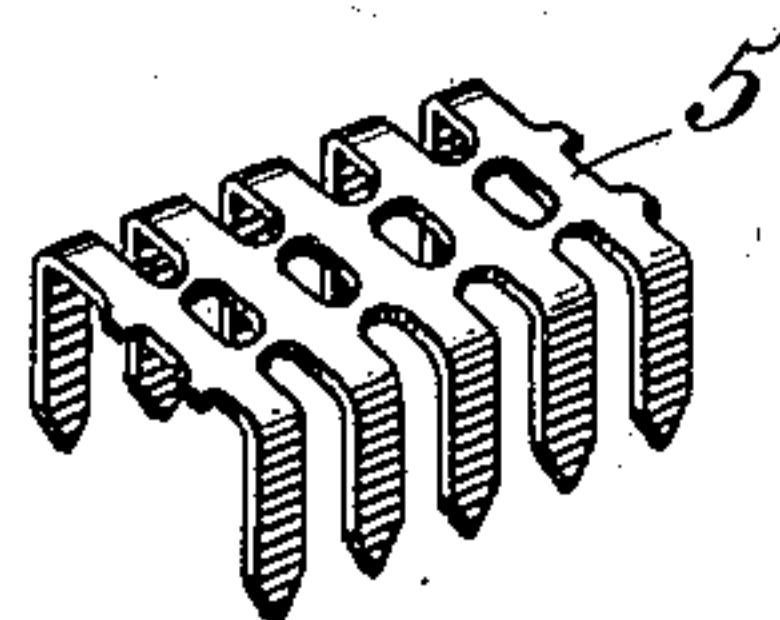


Fig. 8.



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STAPLING-MACHINE.

936,996.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed December 8, 1908. Serial No. 466,457.

To all whom it may concern:

Be it known that I, EDWIN T. GREENFIELD, a citizen of the United States, residing in Kiamesha, county of Sullivan, and State of New York, have made a new and useful Invention in Stapling-Machines, of which the following is a specification.

My invention is directed particularly to improvements in stapling machines of the type disclosed in U. S. Patent No. 572,293, granted to me on the 1st day of December, 1896, in which staples are successively cut from a blank or strip of completed staples and driven through papers and material to be bound together, and it has for its objects, first, to provide an improved means of feeding such staples forward successively and in such manner that there can never be any clogging effect due to a staple being turned in its downward movement after it is cut from the blank or strip: second, to so construct the feeding appliances that the blank or strip shall be fed forward with the greatest accuracy: third, to so construct the feeding appliances of such a machine that the blank or strip of staples after once inserted may be removed at will: fourth, to provide means whereby when such a machine is used for driving staples adapted to perform the function of tacks this result may be effected without discomfort to the person manipulating the machine.

In the stapling machine disclosed in the before-mentioned patent the staple blank or strip feeding appliances are of such a nature that after the blank or strip is once inserted it cannot be removed and the structural arrangement of the staple strip guide-way is such that when the last staple of a blank or strip is fed forward or released it often turns in such a way as to clog the outlet and thereby prevent the machine from operating, the users of the machine often further clogging it by continuing to cut off and attempting to drive staples from a succeeding strip after the last staple in the preceding strip is lodged in the manner stated.

The present improvement effectually overcomes this trouble.

In the use of a machine like that disclosed in the before-mentioned patent for the driving of staples as tacks, and in which the clenching anvil is therefore dispensed with, it has been found that a person may often seriously injure his hand by driving the staple severing and staple driving plunger

forcibly downward through the agency of a blow directly from the hand, and the present improvement provides a novel appliance whereby this objectionable feature is overcome, the same being in the nature of a reciprocating driving weight slidably secured directly to the upper end of the staple severing and staple driving plunger.

For a full and clear understanding of the invention, such as will enable others skilled in the art to construct and use the same, reference is had to the accompanying drawings, in which,

Figure 1 represents in part side elevational, part sectional view a full sized machine, a part of one side of the frame being broken away in order to better illustrate the structural details of my invention. Fig. 2 is a horizontal sectional view taken on the broken line X—X Fig. 1 and as seen looking thereat from the top toward the bottom of the drawings. Fig. 3 is a vertical sectional view taken through Fig. 1 on the line Y—Y and as seen looking thereat from left to right in the direction of the arrows. Fig. 4 is a perspective view of the staple strip feeding pawls illustrating their operative connection with the bell crank lever which is actuated by the staple severing and staple driving plunger in its downward movement. Figs. 5 and 6 are detail views of the holding pawl which prevents the staple blank or strip from moving backward when the staple severing and staple driving plunger is returned to normal position. Fig. 7 is a detail perspective view of the lower end of the staple severing and staple driving plunger and the adjoining end of the guide-way and one of the feeding pawls for the staple blank or strip. Fig. 8 is a perspective view of a short staple blank or strip adapted for use with my improved machine, said staple blank or strip being substantially like that disclosed in U. S. Patent No. 839,836, granted to me January 1st, 1907. Fig. 9 is a side elevational view of a stapling machine like that disclosed in my before mentioned Patent No. 572,293, a part of the frame thereof being broken away so as to illustrate my improvements with relation to the stapling feed and the staple severing and staple driving plunger; certain of said features also being illustrated in dotted lines.

Referring now to the drawings in detail, and first to Figs. 1 to 8 inclusive, 1 and 2

represent the halves of a two-part frame secured together by screws, spacing cylinders and dowel pins, as clearly shown in Figs. 2 and 3; and 3 represents the staple supporting guide-way which is secured in turn by dowel pins between the two parts of the frame in such manner that the staple blank or strip rests thereon in the manner shown in Figs. 1 and 2.

4 is the handle secured to the top of the frame for manipulating or moving the machine as the staples are driven.

6 represents the staple severing and staple driving plunger provided with the usual flanges 7, 7, adapted to move vertically through grooves in the inner faces of the frame, as clearly shown in Fig. 2, the lower ends of said grooves constituting the outlet or channel for the staples as they are driven.

8, 8, represent inclined faces at the lower end of the aforesaid plunger and 9 the cutting edge thereof (see Fig. 7).

10 represents a strong spiral spring, the lower end of which rests upon the upper surface of the frame 1—2, the upper end thereof being secured beneath a shoulder or enlargement of the plunger.

11 and 12 represent ledges or extensions on the inner face of the plunger, their function being to manipulate the feeding devices, as will be described later on.

13 represents a slot or groove in one face of the upper end of the plunger, and 14 a hollow weight fitting accurately around the upper end of the plunger and provided with a guide-screw 15, adapted to move in a slot 13 when the weight 14 is reciprocated up and down; 16 being a hole for permitting the air to escape from the interior of the weight, the function of this part being to aid in the severing of staples, and driving thereof after thus severed, and without injury to the hand of the user.

17 is a bell crank feeding lever secured by a screw directly to the inner face of the part 1 of the frame with its free end in the path of the ledges or extensions 11 and 12, the lower end of said bell crank lever being pivotally connected by a pin 18 with two integrally connected feeding pawls 19, 19 (see Fig. 4).

20 is a leaf spring secured at its upper end to the bell crank lever 17 and free to slide at its lower end against a pin 21 secured directly to the part 1 of the frame, the function of this spring being to feed the staple strip forward, through the agency of the pawls 19, 19, when the plunger 6 is released and allowed to ascend under the influence of the strong spiral spring 10. The limit of this movement of the lever 17 is effected by a stop pin 29 secured also to the part 1 of the frame.

22 is a second leaf spring soldered at one end directly to the bell crank lever 17 and

resting yieldingly against a pin 23 in the outer end of one of the aforesaid pawls 19, 19 and in such manner as to hold them yieldingly against the inclined ends of the teeth of the staple blank or strip 5, as clearly illustrated in Fig. 1.

It will be noted on inspection of Fig. 3 that the outer ends of the two pawls 19, 19 are of such dimensions as to fully fill the spaces beneath the laterally extending ledges of the staple supporting guide-way and between said guide-way and the inner faces of the frame 1—2, so that the lower ends of the legs of the staple to be next severed and driven rest against the outer faces of these pawls and the entire staple is thus frictionally or yieldingly held under the influence of the leaf spring 22 against the inner faces of the grooves which slidably support the staple severing and staple driving plunger and which also constitute an outlet or channel through which the staples when severed are driven. This feature constitutes an important part of my improvement in that by such an arrangement I provide means for preventing clogging in the outlet or channel of any staple after it is severed and as it is driven forward, and I also prevent any possibility of the last staple of the strip which is left in the machine turning or in any way choking the outlet.

24 represents a pivoted holding or checking pawl secured by a screw directly to the part 1 of the frame and provided at its free end with a fork 25, 26, 26 being detents for preventing any backward movement of the staple blank or strip (see Figs. 5 and 6).

27 is a leaf spring secured at one end to the pivoted holding or checking pawl and resting under stress against a stop pin 28 secured to the part 1 of the frame, the function of these parts being to hold the staple blank or strip 5 securely in position at all times and to prevent the withdrawal of the same unless it be desired to effect such withdrawal, as will be hereinafter described in connection with the description of the mode of operation.

I will now describe the mode of operation of a stapling machine like that disclosed in Fig. 1 when used for simply severing and driving staples into materials to be bound together, as for instance, in attaching cards to boxes, securing carpets to floors, and the like. The stapling blank or strip 5 is first slipped into position from left to right Fig. 1 with the legs of the staples straddling the ledges of the staple supporting guide-way 3 and forced firmly to the front until the end of the staple assumes the position shown on the extreme right with the ends of the feeding pawls 19, 19 behind the lower ends of the legs of said staple and with the detents 26, 26 of the pivoted holding or checking pawl 24 behind the second staple in the holes or

openings in the top of the blank or strip, so that said blank or strip cannot now be moved in either direction, otherwise than by the mechanism, two leaf springs 22 and 27 yieldingly effecting this manner of securing the blank or strip for action. The machine is now moved to the position where it is desired to use it by the aid of the handle 4 and the hollow reciprocating driving weight 14 is lifted to its extreme limit shown in full lines, Fig. 1. It is then grasped by the hand and forced downward so that the blow given to the outer end of the staple severing and staple driving plunger 6 by the joint effect of such weight and the power applied thereto by the hand of the user will first sever the staple and then drive it securely into position through the materials to be bound together; the strong spiral spring 10 being compressed by such downward movement. As the plunger was thus moved downward after the staple was severed from the blank or strip the outer ends or faces of the pawls 19, prevented the legs of said staple from turning or from assuming any other than a vertical position by yieldingly holding it against the inner faces of the guide-way grooves. When, however, the plunger reached approximately its lower position the ledge 11 came into contact with the free end of one arm of the bell crank lever 17 thereby causing the other arm thereof to withdraw the pawls 19 to their extreme limit or behind the lower ends of the next staple to be advanced; such action also placing the leaf spring 20 under further tension. It will be noted, however, that when the lower end of the plunger reached the upper edges of the free ends of the pawls 19 and before they were started back under action of the bell crank lever 17, they were given a slight backward movement by the inclined faces 8, 8 of said lower end, as will be made more apparent on inspection of Fig. 7 of the drawings, this arrangement of the inclined faces being designed to move the pawls out of the path of the plunger. On releasing the hollow driving weight 14 the spring 10, acting upon the plunger, forces it upward so that the lower extension 12 comes into mechanical contact with the lower face of the free end of the bell crank lever 17 and, acting together with the spring 20, tends to move the pawls forward into the position shown in Fig. 1, thus advancing the staple blank or strip one step. At the same time, the detents 26, 26 are caused to be locked behind the next staple, thus holding the strip in the position shown. Finally, after all of the staples have been severed from the blank and only one remains in the machine it is fed forward by the next movement and prevented from turning by the outer faces of the pawls 19, 19 as before described, so that it will be driven and made useful as a

staple and without any possibility of clogging up the outlet.

In Fig. 9 of the drawings I have shown how my improvement may be utilized in connection with a stapling machine designed for use in the binding together of papers and other materials, said machine being similar to that disclosed in my prior patent No. 572,293, above referred to, 30 being the base to which the staple severing and staple driving parts are attached and 31 the anvil which may be like that disclosed in said patent, or of such a nature as will effectually clench the legs of the staples when driven through the materials to be bound.

When it is desired to remove the staple strip at any time it only becomes necessary to simultaneously force the spring pressed pawls 19 and 24 out of engagement with the blank or strip when it may be slid out.

I do not limit my invention to the particular details of construction shown in the drawings, as obviously a number of the features thereof may be materially departed from and still come within the scope of my claims hereinafter made, nor to the application of hand operated stapling machines. To make a single illustration, the novel devices hereinbefore described and illustrated in the drawings for effecting the successive feed of a staple blank or strip like that shown and simultaneously holding the staple, which for the time being is in the outlet or channel so that it will surely always be driven by the plunger and without clogging the machine, might be applied with power driven stapling machines which utilize staple blanks like that illustrated in the drawings; or any other type of stapling machines where wire or like materials are used in the formation of staples, my invention in relation to such means being of a very generic nature and capable of a very generic application in the art, whether said staples be in the nature of a staple blank or strip like that shown in the drawings, or formed by the machine during its operation; or, even as to individual staples contained in a chamber, or by any well known means of support, and fed successively from said chamber into the outlet or channel, said staples being in well known general use in the art of stapling machines.

Having thus described my invention what I claim and desire to secure by Letters Patent of the United States is—

1. A stapling machine provided with a cutting and driving plunger having vertical movement in an outlet or channel and adapted to sever staples from a blank or strip and drive them in sequence therethrough; in combination with means operatively connected with the plunger for frictionally holding the staple after it is thus severed from the blank or strip, substantially as described.
2. A stapling machine embracing a staple

supporting guide-way; a staple severing and staple driving plunger; feeding mechanism operatively connected with said plunger for feeding the staple blank or strip forward after each staple is driven; in combination
5 with yielding means operatively connected with the feeding mechanism and adapted to prevent any staple from clogging the machine during its operation, substantially as described.

10 3. A stapling machine embracing a staple supporting guide-way; a staple severing and staple driving plunger; yielding means for holding the staple blank or strip from back-
15 ward movement; a feeding pawl located wholly below the staple strip and operatively connected with the plunger, said pawl being provided with means adapted to yieldingly hold the outer end thereof against
20 each staple as it is placed in position to be driven, substantially as described.

4. A stapling machine provided with means, in the nature of a plunger, for cutting off and driving staples through an out-
25 let or channel; in combination with means operatively connected with the plunger for holding each staple after it is cut in such manner that it cannot change its direction of movement as it is forced downward by
30 the plunger, substantially as described.

5. A stapling machine embracing a staple supporting guide-way; a staple severing and staple driving plunger; a feeding pawl connected therewith and having its driving end
35 located below the staple blank or strip and adapted to act upon the teeth thereof; in combination with a holding pawl located above the staple blank or strip, each of said
40 pawls being provided with yielding means operatively connected thereto, the arrangement being such that their holding ends may be released from the staple blank or strip and the latter withdrawn from the machine,
substantially as described.

45 6. In a stapling machine a staple supporting guide-way adapted to slidably support a staple blank or strip thereon; a feeding pawl connected with feeding mechanism and having its operative end located below the
50 staple blank or strip when the latter is in position for use, and adapted to successively

drive said strip forward step by step; in combination with a holding pawl located above the blank or strip, each of said pawls being provided with yielding means for nor- 55
mally holding them in operative position with the strip and the arrangement such that they may be disconnected therefrom and the strip withdrawn from the machine, substantially as described. 60

7. In a stapling machine a staple supporting guide-way; feeding mechanism operatively connected therewith and adapted to act upon the staple blank or strip from below the same; in combination with holding 65
mechanism located above said blank or strip, said feeding mechanism being provided with means for yieldingly holding the staple strip in its extreme forward position and all so arranged that the last staple of the blank 70
or strip can be driven and utilized, substantially as described.

8. A stapling machine embracing a staple supporting guide-way; a staple severing and staple driving plunger; feeding mechanism 75
for the blank or strip operatively connected with the plunger and a reciprocating driving weight attached to said plunger, the operative ends of said feeding mechanism being yieldingly held against the lower ends of 80
the teeth of each staple as the plunger descends, substantially as described.

9. A stapling machine embracing a staple supporting guide-way; a staple severing and staple driving plunger; feeding mechanism 85
for the blank or strip operatively connected with the plunger; a reciprocating driving weight attached to the plunger and a handle attached to the body or frame of the machine for moving it successively as the staples are 90
severed and driven, the operative ends of said feeding mechanism being yieldingly held against the lower ends of the teeth of each staple as the plunger descends, substantially as described. 95

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

EDWIN T. GREENFIELD.

Witnesses:

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E. McH. JOHNSON.