

June 3, 1930.

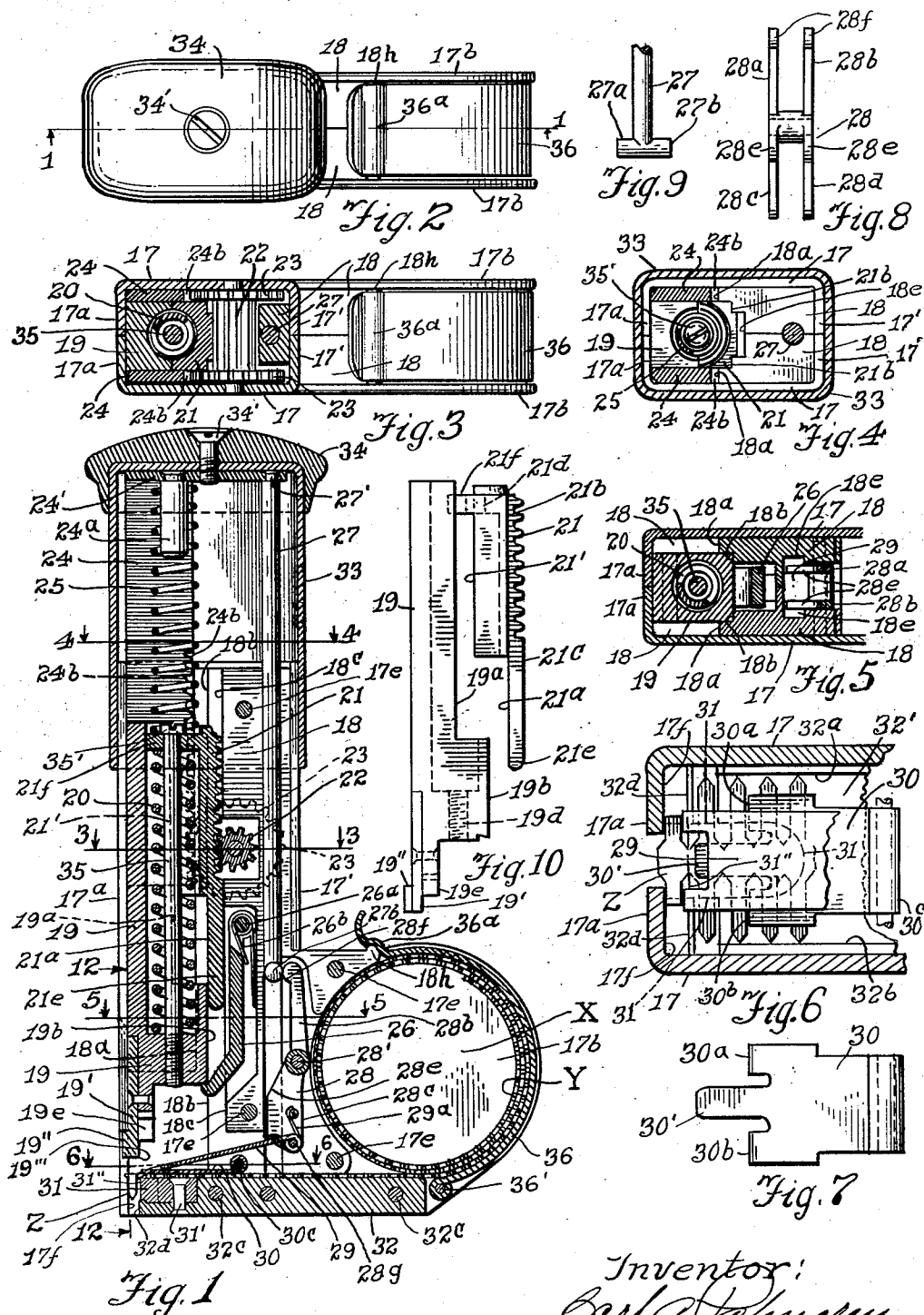
C. A. PALMGREN

1,761,640

STAPLING DEVICE

Filed March 3, 1928

2 Sheets-Sheet 1



Inventor:
Carl Palmgren

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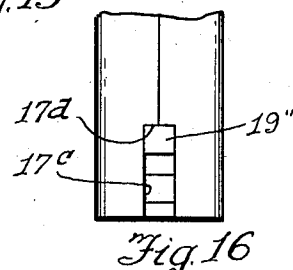
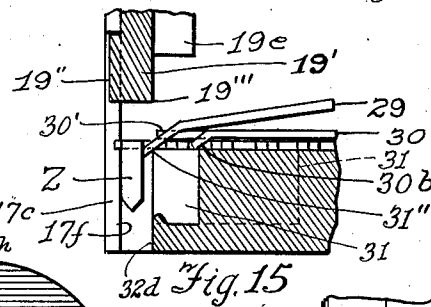
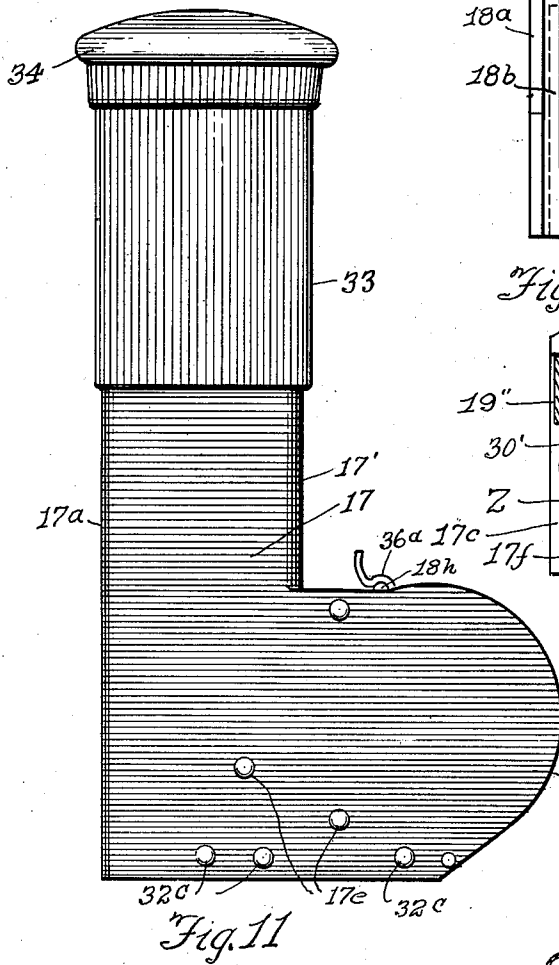
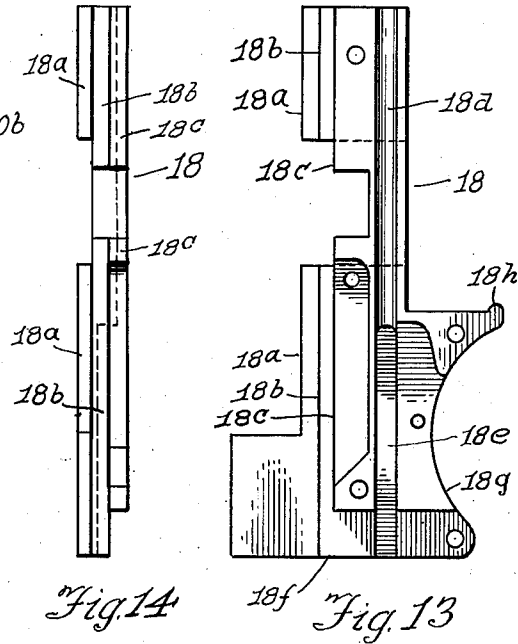
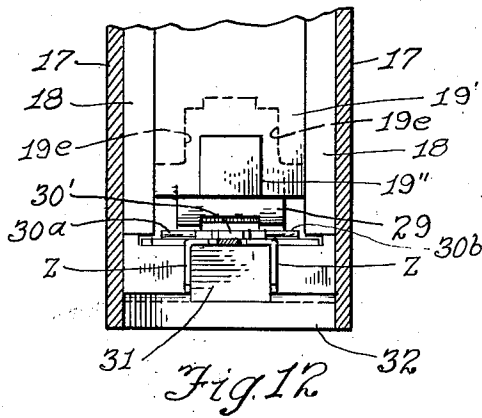
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2 Sheets-Sheet 2



Inventor:

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UNITED STATES PATENT OFFICE

CARL A. PALMGREN, OF CHICAGO, ILLINOIS

STAPLING DEVICE

Application filed March 3, 1928. Serial No. 258,923.

The invention relates to certain new and useful improvements in stapling devices, and is fully described and explained herein and shown in the accompanying drawings, and the objects of the improvements are; first, to provide a stapling device whereby a staple may be driven by pressing downward upon a pusher cap or operating handle and wherein a strong driving spring always under partial compression may be embodied in its construction for the purpose of effecting the forming, severing and driving of a staple formed out of a section of a strip of stapling material coiled up and stored in a cylindrical magazine from which said sections may be fed into position for forming into staples, and afterwards severed and driven by a driver; second, to provide an easily operated means for further compressing said driving spring by use of a simple reduction gear which will permit the driving spring to be compressed with ease, and to provide a retracting spring embodied in such a manner that when being compressed it will add its force of compression to be partially effective in the driving of staples; third, to provide positive both way actuated feeding mechanism for the feeding of staples by the feeding pawl, and whereby the last staple formed from the strip of stapling material will be fed into the driving position; fourth, to provide means for holding the last section of the strip while being formed into a staple and while the preceding one is being severed and driven; fifth, to provide a compact hand operated stapling device of the pusher type whereby all of the operating parts together with a long strip of stapling material may be embodied in such manner as to be most effective in operation and neat and compact in appearance. I attain the above objects by making use of the novel features of construction shown in the drawings in which—

Figure 1 is a central vertical section taken on line 1—1 of Fig. 2 and showing all of the operating parts in normal position, also showing the method of construction; Figure 2 a plan view looking down on the top of the pusher cap upon which the palm of the operator's hand presses for operating the

device; Figure 3 a section taken on line 3—3 of Fig. 1 showing a plan view of the gearing mechanism; Figure 4 a sectional view on line 4—4 of Fig. 1 showing the retracting spring, gear racks and operating cap in section together with the guide block, retracting rack and staple driving hammer in top plan view; Figure 5 a fragmental cross section taken on line 5—5 of Fig. 1 showing the housing, hammer, guide block and trigger in section, and a partial plan view of the staple feeding mechanism; Figure 6 a fragmental sectional plan view taken on line 6—6 of Fig. 1 showing fragments of the feeding pawl and staples, retaining pawl, anvil block and anvil over which sections of the stapling strip are formed into staples and showing a formed staple fed into position for severing and driving together with a blank section of said strip in position over the anvil for forming the succeeding staple; Figure 7 a plan view of the retaining pawl showing method of shaping the hold-down prong; Figure 8 a detail view of the feeding pawl rocker showing the front view and method of forming the cam arms; Figure 9 a fragmental detail of the feeding pawl operating rod showing method of forming the T shaped head provided for tripping the feeding pawl rocker by engaging the cam faces formed upon the rocker; Figure 10 detail views of the staple driving hammer and retracting rack shown slightly apart to show their construction and cooperating faces; Figure 11 an exterior view of one side of the device showing the compactness of design; Figure 12 a fragmental section taken on line 12—12 of Fig. 1 showing the housing in section, a front view of the anvil and anvil block, the driver partially retracted to normal position, the feeding pawl just coming forward to feed a formed staple into position for driving, the folding jaws being retracted after forming a section of the stapling strip on the anvil, and the retaining pawl with the hold-down prong holding the stapling strip; Figure 13 a detail side view showing the inside of one of the guide blocks and showing the groove and channel provided to receive the feeding pawl operating rod, method of forming the

guide faces for guiding the hammer and retracting rack, and for guiding the gear racks; Figure 14 an edge view of the same guide block showing method of notching the outside face to receive one of the operating gears; Figure 15 an enlarged detail fragmental side view showing a portion of the housing, fragment of the driver, fragments of the anvil block and anvil, feeding and retaining pawls, a section of the stapling strip with a formed staple fed into position for being severed from the strip and driven; and Figure 16 a fragmental vertical view showing method of forming an opening in the front of the housing for receiving the boss formed on the driver.

Referring to the drawings 17 is the housing formed to receive the pair of guide blocks 18, hammer 19, driver 19', driver spring 20, rack 21, pinion 22, operating gears 23, gear racks 24, retracting spring 25, trigger 26, feed pawl operating rod 27, feeding pawl rocker 28, strip feeding pawl 29, strip retaining pawl 30, anvil 31, anvil block 32, operating cap 33, and pusher cap 34, and this housing is made in two parts split on the center line and formed to fit around the guide blocks 18 as shown at 17', also around the hammer 19 as shown at 17^a, the side walls 17^b extending outward and forming the ends of a cylindrical magazine chamber "X" provided to receive a coil of stapling material "Y".

The operating cap 33 is formed cup shape and to fit over and around the upper portion of the housing 17 and adapted to slide thereon for the purpose of actuating the gear racks 24 together with the rod 27 secured to the cap 33 as at 27'. The gear racks 24 are made U shape, the upper end forming the cross bar 24' being secured to the cap 33 by the stud rivet 24^a, with the legs extending down along the sides of the hammer 19 and inside of the housing 17, and these legs have formed in them the teeth 24^b meshing with the teeth of gears 23 and are guided between the end walls 17^a and guide faces 18^a of the blocks 18. The hammer 19 reciprocates within the housing 17 being guided between the walls 17^a and guide faces 18^b of the blocks 18 for the purpose of forming, severing and driving the staples formed and shown at "Z". To keep the hammer 19 in proper alignment with the shearing means the retracting rack 21 is shaped as shown in Fig. 10 with the guide faces 21' and 21^a to abut with the faces 19^a and 19^b of the hammer 19, and with the faces 19^b and 21^b in contact with guide faces 18^b while face 21^c abuts guide face 18^c. The spring 20 is seated at its lower end in a recess in the hammer and abuts at its upper end against a lateral projection 21' on the upper end of the rack 21; and a pin bolt 35 located inside the spring is threaded at its lower end into a hole 19^d in the hammer and its upper end passes freely through a hole 21^d in the

projection 21' and is provided with an external head 35' resting thereon.

As a means of fitting the palm of the hand, a pusher cap 34 is adapted to fit over the cap 33 and is held in place by the screw 34'. By pressing down upon the cap 34 the mechanism operates for feeding, folding, severing and driving a staple thru actuation of the racks 24 meshing with and rotating the gears 23, turning the pinion 22 counter-clockwise and forcing the rack 21 downward and compressing the driving spring 20 down inside the hammer 19 until the finger 21^e releases the trigger 26 from under the hammer 19, whereupon the hammer by the force of its spring 20 will descend with the driver 19' shearing off and driving a formed staple and at the same time the jaws or furcations 19^e of the hammer will fold the following section of the stapling strip into staple form over the anvil; and as the cap 33 descends the spring 25 is compressed to add its compressive force to the hammer and the rod 27 is lowered until the projections 27^a and 27^b contact with the cam faces 28^e of the feeding pawl rocker 28 for effecting the retraction of the feeding pawl 29 for engaging the next section of the strip, this retraction being effected just before the release of the trigger 26. The gear mechanism between the operating cap or handle and the hammer-driving spring 20 multiplies and increases the power or pressure applied on the handle by the operator, and so increases the compression and force of the spring while the hammer is retracted and causes the latter to deliver a stronger blow when released. The driving-spring is normally retained under partial compression while all actuating parts are in normal position; for this purpose the pin bolt 35 is inserted into the threaded hole 19^d (after assembling the hammer 19, spring 20 and rack 21) and is turned to position with its head 35' bearing upon the projection 21' to place and retain the spring under partial compression.

Upon relief of pressure on the cap 34 the retracting spring 25 will raise it and effect a retraction of all working parts, this being accomplished by reverse motion of the racks 24 rotating the gears 23 and pinion 22 clockwise causing the rack 21 to rise and lift the hammer 19 by means of the pin bolt head 35' resting upon the projection 21' having the hole 21^d thru which the pin operates freely. Just before the trigger 26, which is mounted freely upon the pin 26^a and actuated by the spring 26^b, engages under the hammer as shown in Fig. 1, the projections 27^a and 27^b will contact with the cam faces 28' causing the member 28 to rock about upon the pin 28' and cause a forward motion to the arms 28^c advancing the folded section of the strip to driving position thru action of the feeding pawl 29, 29 which is mounted upon the

pin 28^e carried by the rocker member 28. For the purpose of holding the last section of the strip of stapling material while being folded over the anvil the retaining pawl 30 has the prong 30' projecting forward and resting upon the said section over the anvil 31 as shown in Fig. 1 and 6, pressure being effected by action of the spring 29^a causing the feeding pawl 29 to bear down upon the prong 30'. To prevent the material strip moving backward after being advanced, the retaining prongs 30^a and 30^b are formed to engage behind each leading section of the strip as it is advanced thru the channel 32', which has the side guides 32^a and 32^b for holding the strip central over the anvil 31, said guides being formed on the block 32 to abut with the faces 18' which prevents the strip rising up and out of the channel 32'. For the purpose of forming a complete enclosure for the coil of stapling material, the semi-circular faces 18^e of the guide blocks 18 form one half of the chamber "X" while the cover 36 forms the other half of said chamber. This cover is made of spring material, and is held in closed position as shown in Fig. 1 by means of the snap catch 36^a which snaps over the hook 18^a together with being hinged upon the pin 36' to allow for opening for the insertion of a coil of staples.

To assure full bending of the tips of the stapling sections over the anvil, the release of the trigger 26 is timed to insure enough downward travel of the projection 21' so that the head 35' will not strike said projection during its downward stroke. To limit the upward travel of the hammer 19, the boss 19'' strikes the top of the notch 17^e as at 17^a, said notch being partially formed in each half of the housing 17. For securing all parts together the rivets 32^e pass thru both side pieces of the housing 17 and anvil block 32 and together with the rivets 17^e provided for holding the members 18 and both side pieces of the housing 17, while the rivet 31' secures the anvil 31 to block 32.

Shearing the sections from the strip of material is accomplished by the cutting edge 19''' of the hammer cooperating with the cutting edge 31'' of the anvil, and after severing a formed staple from the strip the bent legs are guided, while being driven, by the guide faces 17' and the front face of the anvil block 32. For preventing clogging of the device I provide the opening, thru which the staples are driven, of the full width between the housing parts 17 and across the front of the anvil block 32, for the easy removal of any defective staple. This opening permits the first section of the strip of material to be severed from the strip in its flattened state, and will permit a partly formed or defective section to be severed and cleared from the device.

Having described my invention I do not

limit myself to the use of the combination of working parts for the driving of staples formed out of the particular strip disclosed, but I am aware that the same mechanism can be used for the severing and driving staples from other types of staples strips including those of U-shape.

What I claim is—

1. In the combination of a stapling device, a hammer, a staple driving part, a member upon which sections of a strip of stapling material rests while said sections are being severed from said strip and having a cutting edge thereon cooperating with the cutting edge of the driving member, a driving spring, an operating handle, means operated by said handle for compressing said driving spring consisting of a mechanism for increasing the force applied to said operating handle, means for releasing the compression of said driving spring for the purpose of driving a staple, a retracting spring cooperating with said compression mechanism for retracting said hammer, and means operated by said handle for feeding sections of a stapling strip.

2. In the combination of a stapling device, a hammer having a staple-driving part and furcations behind said part to engage and bend the tips of a section of staple forming material into staple form over an anvil, a hammer driving spring, an operating handle, means for maintaining partial compression of said hammer driving spring, compound gear-mechanism operated by said handle and further compressing said driving spring before the severing and driving of a staple, means for retaining said hammer in retracted position while said driving spring is being compressed, means for releasing said hammer for the purpose of functioning said furcations and staple driving part, and means for feeding said staple forming material.

3. In the combination of a stapling device, a hammer having a staple-driving part and furcations behind said part to engage and bend the tips of a section of stapling material into staple form over an anvil, a hammer driving spring, a handle for compressing said driving spring, means interposed between said handle and said driving spring for increasing the pressure applied upon said handle in the compression of said spring, means for retaining said hammer in retracted position during compression of said spring, and means for releasing said hammer for the purpose of functioning said staple driving part and said furcations.

4. In a stapling device, a staple driving means, a driving spring actuating said driving means, an operating handle, and means including a spring interposed between said operating handle and said driving spring increasing the force applied upon said handle in compressing said driving spring for the

actuating of the driving means, said handle and force-increasing means operating in the line of movement of said driving means.

5 5. In a stapling device, a staple driving means, a driving spring for the purpose of actuating said driving means, an operating handle, means interposed between said operating handle and said driving spring increasing the force applied upon said handle in
10 compressing said driving spring for the actuating of said driving means, an anvil over which sections of a stapling strip of material are formed into staple form, a forming member cooperating with said anvil for the
15 forming of said sections into staple form, means for retaining said driving means in retracted position during compression of said driving spring, means for releasing said retaining means, and means for feeding said
20 sections of stapling strip into position for the driving of same.

6. In the combination of a stapling device, a hammer having a staple-driving part and furcations behind said part to engage and
25 bend the tips of a section of stapling material into staple form over an anvil, an operating handle, a driving spring, an operating gear, a pinion gear attached thereto, a compressing member actuated by said pinion gear, a gear
30 rack operated by said handle and actuating said operating gear for the compressing of said driving spring, a retainer for holding said hammer in retracted position during compression of said driving spring, and
35 means for operating said retainer for the release of said hammer for the functioning of said staple-driving part.

7. In the combination of a stapling device, a hammer having a staple driving part, an
40 operating handle, a driving spring, an operating gear, a pinion gear attached thereto, a compressing member actuated by said pinion gear, a gear rack operated by said handle and actuating said operating gear for the compression of said driving spring, a retainer
45 for holding said hammer in retracted position during compression of said driving spring, means for operating said retainer for the release of said hammer for the functioning of said staple-driving part, and means for
50 feeding a strip of stapling material to said staple-driving part for the severing and driving of sections therefrom.

8. In combination, a hammer having a
55 staple-driving part and furcations behind said part to engage and bend the tips of a section of stapling material into staple form over an anvil, an operating handle, a driving spring, a compressing member, an operating
60 gear, a pinion attached thereto for actuating said compressing member, a gear rack actuated by said operating handle and actuating said operating gear, a retainer for holding said hammer in retracted position, a finger
65 actuated by said compression member for re-

leasing said retainer from said hammer, and mechanism for feeding said stapling material.

9. In combination, a hammer having a staple-driving part and furcations behind
70 said part to engage and bend the tips of a section of stapling material into staple form over an anvil, an operating handle, a driving spring, an operating gear, a pinion gear, a compressing member actuated by said pinion
75 gear, a gear rack actuating said operating gear, a trigger retaining said hammer in retracted position during compression of said driving spring, a finger actuated by said compression member for operating said trigger
80 for the release of said hammer, a rocking member, a feeding pawl operated thereby, a member operated by the operating handle for actuating said rocking member, and a retaining pawl provided for holding sections
85 of said stapling material after being advanced to forming position over said anvil.

10. In combination, a hammer having a staple-driving part and furcations behind
90 said part to engage and bend the tips of a section of stapling material into staple form over an anvil, an operating handle, a hammer driving spring, a pinion gear, a compression member having teeth formed thereon meshing with said pinion gear, an operating
95 gear attached to each end of the pinion of said pinion gear, gear racks meshing with each operating gear and actuated by said operating handle, a trigger for holding said hammer in retracted position during compression
100 of said driving spring, a finger upon said compression member for actuating said trigger, a rocking member, a feeding pawl operated thereby and a tripping member operated from said operating handle for actuating
105 said rocking member, said feeding pawl being adapted to feed the last staple section of a strip into driving position.

11. In combination, a hammer having a
110 staple-driving part and furcations behind said part to engage and bend the tips of a section of stapling material into staple form over an anvil, an operating handle, a driving spring, a pinion gear, a compressing member having teeth formed thereon for engaging
115 said pinion gear, operating gears attached to each end of the pinion of said pinion gear, gear racks engaging with each operating gear and operated by said operating handle, a trigger for retaining said hammer in retracted
120 position during compression of said driving spring, a finger actuated by said compression member for releasing said trigger, a retracting spring interposed between said compression member and said operating handle
125 for retracting all actuating members to normal position, a rocking member, a feeding pawl operated thereby, a tripping member operated by said operating handle for actuating said rocking member, and a retain-

ing pawl for engaging sections of the stapling material as they advanced over the anvil, said retaining pawl having a prong extending for pressing down upon the staple section over said anvil.

12. In combination, a hammer having a staple driving part and furcations behind said part to engage and bend the tips of a section of stapling material into staple form over an anvil, an operating handle, a driving spring, a pinion gear, a compressing member having teeth formed thereon for engaging said pinion gear, operating gears attached to each end of the pinion of said pinion gear, gear racks engaging with each operating gear and operated by said operating handle, a trigger for retaining said hammer in retracted position during compression of said driving spring, a finger actuated by said compressing member for releasing said trigger, a retracting spring interposed between said compression member and said operating handle for retracting all actuating members to normal position, a rocking member, a feeding pawl operated thereby, a tripping member operated by said operating handle for actuating said rocking member, a retaining pawl for engaging sections of the stapling material as advanced over the anvil, said retaining pawl having a prong extending forward for bearing down upon said sections over said anvil, and a cylindrical magazine chamber provided to receive a coil of stapling material.

CARL A. PALMGREN.