

Sept. 27, 1949.

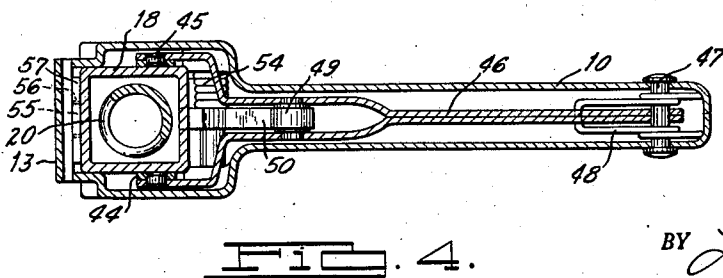
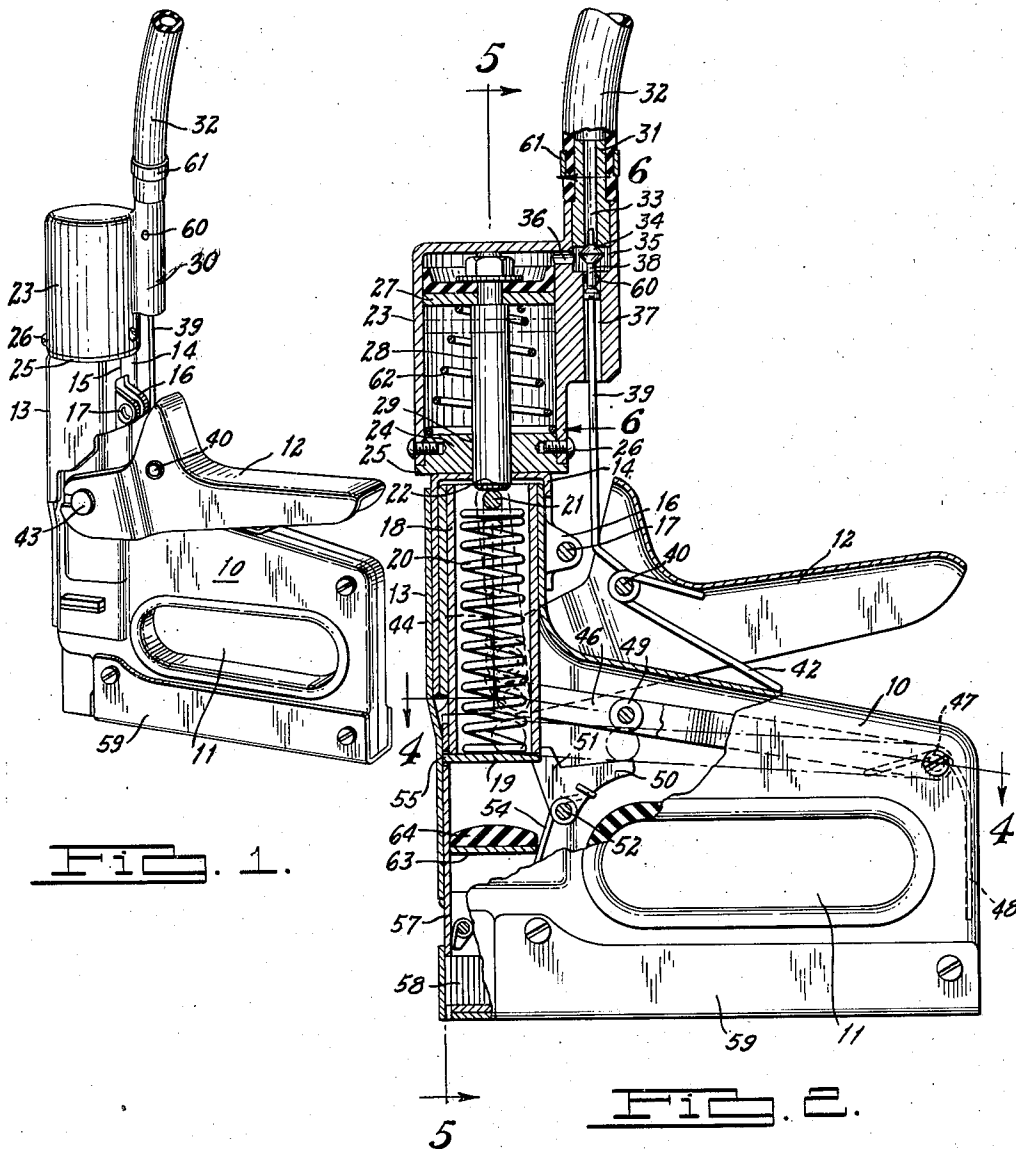
G. D. WALKER

2,482,993

STAPLER

Filed May 26, 1947

2 Sheets-Sheet 1



INVENTOR.

Gilbert D. Walker
BY *Louis Hayka*
ATTORNEY

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G. D. WALKER

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2 Sheets-Sheet 2

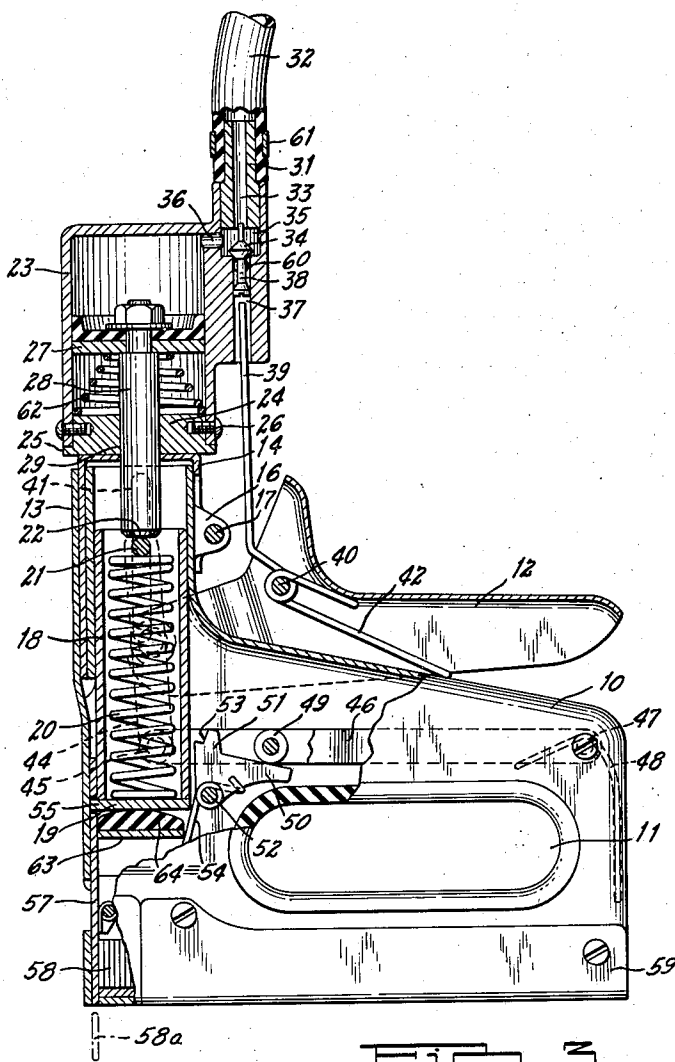


FIG. 3.

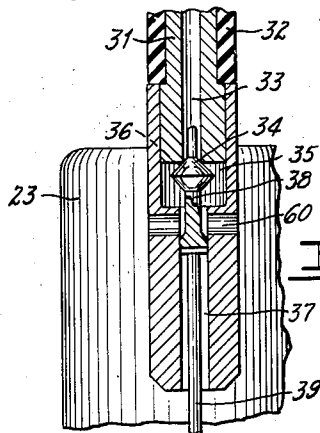


FIG. 6.

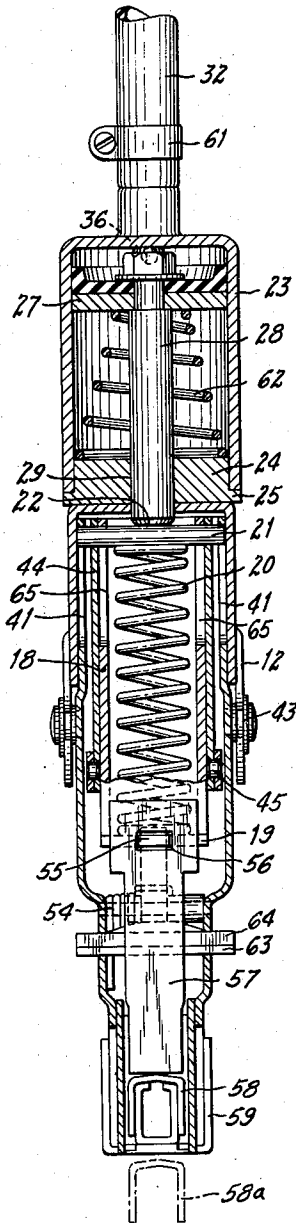


FIG. 5.

INVENTOR.
Gilbert D. Walker
BY *Louis Chayka*
ATTORNEY

UNITED STATES PATENT OFFICE

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STAPLER

Gilbert D. Walker, Detroit, Mich.

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5 Claims. (Cl. 1—49)

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My improvement pertains to portable, manually operated devices by means of which individual staples from a supply in a magazine portion of the device, may be driven into a chosen object.

Up to now the force necessary for the operation of such devices, was solely manual, the mechanism therein being such that by exertion of manual effort, a coiled spring had first to be compressed to supply driving power, whereupon the pent up energy of the spring was released by means of a trigger mechanism, to impart to an individual staple the penetrating thrust needed in stapling.

While on the whole, devices of this kind have proved fully practical, the operation of manually compressing the aforesaid spring, if continued for some time, was particularly tiresome and exhausting to the operators who after a prolonged period of using such a device would often become incapacitated. In order, therefore, to eliminate the necessity of manually compressing the above said spring, to supply the driving power for individual staples, I have combined with a stapler of the conventional type, a mechanism of my invention to convert what up to now was purely a hand operated device, into a power tool actuated by compressed air.

As a result it became possible to operate the tool without undue fatigue to the operators. Further, as a result of my improvement, it became possible to employ heavier springs and heavier staples without appreciably increasing the weight of the device or materially changing its shape. I wish to add that because of my improvement the efficiency of a stapler equipped therewith, has been greatly increased as the compression of the staple-driving spring can now be effected very quickly.

A further object of my invention was to provide all of the above named advantages without making my improved stapler too complicated in structure, or unduly expensive in cost.

I shall now describe my improvement in detail, including in my description the respective parts of the conventional device as working in combination with the elements introduced by me. In my description, I shall refer to the accompanying drawings in which:

Fig. 1 is a perspective view of a stapler as improved by me;

Fig. 2 is a vertical sectional view of my improved stapler with parts shown in side elevation;

Fig. 3 is a vertical sectional view of the stapler

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with parts shown in side elevation, but disclosing different operative positions of its elements;

Fig. 4 is a sectional view on line 4—4 of Fig. 2;

Fig. 5 is a sectional view on line 5—5 of Fig. 2;

Fig. 6 is a sectional view on line 6—6 of Fig. 2.

Similar numerals refer to similar parts throughout the several views.

The stapler includes a flat sheet metal case 10 open in its mid-section as shown at 11 to afford a space for a finger grip in operating said stapler while the palm of the hand of the operator rests on hand lever 12 to which I shall presently refer. The front part of the case is expanded laterally and forms a substantially rectangular cage 13 extending upwardly above the rest of the body of said case. At its upper end the cage is closed by a flat topped cap 14, split on the side facing the lever and being provided with a central circular aperture 22 in its top. Equipped with ears 16 along the edges of the split, the cap may be clamped in place by means of a bolt 17.

Slidably disposed within the cage 13 is a plunger including an oblong shell 18, substantially square in cross section, the shell being open at top, but provided with a flat bottom plate 19. Contained within the shell, and forming a part of the plunger assembly, is a coiled spring 20, bearing at its lower end against said plate 19, and confined at its upper end under a cross pin 21. The outer ends of the pin pass through vertical slots 65 in the walls of the shell, and enter into vertical slots 41 in that portion of the well of the cage which is covered by a hood or cap 14.

Mounted upon the flat top surface of the cap, axially with respect to the coiled spring 20, is a short cylinder 23 fitting over a disk-like base 24, having a marginal flange 25 for the support of the wall of the cylinder. A plurality of spaced screws 26 passing through the wall of the cylinder along its lower fringe, into the body of the disk, radially, serve to keep the cylinder in place upon said base. Disposed within the cylinder is a piston including a head 27 and a supporting rod 28 which passes downwardly through a centrally located bearing 29 in said base 24. A spring 62 coiled around the rod, bears against the head of the piston from below, urging it upwardly.

An integrally formed elongated member 30, disposed externally of said cylinder in parallel relation thereto, terminates at its upper end in a nipple 31 for attachment of a flexible hose 32 which is held in place by means of a clamp 61. An internal duct 33 opening at its upper end into said hose, is controlled by a movable two faced valve 34 located and seated within a cham-

ber 35. A lateral passage 36 opens into the interior of the cylinder 23 at a level above that of the head of the piston. Directly below valve 34 is a downwardly extending cylindrical hole 37 axially aligned with duct 33. Slidingly fitting into the upper end of the hole is a short movable prop 38 loosely supporting valve 34 from below. The prop itself rests on a lifter 39 which is connected to hand-lever 12. Specifically the lift is made of a length of wire which at its lower end is looped over a cross rivet 40. A leaf spring 42 at one end bearing against the upper surface of the body of case 10, normally holds the lever fulcrumed within the side walls of case 10 at 43, in its uppermost position. With the lever in said position, the lifter, by means of the prop, wedges said valve 34 into the mouth of duct 33 as shown in Fig. 2. The valve, it will be noted, has the form of two frust-cones extending in opposite direction from their common base, one of the cones acting as a closure for duct 33, while the opposite cone, the lower one as shown in the drawings, is adapted to act as a closure for hole 37 where the latter opens into chamber 35. Leading outwardly from hole 37, below said chamber 35, is a vent or port 60.

I shall now return to the details of construction having a bearing on the compression of spring 20. It will be noted that cross pin 21 is journaled in a pair of oblong arms 44 extending downwardly along the opposite walls of cage 13 and pivotally connected to a lever 46. The latter is made of two oblong metal strips joined in parallel abutment along a part of their length to form a shank which is pivoted within the rear part of the case upon a bolt 47. The strips are spread apart in a fork formation at their opposite ends where they are connected to the lower ends of arms 44 as above indicated. A spring 48 exerts a pressure against the lever upwardly. A roller 49 mounted within the forked portion of the lever is adapted to bear against arm 50 of a pawl 51 pivoted on a bolt 52. The pawl is indented at 53 so as to normally fit under the edge of plate 19 of the shell 18 enclosing coiled spring 23. A spring 54, anchored within the casing keeps the pawl normally in position shown in Fig. 2 wherein the respective part of the pawl juts out into the path of shell 18 to prevent it from moving downwardly. An integrally formed tongue 55 extends from the opposite edge of the plate 19 and projects into a slot 56 in a staple driver 57.

The construction of the driver is similar in all staplers, and so is its action upon the individual staples, so that further details with respect thereto do not seem to be necessary. However, to conclude this part of the specification on the structure of the stapler, I want to add the staples marked 58 are contained in a magazine section of the stapler in the base or shoe portion 59 of case 10. It may be also mentioned that the staples come in the form of a clip comprising a plurality of individual staples adhering to each other and that by means of a spring arrangement they are fed, one by one to the delivery port through which they are thrust out by said driver. A stop limiting the operative downward movement of the plunger is marked 63 and includes a resilient shock absorber or cushion 64.

After having described the structure of the stapler, I shall now describe the operation thereof:

It will be assumed that hose 32 is connected to a source of compressed air and that such air

is available for use in said stapler. As may already be obvious from the description of the respective parts of the device, the admission of air to operate the same, is controlled by means of valve 34. Normally, as shown in Figure 2, the valve blocks the duct 33 being held in the mouth thereof by means of prop or valve guide 38 resting on top of lifter 39. On depressing lever 12, manually, lifter 39, which at its lower end is connected to the lever, will be pulled downwardly allowing the valve to be pushed by air pressure out of the mouth of the duct and against the mouth of hole 37 in the bottom of chamber 35. Air entering said chamber from duct 33, will rush into cylinder 23 through a lateral passage 36, and overcoming the tension of spring 61, under the piston head 27, will push the piston downwardly causing its rod 28 to bear against said cross pin 21 and to compress spring 20. Simultaneously, arms or links 44 journaled upon the pin will depress lever 46 lowering roller 49 to bear against arm 50 of pawl 51. By the time said roller begins to bear against said arm, spring 20 will have been sufficiently compressed within shell 18 of the plunger to have the desired amount of power needed for the stapling. Swung on its pivotal support by the pressure of the roller, the pawl will slip out from under the bottom plate 19 of shell 18, thereby releasing the compressed spring therein to thrust the shell downwardly against the shock absorbing cushion 64 of stop 63. The bottom plate of the shell being interlocked with the driver by means of tongue 55 will slam said driver against the solid end of the respective staple 58, forcing it outwardly to a position shown in dotted line 58a.

On release of lever 12, leaf spring 42 will cause said lever to return to its initial position shown in Fig. 2 causing valve 34 by means of lifter 39 to close the mouth of duct 33 to cut off supply of air under pressure. Coiled spring 62 within cylinder 23, will now move the piston therein upwardly to its initial position forcing out the air above the piston through passage 36 into chamber 35 and thence downwardly into vent 60 and outwardly therefrom. This is possible because of the position of valve 34, which by means of the lifter has been returned to its normal position blocking duct 33 but leaving the way to the vent open. With the recession of the piston including its rod 28, upwardly spring 48 within case 10 will cause lever 46 to swing up transmitting the movement to arms or links 44 and by means thereof to shell 18 till said shell with spring 20 therein, has resumed its original position as shown in Fig. 2.

It will be obvious that some changes may be made in the structural details of the stapler as improved by me, without departing from the inventive principle disclosed herein. What I, therefore, wish to claim, is as follows:

1. A staple driver comprising a casing, said casing having a compartment for receiving a plurality of staples, a staple driver, a spring for actuating said driver, pneumatically actuated means to compress the spring, trigger means to support the spring while it is being compressed, link and lever mechanism operatively associated with said spring and located in the path of said trigger to trip the trigger when the spring has been compressed to cause said spring to thrust the driver against the staple to be driven, in combination with valve means to control said pneumatically actuated means, and means pivoted to said casing to control the valve,

2. In a stapler of the kind described, comprising a casing having a base for supporting a plurality of staples, a slidable driver for driving the staples, an oblong shell above the driver and receiving a coiled spring, a plate on the bottom of said shell connected to the driver and constituting a support for the spring, a cylinder mounted upon the casing above the shell, a piston therein having a piston rod extending outwardly against a pin disposed transversely in the shell over the upper end of said spring, air conducting means to supply air under pressure to the cylinder to move the piston in the direction of the spring to compress said spring against said plate, a trigger under the plate to support the driver while said spring is being compressed, valve means within the air conducting means to control the supply of air under pressure to the cylinder, hand-lever means on the casing to operate the valve, link and lever mechanism responsive to the movement of the piston towards the spring to trip said trigger to cause said spring to thrust the driver into driving action against the staple to be driven, spring means within the cylinder to return the piston and its rod to its original position on cutting off the supply of air under pressure, and a torsion spring within the casing operatively connected with the link and lever mechanism to return the support for the coiled spring with the driver to their initial positions.

3. In a stapler of the kind described comprising a casing having a base compartment for receiving staples, a flat driver located above the base compartment in the plane of one end thereof, an oblong hollow shell within the casing, said shell having a bottom plate interlocked with the upper end of the driver, a coiled compression spring within the shell and bearing at its inner end against said bottom plate, a cylinder mounted on the casing above the shell and axially aligned therewith, a piston within the cylinder said piston including a piston rod extending into the shell and bearing against a cross pin disposed over the upper end of the spring, air conducting means to convey compressed air into the cylinder to move the piston in the direction of the spring and to compress said spring, a valve in said air conducting means, a hand lever pivoted to the casing to control the valve, trigger means under the edge of the bottom plate of the shell to hold the shell stationary while the spring is being compressed, link and lever mechanism connected to said cross pin to trip said trigger upon compression of the spring to provide for the downward thrust of the shell, spring means within the cylinder to return the piston and its rod to its initial position upon closing of the valve, and a torsion spring within the casing operatively connected with the link and lever mechanism to return the support for the coiled spring with the driver to their initial positions.

4. In a stapler comprising a casing, said casing having a compartment therein located in the base thereof and adapted to receive a plurality of aligned staples, a driver, an oblong shell within the casing above the driver, a coiled compression spring within the shell, the spring at its lower end bearing against the bottom end of the shell, said bottom end having a lateral projection thereon connecting the shell with the

driver, a cylinder mounted upon the casing in axial relation to said shell, a piston movable within the cylinder, a piston rod extending therefrom toward the spring and into the shell, a cross pin interposed between the upper end of the spring and the outer end of the piston rod, said piston rod normally bearing against said cross pin, air conducting means adjoining the cylinder to convey thereto air under pressure from an outside source to cause the spring within the shell to be compressed by the action of the piston, valve means in said air conducting means to control admission of air into the cylinder, a combined hand lever and rod means to control the valve, trigger means under the shell to hold the shell while the spring is being compressed, a lever actuated through intermediate means by the piston to trip the trigger upon compression of the spring to cause the shell, spring and piston to thrust the driver across the front end of the compartment, spring means to return the piston and its rod back to their initial positions upon closing of said valve, and a torsion spring connected to the lever to return the lever, intermediate means and shell with the driver, and actuating spring to their original positions upon retraction of the piston rod.

5. In a stapler comprising a casing having a hollow shoe portion provided with a flat surface for receiving aligned staples, a shell slidably disposed within the casing at right angles to said flat surface, the shell having a transverse bottom plate, a driver disposed above the hollow shoe portion within and along the lower front margin of the casing, a coiled spring within the shell and bearing at one end against said bottom plate, a tongue projecting laterally from said plate into a slot within the driver to secure the same thereto, a cylinder mounted on top of said casing having its axis at right angles to the surface of the shoe and co-axially with the shell, a piston within the cylinder, the piston including a piston rod extending into the shell and bearing on a cross pin disposed transversely of and against the other end of the spring within the shell, means on the cylinder comprising a valve controlled inlet and outlet construction in communication with said cylinder connected to and in communication with a source of compressed air, hand lever and rod means to control said valve for the admission of air to the cylinder, a pivoted support under the edge of the shell, link and lever mechanism connected to the cross pin to withdraw said pivoted support from under the shell upon compression of the spring by the piston thereby releasing the shell to thrust the driver against the staple to be driven, spring means to return the piston and its rod to their initial positions, and a torsion spring within the casing operatively connected with the link and lever mechanism to return the shell, its spring and the driver to their initial positions.

GILBERT D. WALKER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,137,642	Cavanagh	Nov. 22, 1938