

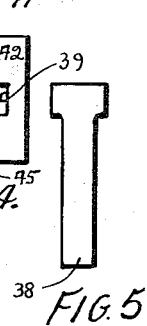
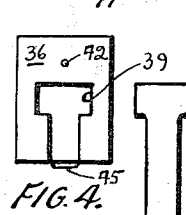
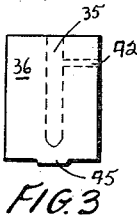
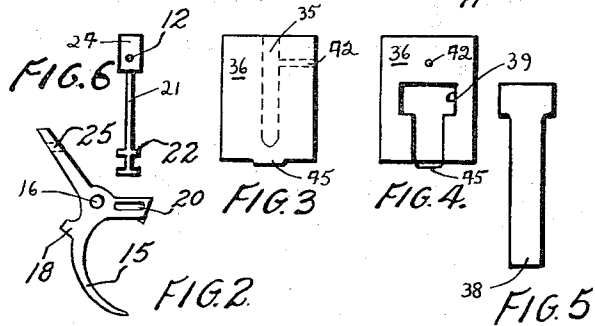
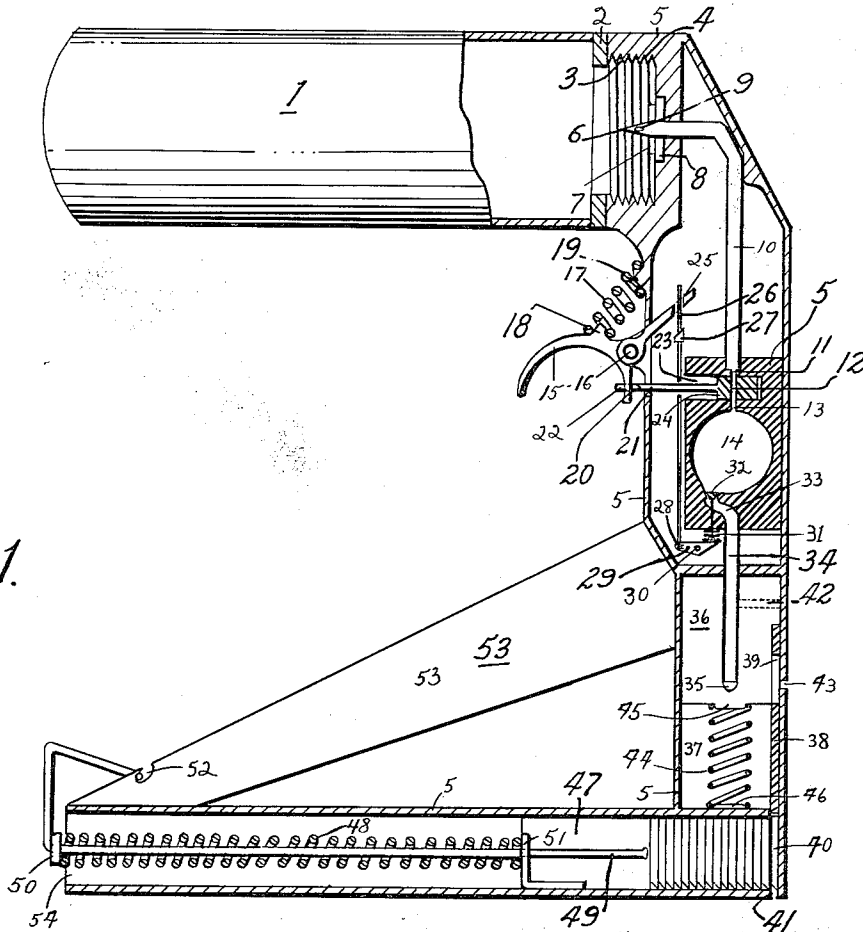
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3,049,712

GAS OPERATED STAPLER

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GAS OPERATED STAPLER

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5 Claims. (Cl. 1—44.4)

This invention relates to a stapler powered by compressed gas. Presently available pneumatic powered staplers offer actuating ease, that is a light trigger pull to actuate, but they also require the added expense and inconvenience of compressors and related equipment. Spring driven staplers offer simplicity and portability, but a considerable force is often necessary to actuate them. This tends to decrease production through an increase of operator fatigue.

It is an object of this invention to provide an easily actuated gas operated stapler which needs no compressor, external motor, electricity, or any wires, gauges, tanks, or installation area. The stapler of the present invention is easy to operate and requires no external connections or apparatus. The motive force for the stapler is provided by interchangeable compressed carbon dioxide capsules.

Other objects and features of this invention will become apparent from the following drawings and description.

FIGURE 1 is a side view of the stapler partially in section to show the operating parts;

FIGURE 2 is a side view of the trigger;

FIGURE 3 is a side view of the ram;

FIGURE 4 is a front view of the ram;

FIGURE 5 is a front view of the staple driver; and

FIGURE 6 is a top view of the first valve member.

The stapler is made up of two precision die cast aluminum halves that when suitably joined form the body. The body 5 comprises a vertical columnar portion containing the operating elements to be described hereinafter, and a lower laterally extending portion forming a staple magazine. An aluminum plate 53 spot welded to the columnar portion of the body and to the lateral end of the magazine forming portion braces the magazine. The upper edge of plate 53 near the magazine has a notch 52 to receive the end of a staple follower rod 49 which extends into a staple passage 54 in the magazine portion. The rod 49 carries a fixed washer 50 against which the rear end of follower spring 48 bears. The forward end of spring 48 bears against staple follower 47 to resiliently urge the follower against a stick of staples 40 in the passage 54. The rod 49 extends through a hole 51 in a rear flange of the follower to guide the follower. The magazine is loaded by unhooking the end of rod 49 from the notch 52 and sliding the rod, spring, and follower rearwardly out of the magazine. A new stick of staples is inserted, the rod, spring, and follower are replaced, and the end of the rod is hooked in the notch 52.

The upper end of the columnar portion of the body 5 has a rearwardly directed threaded opening 4 to receive a compressed carbon dioxide capsule 1. The capsule 1 has a threaded projection 3 with a seal 7 at outer end thereof. Projecting rearwardly in the center of opening 4 is the closed pointed end 6 of gas passage tube 10. The end 6 of the tube 10 has an inlet port 9 to admit gas into the tube. The capsule 1 is screwed into opening 4 and pointed end 6 ruptures seal 7 to admit compressed gas through port 9 into tube 10. Suitable gas seals such as 2 and 8 are inserted at appropriate places between the capsule and the body.

The compressed carbon dioxide capsule 1 may be of the disposable type, or it may be of the type which may be recharged for subsequent use. The recharging may

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be done from a larger portable container of high pressure gas, or it may be done from a gas compressor directly. The pressure of the gas in the capsule and the volume of the capsule are not critical, but preferably should be selected to provide more than thirty operations from a single capsule charge. While carbon dioxide has been specifically mentioned it is obvious that any equivalent gas could be utilized.

On the rear face of the columnar portion of the body 5 a trigger 15 is pivotally mounted. A pivot hole 16 in the trigger receives a pintle on the body. Spring 17, compressed between spring guides 18 and 19 on the trigger and body respectively, urges the trigger in a counter-clockwise direction. The trigger has two radially extending arms, one having a hole 25 to receive a push rod 26 as will be explained, and the second having a slot 20 which receives the locking flange 22 on the outer end of connecting rod 21. The rod 21 extends rearwardly from a sliding valve body 24. The valve body 24 slides horizontally in a cylindrical rearwardly opening passage 23 in the body 5. The valve body 24 has a vertically extending passage 12 that in the rest position of the valve body is aligned with gas passages 11 and 13 above and below the valve body respectively. The lower end of gas passage tube 10 opens into the upper passage 11. Thus it is seen that in rest position gas pressure is available in gas passage 13 below the valve. When the trigger is pressed, valve body 12 will be moved rearwardly by the lower arm on the trigger 30 and connecting rod 21, so that passage 12 is out of alignment with passage 11 and gas pressure is not available in passage 13.

Passage 13 opens into a charge chamber 14 and gas passage 33 leads from the lower portion of the chamber to a tube 34. In the opening from chamber 14 to passage 33 is a valve 32 having a depending rod. The rod is connected to an arm 29, pivoted at 30 to the body 5. A spring 31 surrounds the rod and urges the valve 32 to a normally closed position. The other end 28 of the arm 29 is connected to the lower end of previously mentioned push rod 26. Push rod 26 carries a stop 27 positioned so that a lost motion connection is formed between the radial arm of the trigger and the push rod 26.

The tube 34 extends vertically into a cylindrical chamber 37. Reciprocally slidable in the chamber 37 is a staple driving ram 36. The ram 36 has a top opening vertically extending bore 35 which telescopically receives the lower portion of tube 34. Extending forwardly from bore 35 is a horizontally extending gas escape bore 42, which when the ram is depressed registers with a port 43 in the forward wall of the body 5. The ram 36 is resiliently urged to a normal upper position by a spring 44 seated on the spring guides 45 and 46 on the ram and body respectively. The front face of the ram has a T slot formed therein to removably receive the upper end 39 of staple driver 38. The driver 38 reciprocates vertically in a staple driveway 41, to drive the foremost staple of the stick of staples in the magazine.

The operation of the device is as follows. Assuming the magazine has been loaded with staples as herein described, and a charged carbon dioxide capsule has been attached to the body so that the seal is broken and gas pressure is in tube 10. In the rest position of the device as illustrated in FIGURE 1, gas under pressure flows through tube 10, passage 11, valve passage 12, passage 13, and into chamber 14. Valve 32 is closed to preclude gas flow into passage 33. Using the capsule 1 as a handle the index finger of the operator pulls the trigger. Initial movement of the trigger causes valve 24 to move rearwardly and thus close off and seal the gas in chamber 14. Valve 32 remains closed due to the lost motion connec-

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tion between the trigger and the valve, thus trapping a metered charge of gas in chamber 14. Further movement of the trigger results in an arm of the trigger engaging stop 27 to depress rod 26 and thus open valve 32. The compressed gas in chamber 14 expands into tube 34 and bore 35 in the ram to drive the ram downwardly. Driver 38 on the ram engages and drives the first staple in the magazine. When escape bore 42 in the ram reaches the port 43, the gas is vented to atmosphere and spring 44 returns the ram to rest position. When the trigger is released valve 32 closes and valve 24 opens so that a new charge of compressed gas enters chamber 14 and the device is ready for another stapling operation.

Various changes may be made in the details of construction without departing from the spirit and scope of the invention as defined by the appended claims—

1. A fluid actuated stapler comprising a reciprocable driving ram carrying a driver blade, a gas chamber, a supply source of compressed fluid, a first fluid passage between said chamber and said ram, means to meter a charge of compressed fluid to move the ram in a staple driving stroke, means to return the ram, and manually operated means to actuate said metering means.

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2. The stapler of claim 1, wherein the metering means comprises a first valve between said first passage and said chamber, and a second valve between said chamber and said second passage.

3. The stapler of claim 2, wherein said manually operated means is a trigger having a direct connection to said first valve and a lost motion connection to said second valve.

4. The stapler of claim 3, wherein said supply source of compressed fluid is a detachable compressed gas capsule.

5. The stapler of claim 4, wherein said supply of compressed fluid is a detachable compressed gas capsule.

References Cited in the file of this patent

UNITED STATES PATENTS

2,863,214	Szappanyos	Dec. 9, 1958
2,964,752	Kopf	Dec. 20, 1960

FOREIGN PATENTS

219,261	Great Britain	July 24, 1924
607,444	Great Britain	Aug. 31, 1948