March 10, 1936. W. DRYPOLCHER 2,033,516

STAPLING MACHINE

Filed Jan. 3, 1933

Fig. 1.

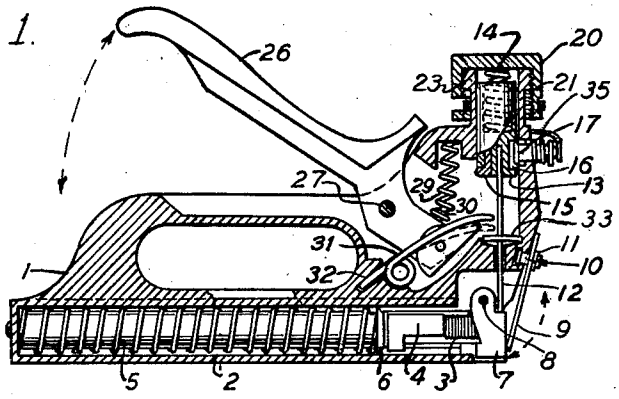


Fig. 2.

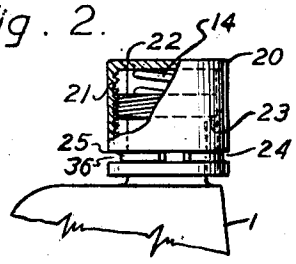


Fig. 3.

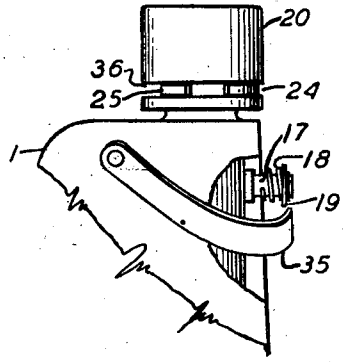


Fig. 4.

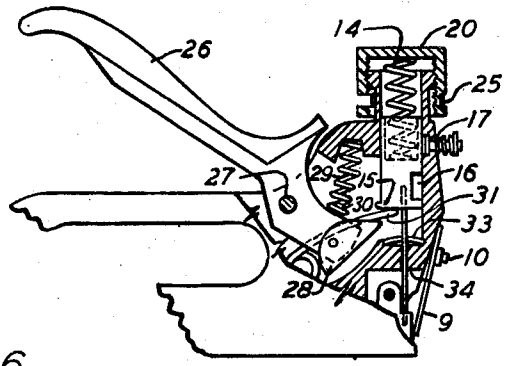


Fig. 5.

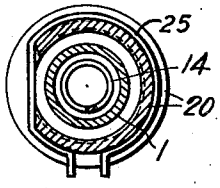
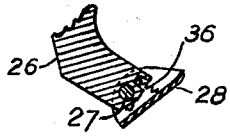


Fig. 6.



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STAPLING MACHINE

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Application January 3, 1933, Serial No. 649,911

11 Claims. (Cl. 1—49)

Machines of this type have been known for several years and while they have generally met with approval it is believed that certain fundamental changes in design would result in considerably greater convenience in their use.

The principal objections to these machines are, first, that due to their solid construction, the staples cannot be loaded into the front end of the machine but must instead be loaded into the rear end. During this loading operation it is possible for the feed spring mechanism to snap loose and injure the operator. It is also possible for some parts of this mechanism to drop on the floor during the loading operation and become lost or bent under foot.

In the second place, because of the tremendous pressure on the driver it is usually at rest at the lower part of its stroke. This condition prevents convenient loading from the front end of the machine and causes considerable difficulty should a clogged staple become jammed up at that point.

Thirdly, all machines of this type generally have a screw cap adjustment member in order to increase the pressure of the power spring. Sometimes, however, when the cap is unscrewed, in an attempt to lessen the pressure, the operator may not realize that the ends of the threads have been reached and the cap may drop off. This feature is a source of great annoyance.

It is an object of this invention to provide a machine which can be conveniently loaded from the front end, by substituting opening members in place of the solid construction.

It is another object of this invention to provide a machine of the type described, in which the staple driver can be withheld from its driving blow near the top of its stroke so that the driver will leave uncovered the opening into which the staples are to be loaded and also, in this position, enable the operator to easily and conveniently remove clogged staples from the channel through which the staples are supposed to be driven.

Still another object of this invention is to provide a detachable means co-operating with the adjusting cap whereby the said cap cannot accidentally come loose during the course of any temporary adjustments in the pressure of the driving spring.

Additional advantages of this invention will be clearly apparent from the following description together with the accompanying drawing forming part of this application.

One form of the invention is illustrated by the accompanying drawing of which Figure 1 is a longitudinal cross section of the machine.

Figure 2 is a side view of the screw cap and stop clamp spring (partly in section).

Figure 3 is a side view of the swinging device used to mechanically release or lock up the driver action.

Figure 4 is a part side view of the machine, partly in section, showing the driver in its lower position.

Figure 5 is a section view taken through the spring cap and housing of the assembled view of Figure 1.

Figure 6 is a part longitudinal section through the lower end of the arm and the pawl, showing the pawl spring which holds the pawl in operative position.

Referring to Figure 1, the working parts are shown in position with detent 17 engaging the driver in a raised position so as to permit a free opening of the magazine door 7 and staples to be loaded into the front end of the machine.

Figure 2 shows the screw cap screwed partially down on the threaded upper part of the housing, thereby compressing the driving spring. It also shows the locking spring in place in the slot around the circumference of the lower portion of the screw cap, and it will be noted that this is well sunk in so that when the cap is unscrewed the locking spring will engage against the under surface of the threads, thereby preventing complete unscrewing of the cap.

Figure 3 shows the arrangement of the lock button and detent. In this view the detent is not acting on the lock button and such lock button is, therefore, held in its most outward position by the action of its spring. The driving ram has in it a slot into which the lock button may be engaged should it be desired to have this button operate to hold the driving ram in a raised position. The method by which this is brought about is as follows:—When arm 35 is swung over button 19, spring 18 is put under strain and detent 17 is pushed against the side of the driving ram. Then by means of the normal operation of the machine the ram is raised until a slot in said ram reaches a level directly opposite the detent at which point continued pressure of arm 35 causes detent 17 to be pushed into the slot, thereby engaging securely the driving ram and preventing it from being forced down. In this raised position, the driving blade having also been raised above the opening into which the staples are loaded, the now locked ram permits easy intro-

duction of a clip of staples into the front end of the machine.

In general, the machine is composed of a frame, a staple-carrying and feeding mechanism, a staple-driving mechanism and lever mechanism for operating the staple-driving mechanism.

In detail, referring to various figures shown herewith, the frame 1 contains a staple-carrying core 2, on to which staples 3, are placed and which are fed forward during the driving action by means of a staple pusher 4, which has behind it the force exerted by feed spring 5, seated in washer 6. At the forward end of the staple core there is a cloure 7, which acts as a stop against which the staples are fed and which also helps to form a channel through which the staples are driven. In this particular case the closure is a U-shaped piece swinging about pivot 8 and acts as a magazine door and is held in closed position by the restraining effect of spring 9. This spring is pivoted on a stud 10 and is held in position on the stud by the lock washer 11.

The staples are driven by a driving blade 12, inserted in a driving head ram 13 which has behind it the expansive pressure of spring 14. The bottom portion of this ram is provided with an insert 15 made of specially hardened metal so as to provide a harder wearing surface for the pawl to slide against while releasing the ram for its power stroke. The ram here is shown with the kerf 16, the purpose of this kerf being to permit the entrance of a pin 17 which extends through the casting from the outside. This pin normally is held out by means of a spring 18, of Figure 3, and washer 19 so that it does not engage with the ram. However, upon application of pressure, either by means of a finger or by means of a swinging device shown as a pivoted bent spring 35, the spring 18 is compressed and the pin 17 engages the kerf as the ram travels past that point. Once the pin is in the kerf it has a locking action and holds the ram raised against the pressure of the expansion spring 14. Since by this same action the driving blade 12 has also been raised and held in its upper position, this permits opening of magazine closure and easy access for front end loading the staples on to the staple core.

As on Figure 2, the expansion spring is contained at its upper end by means of an adjustable screw cap 20. This cap has in it threads 21, which engage with similar threads 22, at the top of the housing. The threads at the top of the housing, however, are few in number and are bounded at their lower end by a sharp shoulder 23. The screw cap has cut in it a groove 24, into which a spring 25 is fitted. One portion 36 of this groove, however, extends inwardly so deeply that a part of the spring 25, extends within the inner circumference of the screw cap. As in Figure 5, the part of the spring which extends inwardly in this fashion will contact against the shoulder when the screw cap is unscrewed sufficiently. This prevents the screw cap from being accidentally unscrewed off the threads and the assembled parts flying out and becoming lost. The lock spring fitted in the groove can easily be removed by snapping it out of the groove should a complete disassembly be desired.

Referring to Figure 4, the lifting of the ram against the pressure of the expansion spring 14 is accomplished by pressure applied on the lever handle 26, which rotates about the pivot pin 27, and which has at its bottom end a movable pawl 28, under spring tension which tends to force it outward. The contact edge of this pawl abuts against the contact edge of the insert 15, with the result that the ram is raised against the pressure of the expansion spring. During the raising action, the contact edge of the pawl is traveling through an arc and, at the proper point, contact is broken, allowing the ram to be driven with the full force of the expansion spring behind it.

Upon releasing the pressure on the lever handle, the spring 29, pressing against the top wall of the casting and against the button 30 of the lever piece, returns the lever handle to its position of rest and, during this return, the spring pivoted pawl passes by the contact point 15 on the ram and snaps back into position, ready for the next driving operation.

During the interval in which a blow is being struck, there are many components of the force which is doing the driving. Some of these components are exerted directly on the staple. Others tend to hammer the machine itself and distort the metal.

As in Figure 1, the recoil spring 31, set in grooves 32, is placed in the path of the ram so that any excess force beyond that needed to drive the staple is absorbed by this spring. This eliminates the problem of recoil or movement of the stapler in an upward direction due to the resistance offered by the work being stapled when the fastener is driven therein. Directly under the recoil spring and surrounding the driving blade is a spring washer 33, which is made of hardened material and is intended to take up any additional force which remains in the spring 14. The spread of this shock over a broad surface by means of a washer eliminates any tendency for channel 34, Figure 4, to be closed up by the swedging force of the blow.

Pawl spring 36 is shown in position in Figure 6.

It will be understood that there may be slight changes made in the construction and arrangement of the details of my invention without departing from the scope of the same and I intend to include all such variations as fall within the scope of the appended claims in this application in which the preferred forms only of my invention are claimed.

I claim:

1. A stapling machine comprising a frame, a staple-carrying and feeding mechanism, a spring-actuated staple-driving mechanism, a pivoted operating lever, a pawl attached to said lever arranged upon operation of said lever to coact with the driving mechanism raising it against the pressure of the spring and subsequently releasing it to drive the staple, unitary adjusting means for enclosing and varying the pressure of the power spring comprising a screw cap, and means for preventing the screw cap from coming loose during adjustment of the pressure of the power spring.

2. In a stapling machine, a frame, a shoulder thereon, a staple-carrying and feeding mechanism, a spring-actuated staple-driving mechanism, a pivoted operating lever, a pawl attached to said lever arranged upon operation of said lever to coact with the driving mechanism raising it against the pressure of the spring and subsequently releasing it to drive a staple, adjusting means for varying the pressure of the power spring, and locking means associated with said cap contacting with the shoulder on the frame to

prevent accidental disengagement of the cap from the frame.

3. In a stapling machine, a frame, a shoulder thereon, a staple-carrying and feeding mechanism, a spring-actuated staple-driving mechanism, a pivoted operating lever, a pawl attached to said lever and arranged upon operation of said lever to coact with the driving mechanism raising it against the pressure of the spring and subsequently releasing it to drive a staple, and a screw cap for varying the pressure of the power spring, locking means associated with said cap, comprising a member of resilient material a portion of which extends within the inside bore of the cap contacting with the shoulder on the frame to prevent accidental disengagement of the cap from the frame.

4. A stapling machine having a frame, a staple-carrying and feeding mechanism, a spring-actuated staple-driving mechanism comprising a spring and a ram, a driving blade carried by said ram, a pivoted operating lever, a pawl attached to said lever and arranged upon operation of said lever to coact with the driving mechanism raising it against the pressure of the spring and subsequently releasing it to drive a staple, and means for locking the driving mechanism so as to permit staples to be loaded into the front end of the machine.

5. A stapling machine having a frame, a staple-carrying and feeding mechanism, a spring-actuated staple-driving mechanism comprising a spring and a ram, a driving blade carried by said ram, a pivoted operating lever, a pawl attached to said lever and arranged upon operation of said lever to coact with the driving mechanism raising it against the pressure of the spring and subsequently releasing it to drive a staple, and means for positively holding the driving mechanism raised against the pressure of the drive spring so as to permit loading staples into the front end of the machine.

6. A stapling machine having a frame, a staple-carrying and feeding mechanism, a spring-actuated staple-driving mechanism, a pivoted operating lever, a pawl attached to said lever and arranged upon operation of said lever to coact with the driving mechanism raising it against the pressure of the spring and subsequently releasing it to drive a staple, and means for securely retaining the driving mechanism adjacent the top of its stroke to permit loading staples.

7. In a stapling machine, a frame, a staple-carrying and feeding mechanism provided with a passageway, a spring-actuated staple-driving mechanism comprising a spring and a ram, a driver carried by said ram, a pivoted operating lever, a pawl attached to said lever and arranged upon operation of said lever to coact with the driving mechanism raising it against the pressure of the spring and subsequently releasing it to drive a staple, means for permitting the insertion of staples into the passageway, and means for arresting the downward motion of the driving mechanism so that the lowest point on the driver is just above the passage-way into which staples are inserted.

8. In a stapling machine, a frame, a staple-carrying and feeding mechanism, having a passageway, a spring-actuated staple-driving mechanism comprising a spring and a ram and a driver, a pivoted operating lever, a pawl attached to said lever and arranged upon operation of said lever to coact with the driving mechanism raising it against the pressure of the spring and subsequently releasing it to drive a staple, and means for engaging the driving mechanism so as to arrest the downward motion of the driver with its lowest point above the passageway to permit insertion of the staples into the passageway.

9. A stapling machine having a frame, a staple-carrying and feeding mechanism having a passageway, a spring-actuated, staple-driving mechanism with a driver, a pivoted operating lever, a pawl attached to said lever and arranged upon operation of said lever to coact with the driving mechanism raising it against the pressure of the spring and subsequently releasing it to drive a staple, and means to engage an edge on the driving mechanism so as to prevent the lowest point on the driver from descending to the passageway into which staples are inserted during the loading operation.

10. A stapling machine having a frame, a staple-carrying and feeding mechanism having a passageway, a spring-actuated staple-driving mechanism, a driving blade, a pivoted operating lever, a pawl attached to said lever arranged upon operation of said lever to coact with the driving mechanism to raise it against the pressure of the spring and subsequently releasing it to drive a staple, and means comprising a push rod held in disengaged position by resilient means and operable to engage the driving mechanism so as to prevent the driving blade from descending below the passageway when staples are inserted during the loading operation.

11. A staple machine having a frame, a staple-carrying and feeding mechanism having a passageway, a spring-actuated staple-driving mechanism with a driver, a pivoted operating lever, a pawl attached to said lever and arranged upon operation of said lever to coact with the driving mechanism raising it against pressure of the spring and subsequently releasing it to drive a staple, means comprising a push rod held in disengaged position by resilient means, and a resilient pivoted strap operable to contact with the push rod to depress it in position to engage an edge on the driving mechanism so as to prevent the lowest point on the driver from descending to the passageway into which staples are inserted during the loading operation.

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