Feb. 16, 1932. I. R. METCALF 1,845,617

STAPLING MACHINE

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Fig. 1.

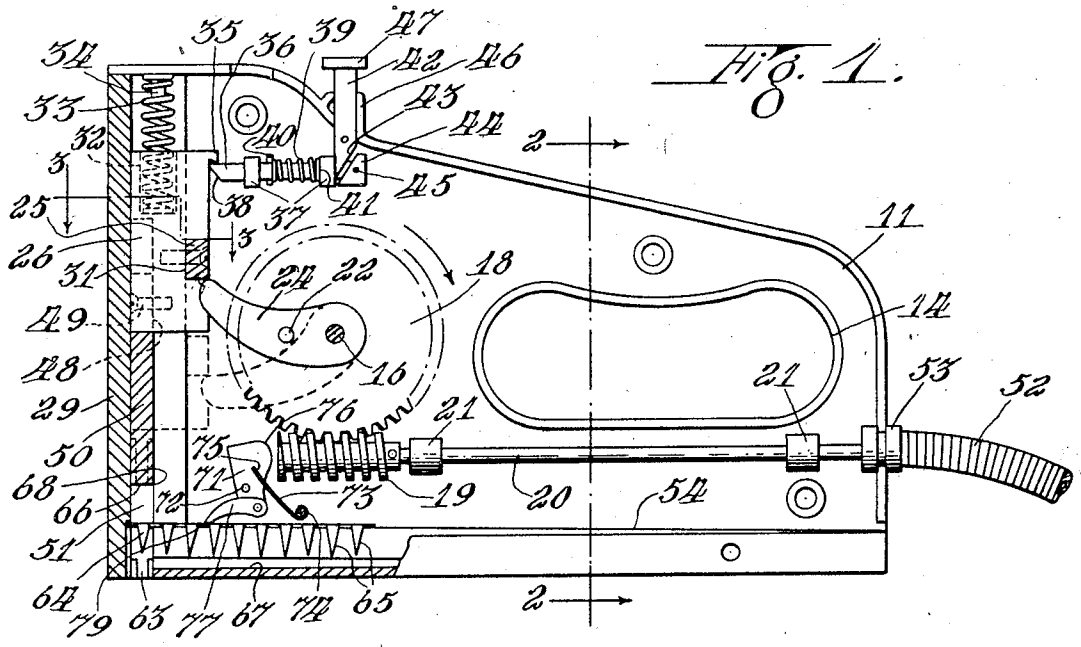


Fig. 3.

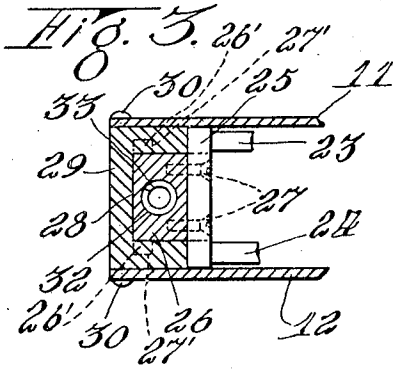


Fig. 2.

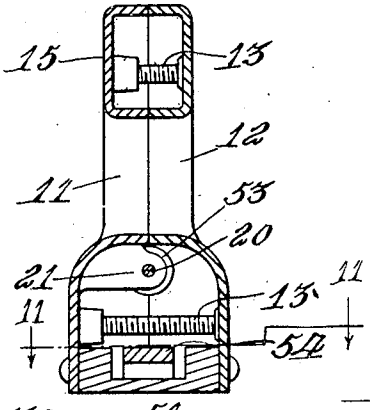


Fig. 4.

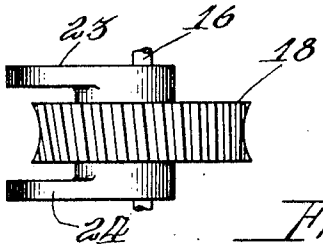


Fig. 11.

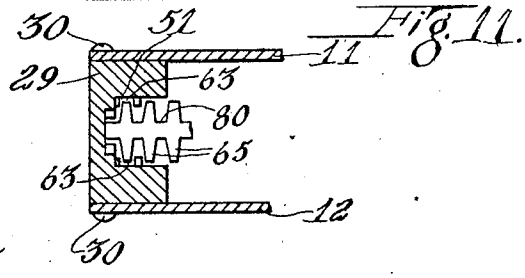


Fig. 6.

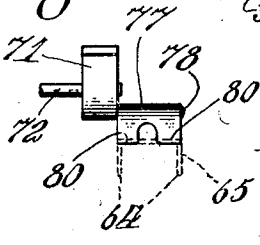
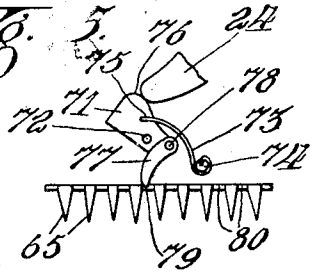


Fig. 5.



Inventor.

Irving R. Metcalf.

By John P. Smith

Atty.

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Fig. 8.

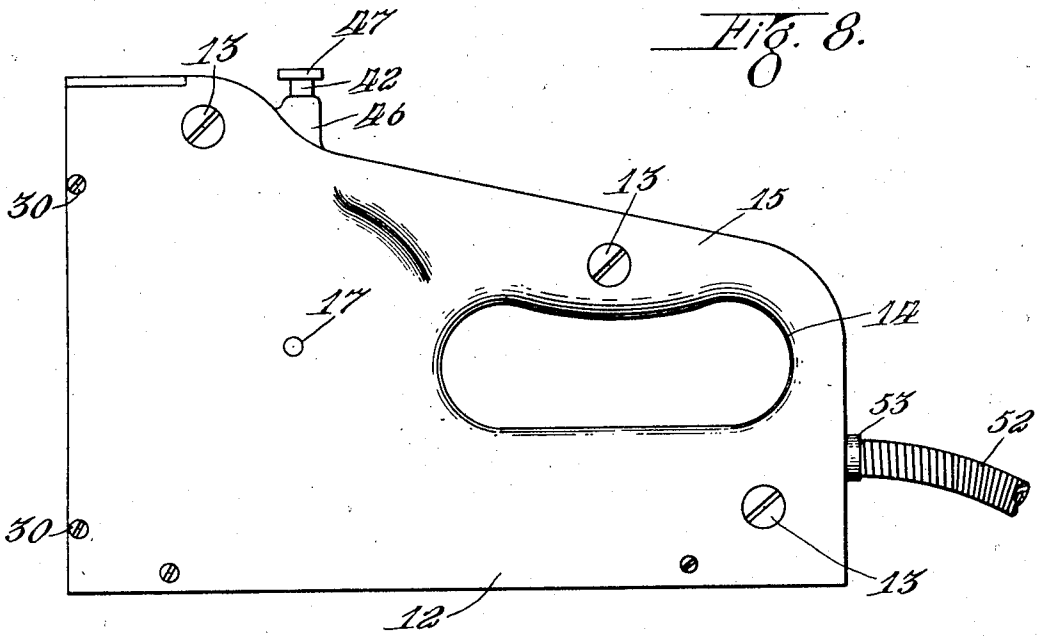


Fig. 9.

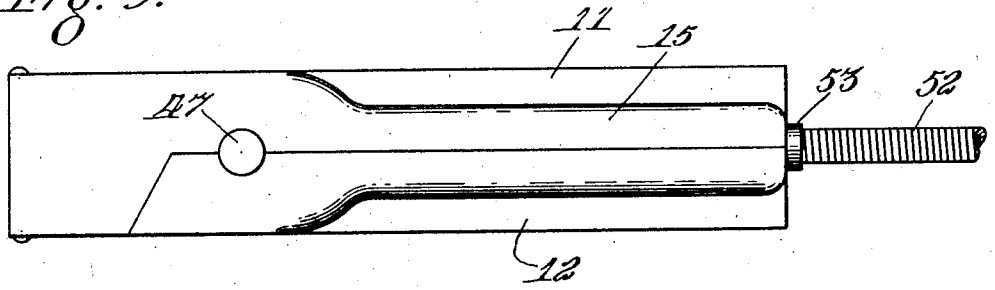


Fig. 10.

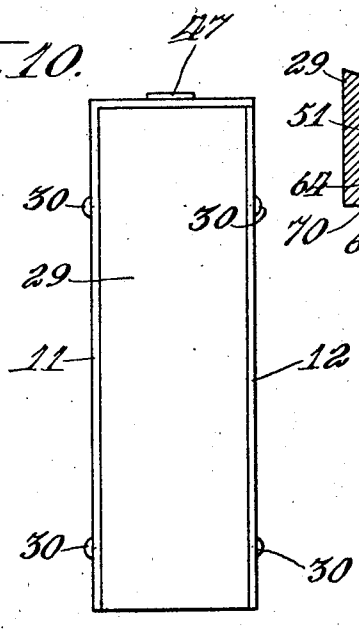
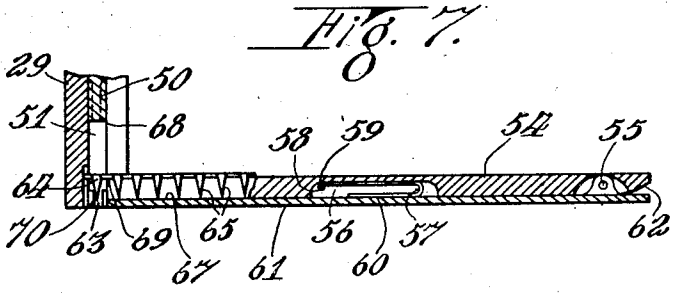


Fig. 7.



Inventor.
Irving R. Metcalf.
By John P. Smith
Atty.

Patented Feb. 16, 1932 1,845,617

UNITED STATES PATENT OFFICE

IRVING R. METCALF, OF ST. CHARLES, ILLINOIS, ASSIGNOR TO LATHAM MACHINERY COMPANY, A CORPORATION OF ILLINOIS

STAPLING MACHINE

Application filed May 2, 1929. Serial No. 359,743.

The present invention is directed to stapling machines which may be controlled so as to intermittently or continuously drive staples.

One of the objects of the present invention is to provide a simple, efficient and easily manipulated stapling machine which utilizes a compression spring to impart the impact to the staple to drive the staple into the work.

A further object of the invention is to provide a novel and improved stapling machine in which a novel mechanism is employed for compressing the impact spring and for advancing the succeeding staple following each impact operation for driving the previous staple.

A still further object of the invention is to provide a novel and improved stapling machine in which the staple supporting member is movable with respect to the frame of the stapling machine so as to properly guide the staple in its proper course into the work.

These and other objects are accomplished by providing a construction and an arrangement of the various parts in the manner hereinafter described and particularly pointed out in the appended claims.

Referring to the drawings, Fig. 1 is a longitudinal cross-sectional view of my improved stapling machine.

Fig. 2 is a cross-sectional view taken on the lines 2—2 in Fig. 1.

Fig. 3 is a fragmentary cross-sectional view taken on the lines 3—3 in Fig. 1.

Fig. 4 is a fragmentary top plan view of the worm wheel and the driving arm construction for compressing the impact spring.

Fig. 5 is a fragmentary detailed view showing the manner in which the rotating impact arms actuate the feeding pawl rearwardly previous to the feeding arm actuating the next succeeding staple in the position for driving the same.

Fig. 6 is a fragmentary and elevational view of the mechanism shown in Fig. 5.

Fig. 7 is a fragmentary detailed cross-sectional view showing the staple supporting member in the depressed position in which the staple about to be driven is positioned to engage the grooved sides for guiding the staple in proper position into the work.

Fig. 8 is a side elevational view of the stapling frame structure.

Fig. 9 is a top plan view of the frame structure shown in Fig. 8.

Fig. 10 is a front elevational view of the same, and

Fig. 11 is a fragmentary cross-sectional view taken on the lines 11—11 in Fig. 2.

The present invention is directed to a simple, efficient and compact motor driven stapling machine and in illustrating one embodiment of my invention, I have shown the same as comprising two side frame members or casing covers 11 and 12, preferably secured together by means of transverse screws 13. These casing members are provided with a longitudinal apertured portion 14 so as to form a handle or hand grip 15 for the purpose of conveniently making the tacking device portble and easily manipulated in various positions.

Rotatably mounted on a shaft 16 mounted in suitable bearing apertures 17 in the respective side casing members 11 and 12, is a worm wheel 18 which meshes with and is operatively driven by a worm 19 which in turn is secured to a drive shaft 20 mounted in suitable spaced apart bearings 21 secured to the casing member 11. Secured to the opposite sides of the worm wheel 18 by means of a pin 22 are two lifter arms 23 and 24 which are adapted to engage a transverse bar 25 secured to the reciprocating or driving member 26 by means of screws 27. The reciprocating or impact member is reciprocally mounted in a substantially rectangular recess 28 formed in the face block 29 which in turn is secured between the side frame members 11 and 12 by means of rivets or screws 30. The driving member 26 is provided with guiding ribs 26′ which engage complementary grooves 27′ in the block 29. The transverse bar 25 is secured in a recess 31 formed on the rear side of the driving member 26. Formed in the longitudinal center of the top of the driver as indicated at 32 is a socket in which is mounted a compression or impact spring 33. The lower end of this spring is

seated in the socket 32 while the upper end of the spring surrounds a downwardly extending pin 34 formed on the top side of one of the casing members. Formed integrally with the driver and preferably on the rear side thereof, is a rearwardly projecting lug 35 which is adapted to be engaged by a reciprocating pawl or latch 36 mounted to slide in spaced apart bearings 37 secured to one of the side casing members. The forward end of the latch 36 is bevelled as shown at 38 to permit the projecting portion 35 to depress the latch backward on the upward stroke of the driver compressing the impact spring 33. This latch is normally pressed into engagement to lock the driver in elevated position or the position shown in Fig. 1 by an extension spring 39 which has one end thereof engaging a pin 40 and the other end thereof, as shown at 41, engaging the rear bearing 37. The latch is normally moved rearwardly to disengage it from the rearwardly extending projection 35 by means of a depressible member 42 which is provided on its lower end with a bevelled or wedge shaped portion 43 which in turn is adapted to engage a corresponding bevelled collar 44 secured to the rear end of the latch member 36 by means of a pin 45. The reciprocable member 42 is reciprocally mounted in an apertured boss 46 formed on one of the casing members and has its upper end provided with an enlarged head 47 which is positioned within easy reach of the operator so that the same may be manipulated by the thumb as the handle 15 is gripped by the operator. Secured in a recess 48 on the front face of the driver member 26 by means of a screw 49 is a driver bar 50 which is preferably made of hardened steel. This driver bar 50 is adapted to reciprocate in vertically extending grooves 51 formed in the lower end of the face block 29. The drive shaft 20 is driven by a flexible shaft 52 which is secured through the medium of a collar 53 to the casing members. The flexible shaft, of course, is driven by a suitable motor.

From the above description, it will be seen that as the shaft 20 is driven in a direction to drive the worm wheel 18 in a direction indicated by the arrow that the revolving lifter arms 23 and 24 will engage the transverse bar 25 and elevate it to the full line position shown in Fig. 1, where it will be locked by the latch 36 engaging the rearwardly extending projection 35 compressing the spring 33 so that when the depressible member 42 is depressed by the thumb of the operator and the latch 36 withdrawn rearwardly, the spring 33 will force the reciprocating member 26 and driving bar 50 downwardly to sever the tack and drive the same into the work in the manner hereinafter described.

Another essential feature of my invention comprises the method of automatically feeding the next successive staple into position and the means for properly guiding the staple during the driving operation so that it is driven vertically and properly into the work. This mechanism comprises a staple supporting bar 54 which is pivoted at 55 on a pin extending transversely through the casing members. This staple supporting bar is provided with a recess 56 on the lower side thereof, in which is mounted a looped flat spring 57 which has an eye formed on one end thereof as shown at 58 and secured to the recess by means of a pin 59. The lower or free end of this looped spring 57 is adapted as shown at 60, to engage the bottom portions 61 of each of the side plates or casing members 11 and 12. The movement of the staple supporting bar 54 is limited in its upward movement by reason of the rear end of the bar contacting the bottom portion 61 of the casing members as indicated at 62. Formed on the opposite sides of the front face bar 29 are two recesses 63 which forms the guide for engaging the opposite sides 64 of the staple 65 about to be driven. These staples 65 are the conventional form of staples now in general use and are arranged in strips as illustrated in Figs. 1 and 7 of the drawings and are supported on or straddled over the staple supporting bar 54. On the movement downwardly of the staple driver 50 the lower end 66 contacts with the upper surface of the staple 65 that is in a position to be driven and depresses the bar 54 downwardly about its pivot 55 against the tension of the spring 57 from the position shown in Fig. 1 to that shown in Fig. 7, at which time the free or front end of the bar 54 contacts with the bottom 61 of the casing members as shown at 67 and on a further movement of the driver 50, the rear edge, of the drivers as shown at 68 severs the staple or tack on the forward upward edge 69 of the bar, but just previous to this severing operation the lower point 70 of the staple enters the grooves or guides 63 to prevent the staple from turning or twisting so that the same is properly driven vertically downwardly during the severing and driving operation of the staple.

Another important feature of the present invention includes a novel means and mechanism for feeding the next successive staple into position to be severed and driven in combination with the mechanism for compressing the impact spring. This mechanism comprises a novel spring actuated lever 71 which is pivoted on a shaft 72 which in turn is journaled in the side frame or casing members 11 and 12 in any well known manner. This lever is normally actuated to the position shown in Fig. 1 by a flat spring 73 which has one end thereof secured to a transverse pin 74 which in turn, is secured to the side casing members 11 and 12 in any well known manner. The free end of this spring 73 is secured in a slot

75 formed in one side of the lever 71 to normally actuate the lever to a position shown in Fig. 1. The upper end of the lever 71 is provided with a cam projection 76 which is located in the path of one of the revolving arms 24 as clearly shown in Fig. 5, so that on the initial upward stroke of the arm 24, following the downward stroke of the driver, the lever 71 is actuated to the position shown in Fig. 5 and as the arm passes the cam 76 on the lever 71, a bifurcated pawl 77 pivoted at 78 to the lower end of the lever has its free end, as shown at 79, engaging the opposite recesses, as shown at 80, between the staples 65 and on account of the tension of the flat spring 73 the next succeeding staple is moved into position for the next operation of the severing and driving of the next succeeding staple. At the same time, it will be noted that by reason of the spring 57, the staple supporting bar 54 is raised to its elevated position as shown in Fig. 1 to be in position for the next cycle of operation of severing and driving the next staple.

From the above description it will be readily seen that if the control or depressible member 47 is held depressed, that these staples may be driven continuously or if it is desirous to drive them intermittently, the pressure is relieved intermittently from the depressible member 47 and by reason of the latch 36 engaging the rearwardly projecting lug 35 on the reciprocating member 26, the continuous operation of driving the staple is interrupted without, however, interrupting the driving mechanism such as the worm wheel and drive shaft. But it will be noted that immediately on the depressing of the control member 47 a staple is driven and staples thereafter may be continuously driven while the control member is held depressed and interrupted only when the pressure is released from the control member.

From the above description, it will be seen that I have provided a novel, simplified and compact automatically actuated stapling machine which will continuously or intermittently drive tacks at the will of the operator and by reason of its lightness in weight, permits the same to be used in various positions and for manyfold purposes.

While in the above specification, I have described one embodiment which my invention may assume in practice, it will of course be understood that the same is capable of modification and that modification may be made without departing from the spirit and scope of my invention as expressed in the following claims.

What I claim as my invention and desire to secure by Letters Patent is:

1. A stapling machine comprising complementary casing frame members, a reciprocating driving and severing member mounted in said frame, a compressible spring for imparting an impact to said reciprocable member, a rotary driven member for compressing said compression spring, and means actuated by said rotary member for positioning each successive staple in the path of said reciprocable member whereby said reciprocable member may drive said staple into the work.

2. A stapling machine comprising complementary casing frame members, a reciprocable driving and severing member mounted in said frame, a compression spring mounted in said frame and engageable with said reciprocable member for imparting an impact thereto, a rotary member for compressing said compression spring, means operated by said rotary member for feeding successive staples in the path of said reciprocable member, and a lock mounted on said frame for locking said reciprocable member under spring tension.

3. A stapling machine comprising complementary casing frame members, a reciprocable driving member mounted in said frame members, a compression spring mounted in said frame and engageable with said reciprocable member for imparting an impact to said reciprocable member, a lock for locking said reciprocable member under spring tension, means for compressing said compression spring, and means operated by said first named means for feeding successive staples into the path of said reciprocable member whereby said staples may be intermittently or continuously driven into the work.

4. A stapling machine comprising complementary casing frame members, a reciprocable staple driving and severing member mounted in said frame, a compression spring for imparting the impact to said reciprocable member, power actuated means for compressing said compression spring, and means operated by said first named means for successively positioning staples into the path of said driving member whereby said driving member may drive said staples into the work.

5. A stapling machine comprising complementary casing frame members, a reciprocable member mounted in said frame, a compression spring mounted in said frame and engageable with said reciprocable driving member for imparting an impact to said driving member, rotary means adapted to move in the path of said reciprocable member for compressing said compression spring, and means mounted in the path of the said rotary member and actuated thereby for successively moving staples into the path of said reciprocable member whereby said reciprocable member may drive the staples into the work.

6. A stapling machine comprising complementary casing frame members, a reciprocable member mounted in said frame, a compression spring mounted in a socket formed in said reciprocable member having one end thereof engageable with said frame, a rotary

member having an arm thereof movable into the path of said reciprocable member for compressing said compression spring, and a lever positioned below said rotary member and located in the path of said rotary arm for feeding successive staples into the path of said reciprocable member prior to compressing said spring.

7. A stapling machine comprising a frame, a reciprocable driving member mounted in said frame, a compression spring mounted in said reciprocable member and said frame for imparting an impact in said driving member, a lock for locking said driving member under spring tension, a rotary member having arms adapted to be projected into the path of said reciprocable member for lifting said reciprocable member and pressing the same under spring tension, and a staple feeding member pivoted to said frame and adapted to be actuated by an arm of said rotary member whereby said staples are successively fed into the path of said driving member for driving said staples into the work.

8. A stapling machine comprising a frame, a reciprocable spring actuated severing and driving member mounted on said frame, power actuated means for placing said reciprocable member under spring tension, and staple supporting means movably mounted on said frame for properly positioning and guiding said staples prior to being severed and driven by said reciprocable member into the work.

9. A stapling machine comprising a frame, a reciprocable driving member mounted on said frame, means for driving said reciprocable driving member, and a staple supporting movable member mounted on said frame, there being grooves formed on the opposite sides of said frame adjacent the path of said driving member whereby, during a portion of the movement of said driving member said staple supporting member is moved to guide the staple to be driven into said grooves for properly guiding the staple into the work.

10. A stapling machine comprising a frame, a reciprocable driving member mounted on said frame, means for driving said reciprocable driving member, there being guiding grooves in the lower end of the path of said driving member for guiding the staple to be driven, and a staple supporting member movably mounted on said frame and actuated by the movement of said driving member to enter the staple to be driven into said grooves for properly driving said staple into the work.

11. A stapling machine comprising a frame, a reciprocable driving member mounted on said frame, means for driving said reciprocable member, a staple supporting member pivotally mounted on said frame and spring actuated to an elevated position, and means for successively positioning a staple, one at a time, in the path of said driving member, there being grooves formed in the lower end of the path of said reciprocating member for receiving and guiding the staple to be driven, whereby during a portion of the movement of said driving member said staple supporting member is actuated downwardly to position the staple being driven to said grooves for properly guiding said staple into the work.

12. A stapling machine comprising a frame, a reciprocable spring actuated driving member mounted on said frame, means for placing said reciprocable member under spring tension, means for feeding successive staples into the path of said driving member, a staple supporting member pivoted to said frame having its free end positioned adjacent the path of said driving member, and guiding means formed adjacent the path of said driving member, whereby the staple to be driven is moved into engagement with said guiding means by the driving member moving said staple supporting member downwardly about its pivot prior to severing and driving the staple into the work.

In testimony whereof I have signed my name to this specification, on this 29th day of April A. D. 1929.

IRVING R. METCALF.