Oct. 22, 1940. J. T. KILBRIDE 2,218,794

STAPLING MACHINE

Filed Oct. 20, 1937 2 Sheets-Sheet I

Fig. 1

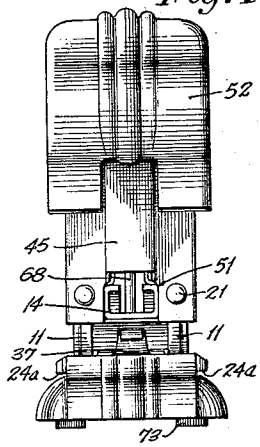


Fig. 2

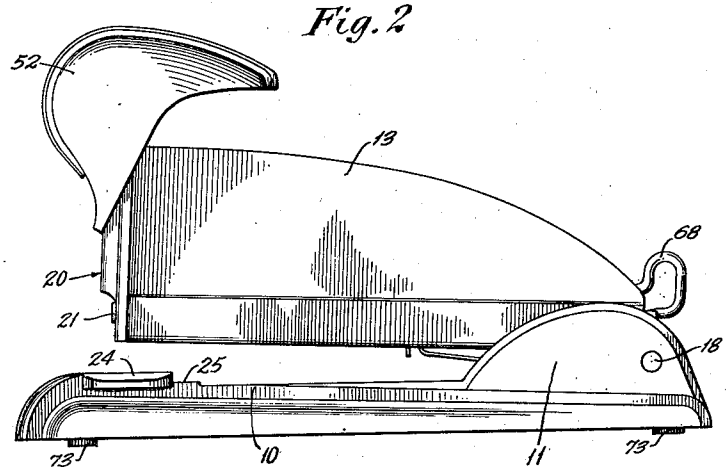


Fig. 5

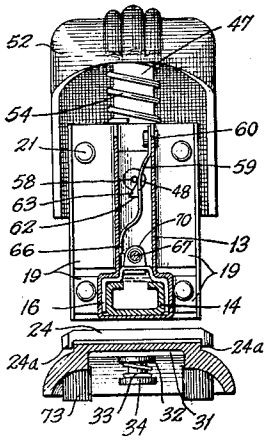


Fig. 3

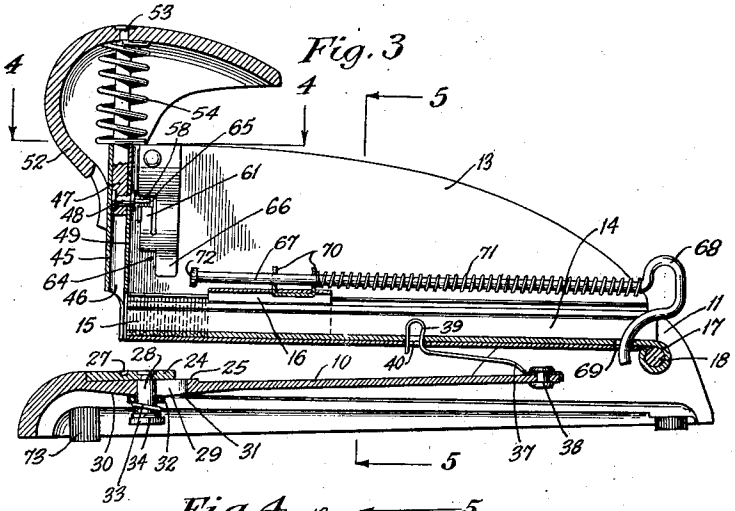


Fig. 6

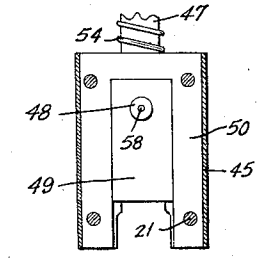
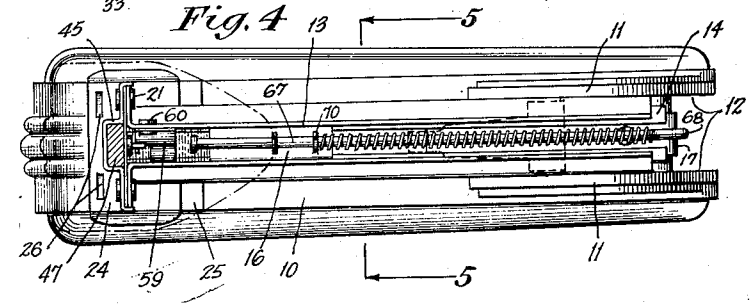


Fig. 4



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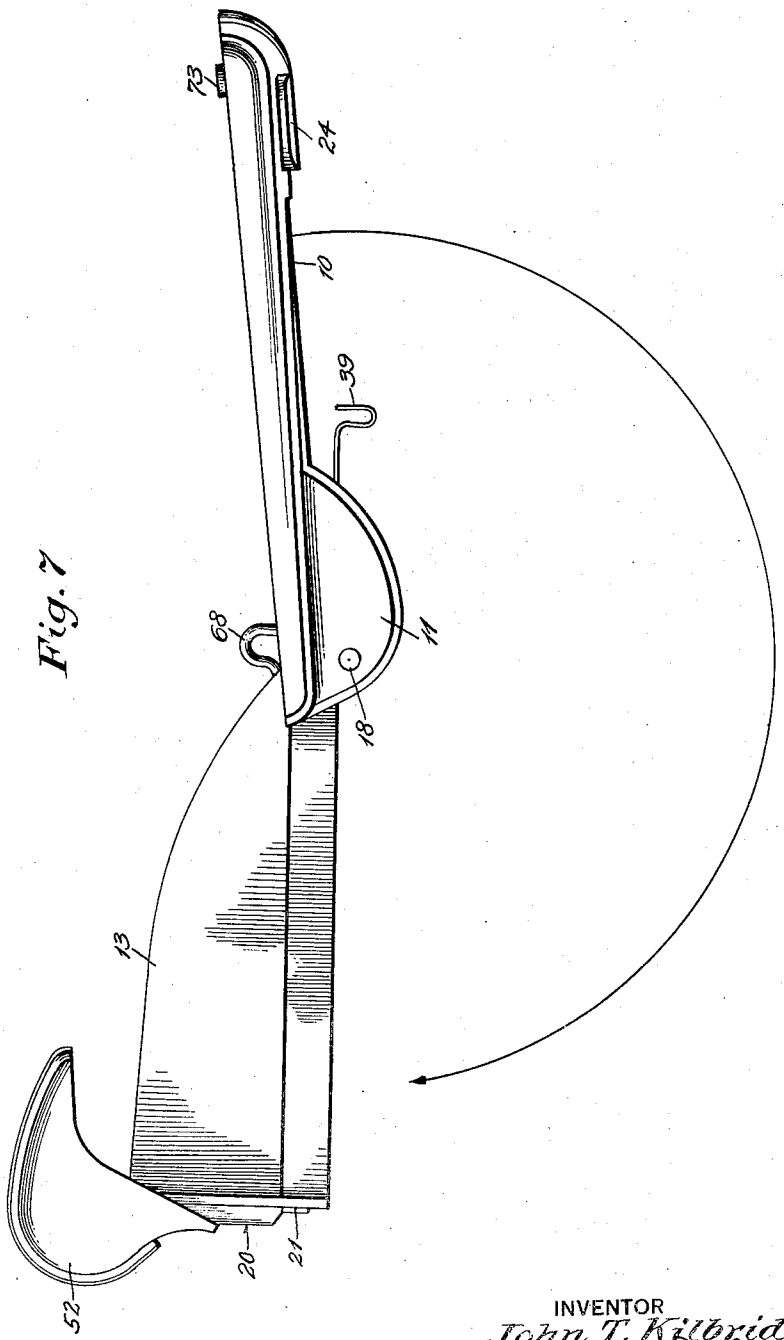


Fig. 7

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2,218,794

STAPLING MACHINE

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Application October 20, 1937, Serial No. 170,107

9 Claims. (Cl. 1—3)

The invention relates to a stapling device and particularly to that type of device which is manually operated to insert and/or clinch staples in work.

The object of the invention is to provide a device which is simple in design, reliable in operation and which can be cheaply manufactured.

Staple-driving devices of the present type are constructed and arranged so that they can be used with a staple-clinching anvil in order to bend the staples as they pass through the work or they can be used to drive the staples as a tack into the work. Many complicated mechanisms have been devised for holding the arm carrying the staple-driving mechanism normally in a position to be used with an anvil while still being releasable to be moved into a tacking position. The device of the present invention provides a very simple mechanism for accomplishing this result and one which is very effective. In the form shown, this consists of a leaf spring secured at one end to the base and having its other end in releasable latching engagement with the arm, the spring functioning both as the means for holding the arm in proper staple-driving position and also as a latch for preventing undesired movement of the arm away from the base.

The anvil, used with staple-driving devices, is usually provided with a staple-clinching face for bending the legs of the stable into permanent relation with the work and a second staple-clinching face for bending the staples into a position where they can be readily removed so that they only temporarily hold the work. The device of the present invention provides an effective means for moving and holding the anvil in either position and comprises a pair of tapered surfaces or cams formed on the underside of the base for engagement with a spring-pressed element on a stud carried by the anvil and which extends through a slot in the base.

The movable arm for carrying the staple-driving mechanism of the present invention is formed so that it provides an adequate support for the staple-driving mechanism at one end and conceals completely the staple-feeding mechanism carried by the arm, while at the same time permitting the latter to be readily accessible from the staple-replenishing operation. This arm is made by an assembling operation which greatly reduces its cost of manufacture.

The device also provides the staple-driving mechanism with a damping means for the device which controls the staple-driving plunger so that it cannot feed a second staple until the first has been completely discharged from the staple-driving mechanism, thus preventing jamming of the staples in the same. This means reduces the objectional vibrations set up in the device by the operation of the staple-driving plunger in its movement to and from staple-driving position.

The operating handle for the staple-driving mechanism, according to the present invention, is secured to the top of the staple-driving plunger and extends over the face of the staple-driving mechanism and back and around said mechanism so as to substantially enclose the same and protect it from dust and damage.

The elements of the device are made almost entirely from sheet metal stampings which can be readily assembled. Because of this, the cost of manufacture, which is an item of great importance in devices of this type, is greatly reduced.

Other feaures and advantages of the invention will be apparent from the specification taken in connection with the drawings, in which:

Figure 1 is a front view of the device.

Fig. 2 is a side elevation of the device.

Fig. 3 is a longitudinal section of the device.

Fig. 4 is a section of the device taken along line 4—4 of Fig. 3.

Fig. 5 is a section of the device taken along line 5—5 of Figs. 3 and 4.

Fig. 6 is a detail sectional view showing the spacer plate and its relation to the staple-driving blade.

Fig. 7 is a view showing the machine with its base swung back to adapt the device to be used as a tacker.

According to the present invention, the base is formed with a raised platform 10 and has a pair of ears or bearings 11 formed at the rear thereof. The platform has a portion of the base cut out between the bearings, as shown at 12 in Fig. 4, for a purpose to be later described.

The movable arm of the device is formed of a pair of nested channels. The outer channel 13 is T-shaped in cross-section and has an inner C-shaped channel 14 nested and secured by welding or the like within the head of the T. The two channels are of such a shape as to form a channel between them in the head of the T for receiving and supporting a strip of staples 15 and a staple contactor 16 of the staple-feeding mechanism, to be later described, which engages the back end of the strip of staples and feeds them into position to be engaged by the staple-driving mechanism. The inner or C-shaped channel extends beyond the back of the T-shaped

channel so that its upper surface forms a guide surface whereby the staples can be readily inserted into the space between the channels. This end of the inner channel is also provided with a hinge 17 for engaging a hinge pin 18 extending between the ears 11. The hinge 17 may be formed integrally with the channel or may be formed separately and secured thereto by rivets, spot welding or any suitable means.

The forward end of the T-shaped channel is provided with a plurality of out-turned flanges 19 to which is secured a staple-driving mechanism 20 by any desired means such as welding, riveting or the like. It is herein shown as connected by rivets 21.

The two channels are formed of sheet metal and each can be made of a single stamping or of a plurality of stampings which can be readily assembled and welded or otherwise secured.

A staple-clinching anvil 24 is mounted below the staple-driving mechanism on a bearing surface 25 on the base for longitudinal sliding movement. The anvil is provided with a plurality of clinching faces, the clinching face indicated at 26 will turn the legs of the staple outwardly so that the staples can be readily removed and therefore only temporarily securing the work. The clinching face 27 will turn the legs inwardly in order to more permanently secure the staples in place in the work. The anvil is slidable on the base so that either of the clinching faces can be shifted to a position to cooperate with the staple-driving mechanism and is prevented from rotating on the base to disalign the clinching faces and the staple-driving mechanism by flanges 24a which engage the sides of the base as shown in Fig. 5.

In order that the anvil can be shifted on the base and held in adjusted position, a stud 28 is secured thereto so as to extend through a slot 29 formed in the base When the stud is at either end of the slot, one set of clinching faces will be in proper position for coaction with the staple-driving mechanism.

The undersurface of the base is provided with a means for holding the stud in engagement with the ends of the slot. In the present instance it comprises a pair of cam surfaces 30, 31 which slope away from an apex formed at the mid-point of the longitudinal slot. A washer 32 is slidably mounted on the stud 28 and a coil spring 33 slipped over the stud and the end of the stud headed over as at 34. This spring will force the washer into engagement with the undersurface of the base and will pull the anvil into firm relation with the bearing surface on the base. The washer will also engage the cam surfaces and will hold the anvil in either of its operative positions and will operate to make the movement of the anvil, after passing the mid-point of the slot, easier so that the anvil will, in normal operation, move quickly to the end of the slot. When the anvil has been moved to either end of the slot, the cam surface will hold the anvil in position against casual movement so that the anvil will always be in proper position to cooperate with the staple-driving mechanism. The stud is of sufficient length that it forms a handle by which the anvil can be readily manipulated.

The movable arm of the present invention, which carries the staple-driving mechanism, is normally held in raised position and when put in operation is moved about the pivot into work-engaging position at which time the staple-driving mechanism will drive the staple through the work. The arm is also restrained from free movement away from the base. A novel means, requiring but a single element, has been arranged for accomplishing these results. This comprises a leaf spring bent in the manner shown in Fig. 3. One end of the spring 37 is secured to the base by a rivet 38 or any other means. The other end of the spring is formed so as to be releasably connected to the arm so that it normally holds the arm in raised position above the base and also holds it against free movement about its pivot in a direction away from the base.

When it is desired to use the staple-driving mechanism, however, as a tacking device to drive the staples into a board or other work, the connection between the spring and the arm is released so that the arm can be moved away from the base to a position where it can be placed directly in contact with the work. The cut-out portion 12 of the base will permit the arm to pivot so that the base will not interfere with the mechanism during the tacking operation.

The releasable connection may take any form which will releasably grip the arm. The form shown comprises a U-shaped loop 39 formed on the end of the leaf spring and adapted to be received in an aperture 40 in the bottom of the arm and be held therein by the resiliency of the spring. To release the connection between the spring and the arm to enable the arm to be moved away from the base, it is merely necessary to pull up on the arm to overcome the grip of the U-shaped loop on the edges of the aperture in the arm. This grip will be readily overcome upon movement of the arm away from the base before any damage can be done to the spring. In other words, because of its self-releasing properties, it affords a protection to the spring against possible misuse by the user.

After the device has been used for a tacking operation, the arm can be moved back into its normal position and the loop, which is self-engaging, will be received into the opening and releasably lock the arm thereto without any attention from the user.

The staple-driving mechanism of the present invention comprises a face plate 45 of sheet metal having an outwardly-extending channel 46 in which is slidably mounted a plunger 47. The plunger 47 has a staple-driving blade 49 secured thereto by a rivet 48. A U-shaped spacer plate 50 of sheet metal, at least as thick as the thickness of the blade 49, is secured to the face plate with the bow of the U extending across the upper end of the staple-driving blade as shown in Fig. 6, so as to form an effective stop for the blade during upward movement. The face plate and spacer plate are secured to the outwardly-extending flanges 19 of the T-shaped channel by welding, riveting or otherwise and securely hold the head in place. The lower surface of the face plate is provided with an opening 51 whereby the work can be seen so that the staples can be accurately driven. The opening is not wider than the inner channel 14 so that the face plate will extend over the channel formed in the arm to receive the staples and will form an effective stop against which the staples are pressed by the staple-feed mechanism, so that they will be positioned under the staple-driving blade carried by the head.

A handle 52, which extends over the face plate and back end over the arm to cover the staple-driving mechanism, is provided with an opening into which a reduced end 53 of the plunger 47 is

positioned and heated over. A spring 64 is interposed between the head and the upper surface of the face plate and arm, as shown in Fig. 3, and normally holds the plunger in raised position.

The staple-driving mechanism is provided with a means for preventing the plunger from permitting a second staple to feed into staple-driving position until the staple already in position has been discharged from the device. This will prevent jamming of the staples in the staple-driving mechanism. This means, according to the present invention, includes the projection or pin 58 formed on the rivet 48 which secures the blade and plunger together. This pin extends into the space between the side walls of the channel 13. A spring 59 is secured to one wall of the channel by rivets 60 and is bent to extend diagonally across the channel as shown in Fig. 5, with the mid-portion of the spring extending in a plane parallel to the movement of the pin when the plunger is operated to drive a staple into the work. The mid-portion of this spring has an arm 61 formed therein by slitting and cutting out the spring 59 in the manner shown in Fig. 3. A latch 62, having its upper surface provided with a cam 63, is formed on the upper end of the spring arm 61, so as to be positioned in the path of movement of the pin. Movement of the pin downwardly during movement of the plunger into staple-driving position causes the pin to engage the cam surface 63 and flex the arm 61 until the pin passes the edge of the latch 62, at which time the arm moves the latch into its normal position so that it extends over the pin. The plunger, when moved to this extent, will have engaged a staple and moved it out of the staple-receiving channel toward the work. The latch will prevent the plunger from moving back to engage another staple until the first staple has been expelled from the staple-driving device. As the plunger completes its downward stroke, the pin will pass into the cut-out portion 64 of the spring and upon its return movement will engage the curved undersurface of the spring 59 and will flex the arm 61 to the left in Fig. 5, until it has passed into the opening 65 at which time the arm 61 will spring back in place.

Due to operation of the pin on the plunger in flexing the arm 61, objectionable vibrations are set up in the spring. To reduce these objectionable vibrations to a minimum, the end of the spring 59 has been provided with a tail portion 66, which engages the other side wall of the channel and is held thereagainst by the resiliency of the spring. This tail, acting on the side wall, effectively damps out the vibrations set up in the spring during operation.

The staples are fed toward the forward end of the arm and into engagement with the face plate by means of the staple contactor engaging the back end of the staples. The staple which is moved in contact with the face plate will be disposed under the staple-driving blade, and, upon the operation of the staple-driving mechanism, the blade will engage the staple and force it to work. The mechanism for feeding the staples includes a guide 67 having a curved end 68 forming an abutment at that end, and a tail piece adapted to fit in an opening 69 in the arm. The staple contactor is provided with a pair of upwardly-extending legs 70, which are apertured to receive and slide on the guide 67. These legs can be formed on the contactor in any convenient manner, as by stamping out or by welding them in place. A coil spring 71, disposed about the guide 67, and abutting against the bent tail end 68 and the leg 70 on the staple contactor, normally moves the staple contactor into engagement with the back end of the staples. The staple contactor is prevented from sliding off the rod by heading over the end of the rod 67 as shown at 72.

If desired, the base can be mounted on a plurality of rubber feet 73 so that the metal of the device will not come in contact with the desk or other surface upon which the device is used.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. In a stapling device, the combination of a base; an anvil slidable on a bearing on the base and provided with a plurality of clinching faces of dissimilar arrangement; a stud secured to the anvil, the base being provided with a longitudinal slot through which the stud projects and having a pair of tapered cam surfaces sloping away from the center of the slot toward the ends thereof; and means surrounding the stud and bearing against the undersurface of the base for cooperating with the cam surfaces and holding the anvil in one of its adjusted positions.

2. In a stapling machine, a base having a staple-clinching anvil; an arm pivoted at its rear end to the rear end of the base; staple-driving mechanism positioned at the forward end of the arm to be disposed over the staple-clinching anvil; and a leaf spring secured to the base at one end and detachably secured at its other end to the arm for restraining pivotal movement of the arm away from the base but permitting the arm to be pivotally moved away from the same to assume a position substantially coplanar with said base upon the end being detached from said arm, said spring normally holding the arm out of work-engaging position but permitting it to move into work-engaging position upon pressure on the staple-driving mechanism.

3. In a stapling machine, a base having a staple-clinching anvil; an arm pivoted at its rear end to the rear end of the base; staple-driving mechanism positioned at the forward end of the arm to be disposed over the staple-clinching anvil; and a leaf spring secured to the base at one end and having a spring catch formed integral with the other end for detachably engaging the arm.

4. In a stapling machine, a base having a staple-clinching anvil thereon; an arm pivoted to the base; staple-driving mechanism mounted on the arm so as to be disposed over the anvil, said staple-driving mechanism including a staple-driving plunger having a projection thereon; and resilient means for preventing the staple-driving plunger from returning to normal position until after it has completed a full stroke, said last-named means comprising a ratchet and means for damping vibrations of said resilient means produced by displacement of the latter from its normal position by movement of the plunger.

5. In a stapling machine, a base; an arm pivoted at its rear end to the rear end of the base and having an aperture in the bottom thereof intermediate its ends; a staple-driving mechanism positioned at the forward end of the arm; and a leaf spring secured at one end to the base and having a spring catch formed integral with the other end adapted to be received by the aperture in the arm thereby restraining the arm from

free movement about its pivot away from the base.

6. In a stapling machine, a staple-driving mechanism including a staple-driving plunger having a projection thereon; and means cooperable with said projection for preventing the plunger from returning to normal position until it has completed a full stroke including a resiliently mounted latch positioned in the path of the projection, said means being secured at one end and having the other end in engagement with a part of the machine in order to damp vibrations set up in the means by the resilient latch upon movement of the plunger.

7. In a stapling device, the combination of a base; an anvil slidable on a bearing on the base and provided with a plurality of clinching faces of dissimilar arrangement; a stud secured to the anvil, the base being provided with a longitudinal slot through which the stud projects and having a pair of tapered cam surfaces sloping away from the center of the slot toward the ends thereof, and means surrounding the stud and bearing against the undersurface of the base for cooperating with the cam surfaces and holding the anvil in one of its adjusted positions; a pair of ears formed integrally on the base; an arm pivotally mounted between said ears and comprising a T-shaped outer channel and a C-shaped inner channel nested in the head of the T and extending beyond the rear end of the T-shaped channel and having a hinge thereon for receiving a pivot; staple-driving mechanism at the other end of the arm comprising a staple-driving plunger; and means for preventing operation of the plunger to return it to raised position until a full stroke has been made.

8. In a stapling machine, a base; an arm pivotally mounted on the base, said arm comprising a channel of substantial height at its forward end; a staple-driving mechanism secured to the forward end and including a staple-driving plunger having a projection extending into the space between the walls of the channel; a resilient element secured to one wall of the channel and extending diagonally across the path of movement of the projection and having its other end in frictional contact with the other wall of the channel to damp vibrations caused by the displacement of the resilient element from the normal position thereof by the driving movement of said plunger.

9. In a stapling machine, a base; an arm pivoted at its rear end to the rear end of the base and adapted to be moved into either a staple-driving position or a tacking position, the arm having an aperture in the bottom thereof intermediate its ends; a staple-driving mechanism positioned at the forward end of the arm; and a leaf spring secured at one end to the base and having the other end thereof formed into a resilient loop which is adapted to be received by the aperture in the arm to thereby restrain the arm from free movement about its pivot away from the base but capable of being released from the arm whereby the arm can be moved into tacking position.

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