Aug. 1, 1944. C. M. LINDSTROM 2,354,760

FASTENER-APPLYING IMPLEMENT

Filed Nov. 25, 1941 2 Sheets-Sheet 1

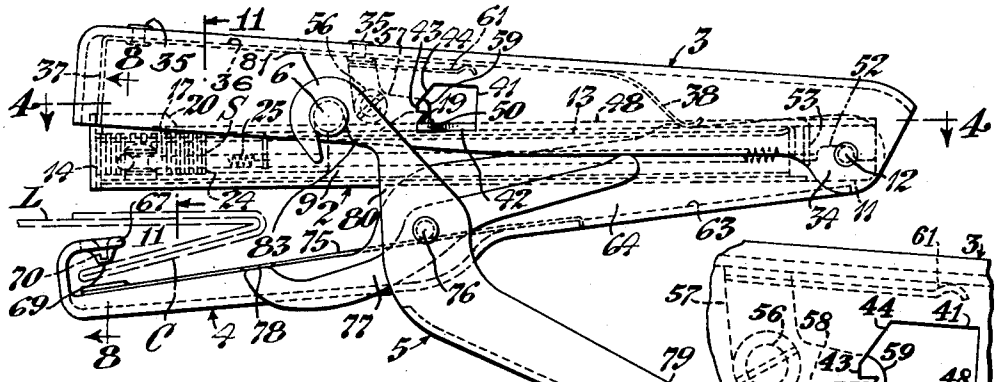


Fig. 1.

Fig. 12

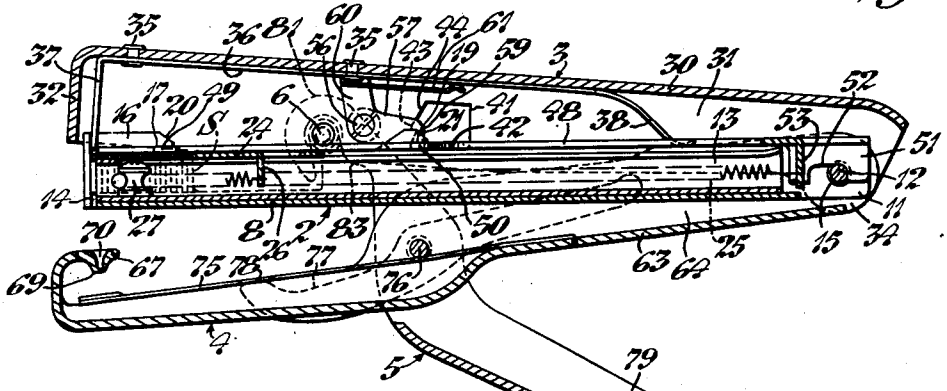


Fig. 2.

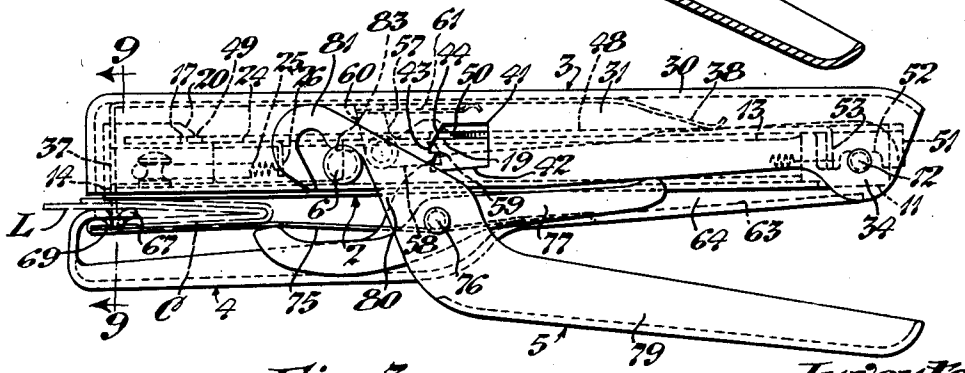


Fig. 3.

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FASTENER-APPLYING IMPLEMENT

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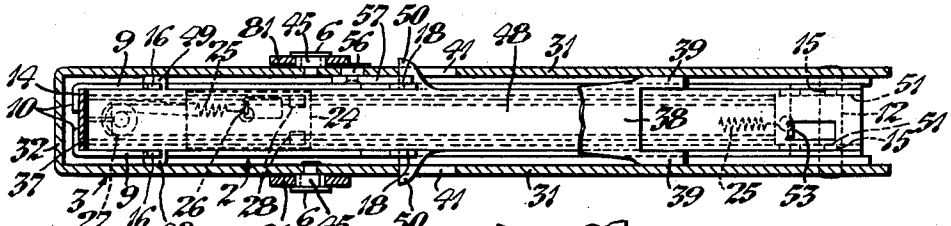


Fig. 4.

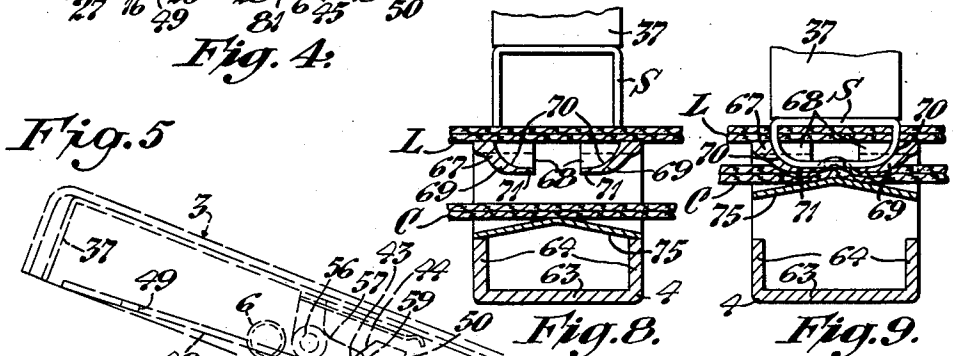


Fig. 5

Fig. 8.

Fig. 9.

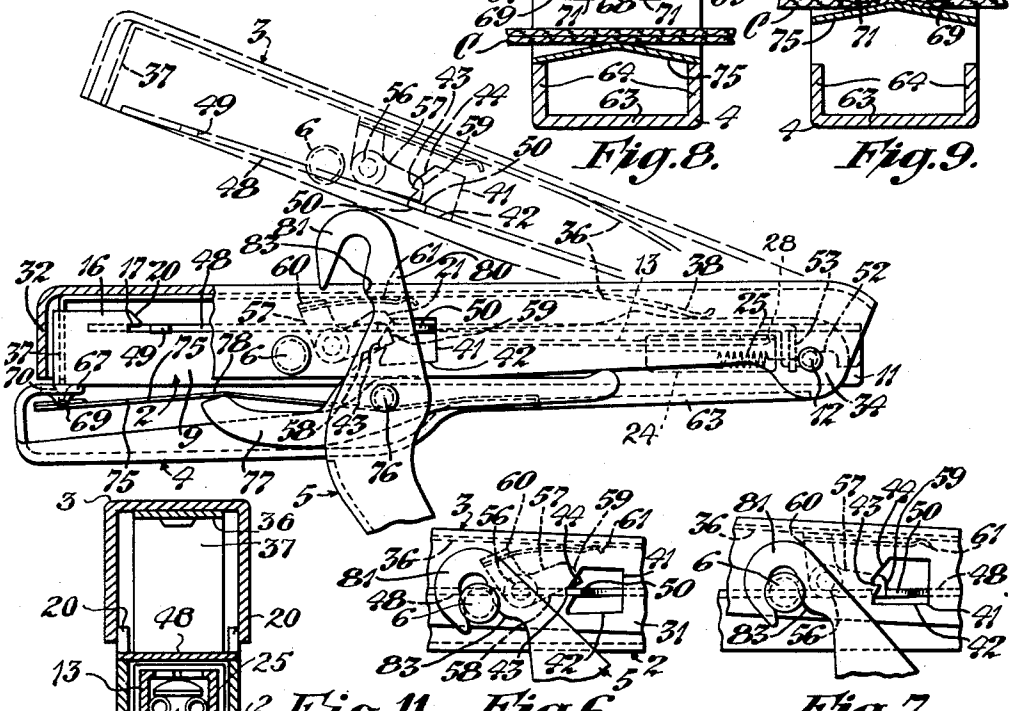


Fig. 11

Fig. 6.

Fig. 7.

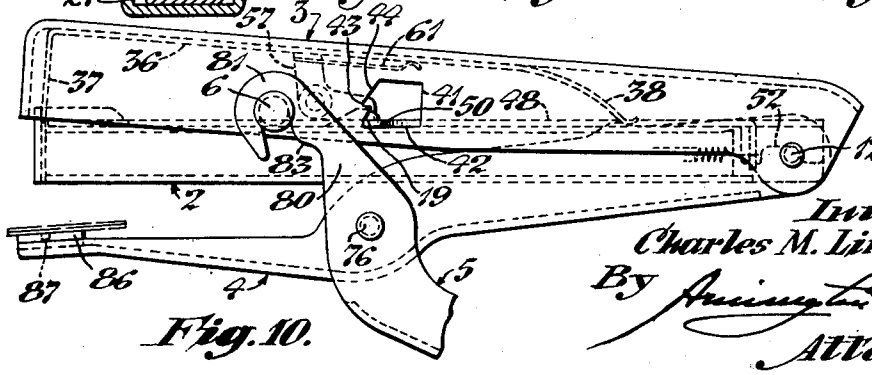


Fig. 10.

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UNITED STATES PATENT OFFICE

2,354,760

FASTENER-APPLYING IMPLEMENT

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Application November 25, 1941, Serial No. 420,400

17 Claims. (Cl. 1—49)

The present invention relates to fastener-applying implements and more particularly to plier-type implements adapted to be held and operated in one hand.

One of the objects of the present invention is to provide an implement of the type indicated having a magazine with an open side through which fasteners may be supplied and a fastener-applying arm movable toward the magazine to drive fasteners therefrom and away from the magazine to open the latter to receive a supply of fasteners through its open side.

Another object is to provide an implement of the type indicated with a fastener-applying arm at one side of the magazine and a clinching arm at the opposite side thereof.

Another object is to provide an implement of the type indicated with power-multiplying means for simultaneously operating the arms toward the magazine with a progressively increasing applied force to drive and clinch the fasteners.

Another object is to provide an implement of the type indicated in which a lever is rockable in one direction to operate the implement to drive and clinch fasteners and in the opposite direction to release the fastener-applying arm to permit it to be swung away from the magazine to open the latter.

Another object is to provide an implement of the type indicated with a plate overlying the fasteners in the magazine to prevent their upward movement therein.

Another object is to provide an implement of the type indicated in which the plate interlocks with the magazine and fastener-applying arm to limit their relative movement away from each other while permitting their movement toward each other to drive the fasteners.

Another object is to provide an implement of the type indicated in which the plate and fastener-applying arm cooperate to prevent a return stroke of the arm with respect to the magazine until a driving stroke is completed.

Another object is to provide an implement of the type indicated with an anvil for causing the legs of a fastener to penetrate certain of the laminations of a plurality thereof without penetrating other laminations to connect them with a blind stitch.

Still another object is to provide an implement of the type indicated which is reliable in operation and of simple and compact construction to adapt it for economical manufacture.

Further objects of the invention are set forth in the following specification which describes a preferred form of implement, by way of example, as illustrated by the accompanying drawings. In the drawings:

Fig. 1 is a side elevational view of a fastener-applying implement incorporating the novel features of the present invention and showing the manually-operable lever pivotally mounted on the clinching arm with its hook-shaped end engaging an abutment on the fastener-applying arm;

Fig. 2 is a longitudinal sectional view of the implement showing the spring for normally holding the fastener-applying and clinching arms in spaced relation to the magazine;

Fig. 3 is a view similar to Fig. 1 showing the fastener-applying and clinching arms as actuated toward the magazine by the manually-operable lever to drive and clinch a fastener;

Fig. 4 is a sectional plan view taken on line 4—4 of Fig. 1 showing the plate overlying the fasteners in the magazine and the laterally-extending lugs on the plate which interlock with the magazine and fastener-applying arm;

Fig. 5 is a view similar to Fig. 3 showing the manually-operable lever as rocked in clockwise direction to release its hooked end from engagement with the fastener-applying arm and to slide the plate to disengage its lugs from interlocking engagement with the magazine;

Fig. 6 is a detailed view of a portion of the implement showing one of the lugs on the plate in engagement with a notch on the fastener-applying arm to prevent a return stroke of the latter until a driving stroke is completed;

Fig. 7 is a view similar to Fig. 6 showing the pawl overlying the notch on the fastener-applying arm and the lug on the plate as riding over the pawl during the return stroke of the arm;

Fig. 8 is an enlarged transverse sectional view taken on line 8—8 of Fig. 1 showing the position of the work on the anvil during a fastener-applying operation;

Fig. 9 is an enlarged transverse sectional view on line 9—9 of Fig. 3 showing the manner in which a fastener is driven and clinched in the work;

Fig. 10 is a side elevational view of an implement having a modified form of clinching arm;

Fig. 11 is a transverse sectional view taken on line 11—11 of Fig. 1; and

Fig. 12 is an enlarged detailed view of the full-stroke mechanism illustrated in Fig. 1.

In Figs. 1 to 9 of the drawings the invention is shown applied to an implement of a type gen-

erally similar to that illustrated and described in United States Letters Patent to Peter O. Germain, No. 2,218,934, issued October 22, 1940, for attaching the cuff to the leg portion of trousers. In general, the implement comprises a magazine 2 in the form of an arm, a fastener-applying arm 3 at one side of the magazine, a clinching arm 4 at the opposite side of the magazine, and a manually-operable force-multiplying lever 5 pivotally mounted on one of the arms and operatively engageable with the opposite arm. In the present illustrated embodiment of the invention the manually-operable lever 5 is pivotally mounted on the clinching arm 4 and engages an abutment or abutments 6 on the fastener-applying arm 3, see Fig. 1.

The magazine 2 is of channel-shape having a bottom wall 8 and parallel side walls 9 extending upwardly at opposite side of the bottom wall. The forward ends of the side walls 9 project beyond the bottom wall 8 of the magazine and are folded inwardly toward each other at right-angles to the side walls to provide a front wall 10, see Fig. 4. At the rearward end of the magazine 2 the side walls 9 project beyond the bottom wall 8 to provide ears 11 which are pierced to receive a pivot-pin 12. The pivot-pin 12 extends across the magazine 2 with its ends projecting laterally beyond the side walls 9 and has peripheral grooves 15 adjacent the inside faces of the side walls, see Figs. 2 and 4.

Mounted in the magazine 2 is a channel-shaped core 13 having side walls spaced inwardly from the side walls 9 of the magazine. The bottom wall of the core 13 is attached to the bottom wall 8 of the magazine 2 by rivets, welding, or like means and the forward end of the core is spaced from the front wall 10 of the magazine to provide a throat 14 therebetween through which the fasteners are driven. The upper edges of the side walls 9 of the magazine 2 extend parallel to the bottom wall 8 throughout the greater portion of their length and the upper edges of the core 13 are preferably positioned below the upper edges of the magazine side walls. Adjacent the forward end of the magazine 2 the side walls 9 have upstanding flanges 16 which are undercut or slotted in alinement with the top edge of the walls to provide spaced notches 17, see Figs. 4 and 5. Intermediate the ends of the magazine 2 similar flanges 18 and notches 19 are provided. The upper edges of the pairs of the flanges 16 and 18 overlying the notches 17 and 19 are inclined rearwardly to provide cam-faces 20 and 21, respectively.

The fasteners are herein illustrated in the form of U-shaped staples S which are inserted into the magazine through its open top and supported in straddled relationship on the core 13 with their legs positioned between the side walls of the magazine and core. It will be understood, however, that other forms of fasteners may be used in the implement and, preferably, the staples S are provided with arched crowns or crossbars to facilitate their removal from the work. The staples S are automatically advanced along the magazine 2 by means of a pusher 24 of inverted U-shape which straddles the core 13. The pusher 24 is adapted to be yieldingly advanced by means of a coil-spring 25, see Fig. 2, having one end attached to a lug 26 depending from the pusher. The spring 25 extends forwardly from the pusher 24 and around a post 27 projecting upwardly from the bottom of the core 13 adjacent its forward end, the spring being stretched rearwardly along the core between its side walls. The top wall of the pusher 24 is provided with apertures 28, see Fig. 4, at its rearward end for engagement with the rearward corners of the side walls of the core 13 for latching it in retracted position.

The fastener-applying arm 3 is of inverted channel-shape having an upper wall 30 and depending side walls 31, with the forward end of the upper wall folded downwardly against the ends of the side walls 31 to provide a front wall 32. The rearward portion of the upper wall 30 is rounded or arched to adapt it to fit the palm of the hand and provide for gripping it therein. The side walls 31 of the arm 3 are suitably spaced to adapt them to straddle the side walls 9 of the magazine 2 to telescope thereover and at their rearward ends the side walls are provided with depending flanges 34 which are pierced to receive the projecting ends of the pivot-pin 12. Thus the magazine 2 and fastener-driving arm 3 are mounted for relative telescopic movement, one within the other.

Mounted on the under side of the upper wall 30 of the fastener-applying arm 3 is a resilient sheet-metal strip 36 having its forward end bent at right-angles to provide a staple-driver 37, its rearward end being curved downwardly toward the magazine 2 to form a leaf-spring 38. The element 36 is attached to the upper wall 30 of the fastener-applying lever 3 by rivets 35 or by other suitable means. The end of the rearwardly and downwardly extending leaf-spring portion 38 of the resilient element 36 is bifurcated to provide depending spaced fingers 39, see Fig. 4, adapted to bear against the upper edges of the opposite side walls 9 of the magazine 2 as shown in Fig. 5, whereby the spring normally maintains the fastener-applying arm 3 raised in spaced relation to the magazine while being adapted to yield to permit relative telescoping movement of the magazine and arm to reciprocate the driver 37 in the throat 14, see Fig. 3.

The side walls 31 of the fastener-applying arm 3 are provided with alined apertures 41, each having a bottom edge 42, a detent-notch 43 in its forward edge intermediate the top and bottom of the aperture and a cam-face 44 inclined rearwardly from the notch to the upper edge thereof. Forwardly of the apertures 41 the side walls 31 mount the laterally-projecting studs or abutments 6 on which sleeves or bushings 45 are rotatably mounted, see Fig. 4.

In accordance with the present invention a metal strip or plate 48 is mounted for longitudinal sliding movement between the fastener-applying arm 3 and the magazine 2, the rearward end of the plate being positioned between the bifurcated fingers 39 depending from the leaf-spring 38. The plate 48 has a pair of lugs 49 projecting laterally from its opposite sides adjacent its forward end and similar lugs 50 intermediate its ends which project through the apertures 41 in the side walls 31 of the fastener-applying arm 3. The plate 48 is adapted to overlie the open top of the magazine 2 with the laterally-projecting lugs 49 and 50 resting on the upper edges of its side walls 9 to hold the staples S seated on the core 13. At the rearward end of the plate 48 are depending spaced flanges 51, see Fig. 2, having elongate slots 52 in their lower edges which overlie the pivot-pin 12 to adapt the plate for sliding movement thereon. Between the depending flanges 51 at the rearward end of the plate 48 is a depending finger 53 to which the rearward end of the coil-spring 25 is con-

nected so that the spring functions to advance the pusher 24 and also to yieldingly slide the plate 48 forwardly. The lugs 49 and 50 projecting laterally from the plate 48 are adapted to interlock with the notches 17 and 18 in the side walls 9 of the magazine 2, see Figs. 1 and 2; while the lugs 50 project through the apertures 41 in the side walls 31 of the fastener-applying arm 3 and engage the bottom edges 42 thereof to limit the relative movement of the fastener-applying arm away from the magazine. The aperture 41, however, are of suitable dimension to permit movement of the fastener-applying arm 3 toward the magazine 2 and plate 48 interlocked therewith to drive the staples S from the magazine into the work.

The forward edges of the laterally-projecting lugs 50 on the plate 48 also cooperate with the notches 43 in the forward edges of the apertures 41 to prevent a return stroke of the fastener-applying arm 3 until a full driving stroke has been completed. Cooperating with the forward edges of one of the apertures 41 is a pawl 57, see Figs. 2, 5, 6 and 7, having a straight lower edge 58 and a rounded edge or cam-face 59, the forward end of the pawl projecting beyond the edge of the notch 43, see Fig. 12. The pawl 57 is pivotally mounted on a stud 56 projecting inwardly from one of the side walls 31 of the fastener-applying arm 3. The pawl 57 is in the form of a bell-crank having an upright arm 60 engageable with the under side of the upper wall 30 of the fastener-applying arm 3 to limit its rocking movement in clockwise direction and position its lower edge 58 in spaced relation to the lower edge 42 of the aperture 41, see Fig. 7. The end of the arm 60 is normally held in engagement with the upper wall 30 of the fastener-applying arm 3 by a leaf-spring 61 on said arm which bears against the under side of the leaf-spring 36 and is yieldable to permit rocking movement of the pawl 57 in a counterclockwise direction as indicated in Fig. 6.

The clinching arm 4 is of channel-shape having a bottom wall 63 and upstanding side walls 64 suitably spaced to adapt them to fit between the side walls 31 of the fastener-driving arm and the side walls 9 of the magazine 2. The side walls 64 of the clinching arm 4 project rearwardly beyond the bottom wall 63 and are pierced to receive the pivot-pin 12. Thus, the fastener-applying arm 3 and clinching arm 4 are pivotally connected to the magazine 2 by the pivot-pin 12 for relative movement toward and away from the magazine, the pin 12 being held in place by the engagement of the edges of the flanges 51 depending from the plate 48 with the grooves 15 therein, see Fig. 2. The clinching arm 4 is normally held in spaced relation to the magazine by the engagement of the upper edges of its side walls 64 with the ends of the fingers 39 depending from the leaf-spring 38.

The clinching arm 4 is slightly offset downwardly intermediate its ends and the bottom wall 63 extends forwardly beyond the side walls 64 and is folded upwardly and rearwardly to provide a clinching anvil 67 underlying the throat 14 in the magazine 2. The anvil 67 is slotted centrally to provide spaced prongs 68, see Figs. 8 and 9, generally similar to the anvil illustrated in the Germain patent, referred to above. The anvil 67 is distinguished from the anvil disclosed in the Germain patent in that the material of the prongs 68 is struck downwardly therefrom to provide protuberances 69 depending from the bottom of the prongs with clinching grooves 70 formed in the upper faces of the prongs and continued downwardly into the protuberances. The clinching grooves 70 are gradually curved downwardly from the upper faces of the prongs 68 and then inwardly toward each other in a plane parallel to the upper faces thereof with a very thin wall 71 between the bottom of the clinching groove and the bottom of the protuberances 69.

Fastened at its rearward end to the bottom wall 63 of the clinching arm 4 is a presser-bar 75 in the form of a leaf-spring which is arched laterally at its forward end as shown in Figs. 8 and 9. Pivotally mounted on the projecting ends of a pin 76 extending through the side walls 64 of the clinching arm 4 are two levers 77 arranged with their rearward ends adapted to be engaged by the bottom edges of the side walls 31 of the fastener-applying lever 3 and with their forward ends underlying lugs 78 projecting laterally from the presser-bar 75, see Figs. 1 and 5.

The force-multiplying lever 5 has a relatively long finger-grip portion 79 extended in a pair of curved bifurcations or arms 80 adapted to straddle the clinching arm 4. The arms 80 are pierced intermediate their ends to receive the ends of the pin 76 on which the operating levers 77 for the presser-bar are mounted. The outer extremities of the arms 80 of the force-multiplying lever 5 are slotted to provide hook-shaped ends 81 engageable with the sleeves 45 on the abutments or pins 6. The force-multiplying lever 5 is thus pivotally mounted on one arm 4 and operatively connected to the opposite arm 3 whereby movement of the lever acts to simultaneously swing the arms toward the magazine 2 to drive and clinch a staple S. Adjacent the hooked ends 81 of the arms 80 of the lever 5 are curved cam-faces 83 for engaging the sleeves 45 on the abutments 6 for first swinging the arms toward the magazine at relatively high velocity and thereafter operating the arms toward the magazine with less velocity and an increased applied force. As the cam-faces 83 are continuously curved they move the arms toward the magazine with a gradually increasing applied force. One form of the implement having been described in detail its mode of operation is explained as follows.

As stated above, the fastener-applying implement illustrated in Figs. 1 to 9 of the present drawings is particularly adapted for attaching the cuff C to the leg portions L of trousers with a blind stitch. To this end the work is applied to the implement in the manner illustrated in Fig. 1 with the leg portion L of the trousers, represented by dash lines, overlying the upper faces of the anvil prongs 68 and the cuff portion C positioned between the prongs and the forward end of the presser-bar 75. The implement is then operated to drive a staple S through the leg portion L of the trousers and into the cuff C by rocking the force-multiplying lever 5 in a counterclockwise direction from the position illustrated in Fig. 1 to that illustrated in Fig. 3.

Upon rocking movement of the force-multiplying lever 5 the curved cam-faces 83 on its arms 80 are moved relatively of the sleeves 45 on the abutments 6 projecting laterally from the fastener-applying arm 3. Such rocking movement of the lever 5 causes the abutments 6 and pivot-pin 76 for the lever to move toward each other whereby to simultaneously rock the fastener-applying arm 3 and clinching arm 4 toward the magazine 2. Due to the peculiar form of the cam-faces 83

the fastener-applying arm 3 and clinching arm 4 move toward each other at relatively high velocity at the beginning of the fastener-applying operation and thereafter move toward each other at a lesser velocity but with an increased applied force. As the cam-faces 83 are continually curved the fastener-applying arm 3 and clinching arm 4 are operated toward each other with a progressively increasing applied force.

The first movement of the force-multiplying lever 5 rocks the clinching arm 4 toward the bottom of the magazine 2 to position the anvil 67 adjacent the throat 14 and moves the fastener-applying arm 3 toward the magazine to reciprocate the driver 37 through the throat 14 to drive a staple S therefrom. Simultaneously with the movement of the fastener-applying arm 3 and clinching arm 4 toward the magazine 2, the bottom edges of the side walls 31 of the fastener-applying arm 3 engage the rearward ends of the lever arms 77 to rock them on the pivot-pin 76 and thereby raise the presser-bar 75 to engage its forward end with the cuff C and press it toward the under side of the anvil 67. Due to the pressure applied by the forward end of the presser-bar 75 on the cuff C of the trouser-leg L the cuff is compressed at the protuberances 69 prior to driving the staple in the manner illustrated in Fig. 9 to cause the inner layer or lamination of the cuff to project into the opening between the spaced prongs 68 of the anvil 67.

After the cuff C is compressed in this manner against the bottom of the anvil 67 the driver 37 operates to drive the legs of the staple S through the leg portion L of the trousers and into the clinching grooves 70, as shown in Fig. 9. The clinching grooves 70 will then act to continually deflect the legs of the staple S toward each other as they are driven through the trouser-leg portion L so that their ends penetrate the inner layer or lamination of the cuff C projecting upwardly between the spaced prongs 68 without penetrating the outer layer of the cuff. By this method of operation of the implement the cuff C will be attached to the leg L of the trousers with a blind stitch which is comparatively loose therein to facilitate its removal.

Upon release of the force-multiplying lever 5 the bifurcated fingers 39 at the end of the leaf-spring 38 which projects downwardly and rearwardly from the upper wall 30 of the fastener-applying arm 3 act against the upper edges of the side walls 64 of the clinching lever 4 and the upper edges of the side walls 9 of the magazine 2 to return the parts into open relationship as illustrated in Fig. 1. As the fastener-applying lever 3 is moved away from the magazine 2 the driver 37 is withdrawn from the throat 14 so that the pusher 24 may advance the staples S to position the foremost staple in the throat 14. The work can then be removed from the anvil 67 and the fastener-applying operation may be continuously repeated in the manner explained above by merely rocking the force-multiplying lever 5 on its pivot 76.

At the beginning of a fastener-applying operation one of the lugs 50 projecting laterally from the plate 48 underlies the bottom edge 58 of the pawl 57, see Figs. 1, 2 and 12. During the relative movement of the fastener-applying arm 3 toward the magazine 2 and the plate 48 interlocked therewith the lugs 50 slide upwardly along the forward edge of the apertures 41 until they are in alinement with the notches 43, the pawl 57 resting on the top of the lug rocking on its pivot-stud 56 against the action of the spring 61 during such movement. The coil-spring 25 will then slide the plate 48 forwardly to engage the lugs 50 with the detent-notches 43 in the manner illustrated in Fig. 6. Consequently, if the fastener-applying arm 3 is moved toward the magazine 2 without completing a full driving stroke the engagement of the lugs 50 on the plate 48 with the notches 43 in the side walls 31 of the fastener-applying arm 3 will prevent return movement of the latter and the feeding of another staple into the throat 14.

However, upon completion of a full driving stroke the lugs 50 will slide along the rearwardly inclined cam-faces 44 at the forward edge of the apertures 41 until the forward edge of the lug 50 is displaced rearwardly of the end of the pawl 57 and disengaged therefrom so that the latter will be immediately moved by the spring 61 to the position illustrated in Fig. 7 where its curved end or cam-face 59 will overlie the detent-notch 43. Upon release of the force-multiplying lever 5 the fastener-applying arm 3 will move away from the magazine 2 and plate 48 interlocked therewith and the laterally-projecting lug 50 on the plate will ride over the rounded end or cam-face 59 of the pawl to clear the notch 43. It will be understood that the slight rearward movement of the plate 48 is not sufficient to release the lugs 50 from engagement with the notches 17 and 19 on the magazine 2. The engagement of the lugs 50 on the plate 48 with the bottom edges 42 of the apertures 41 acts to limit the movement of the fatsener-applying arm 3 away from the magazine. The rocking movement of the pawl 57 by the spring 61 from the position shown in Fig. 6 to that shown in Fig. 7 is limited by the engagement of the end of the arm 60 with the top wall of the fastener-applying arm 3 to position the bottom edge 58 of the pawl in spaced relation to the lower edge 42 of the aperture 41. Thus, the movement of the lug 50 on the plate 48 into engagement with the lower edge 42 of the aperture 41 disengages it from the end of the pawl 57 to adapt the plate 48 to be moved forwardly by the coil-spring 25 to cause this lug to underlie the bottom edge 58 of the pawl; or, in other words, to return the lug 50 to its initial position between the lower edge 42 of the aperture 41 and the bottom edge 58 of the pawl as illustrated in Fig. 1.

To open the magazine 2 to receive a supply of staples S the force-multiplying lever 5 is first rocked in counterclockwise direction to move the fastener-applying arm 3 and clinching arm 4 toward the magazine 2 as illustrated in full lines in Fig. 5. The arms 3, 4 and 5 are then held in close relationship by one hand and the force-multiplying lever 5 is rocked in clockwise direction by the other hand to release the hooked ends 81 of its arms 80 from engagement with the abutments 6 on the fastener-driving arm 3. The rocking movement of the lever 5 in a clockwise direction also causes its arms 80 to engage the ends of the laterally-projecting lugs 50 on the plate 48 and slide the plate rearwardly against the action of the coil-spring 25 to disengage the lugs 49 and 50 from the notches 17 and 18 on the magazine 2. Upon release of the fastener-applying arm 3 and clinching arm 4 while the plate 48 is held in retracted position the leaf-spring 38 bearing against the side walls 9 of the magazine 2 will rock the fastener-applying arm and plate away from the magazine. The fastener-applying arm 3 and plate 48 interlocked therewith may then be swung away from the magazine 2 in the

manner illustrated by dash lines in Fig. 5 to expose the open top of the magazine.

The pusher 24 is slid rearwardly along the magazine 2 until the apertures 28 in its upper wall engage the rearward corners of the core 13 to hold it in retracted position, see Fig. 5. The staples S may then be inserted through the open top of the magazine in straddled relation on the core 13 with their legs positioned between the side walls of the core and side walls of the magazine. After the magazine has been loaded with a supply of staples S the pusher 24 may be rocked manually to release it from the rearward corners of the core 13 to adapt it to be moved forwardly by the spring 25 to engage and advance the staples S in the magazine. The fastener-applying arm 3 and plate 48 are then swung as a unit toward the magazine 2 and pressed toward the clinching arm 4 while the lever 5 is held in position to adapt the abutments 6 to pass by the hooked ends 31. During the relative movement of the fastener-applying arm 3 toward the magazine 2 the lugs 49 and 50 on the plate 48 engage the cam-faces 20 and 21 on the side walls 9 of the magazine 2 to thereby cause the plate to be cammed rearwardly until the lugs 50 aline with the notches 17 and 18. The plate 48 will then be slid forwardly on the magazine by the coil-spring 25 to interlock the laterally-projecting lugs 49 and 50 with the notches 17 and 19 in the magazine. The lever 5 is then rocked in counterclockwise direction and the fastener-applying arm 3 released to move away from the magazine 2 under the action of the spring 38 whereby the hooked ends 31 of the arms 30 of the lever 5 will engage with the abutments 6 on the arm. The implement is then ready for a fastener-applying operation.

Fig. 10 of the drawings illustrates an implement similar to that shown in Figs. 1 to 9 but having a modified form of clinching anvil 86 thereon. The clinching anvil 86 illustrated in Fig. 10 comprises a block fixedly mounted on the end of the clinching arm 4 by any suitable means and having clinching grooves 87 formed therein in alinement with the throat 14. The implement illustrated in Fig. 10 is operated in substantially the same way as the implement illustrated in Figs. 1 to 9 and is adapted for more general application, that is, to apply fasteners in the ordinary manner for attaching papers together and for similar work.

It will be observed from the foregoing specification that the present invention provides a plier-type implement of novel construction for applying fasteners to various types of work. It will be observed that the invention provides a plier-type implement which is adapted to be operated with a gradually increasing applied force and one in which the fastener-applying arm is prevented from moving through a return stroke until a full driving stroke is completed whereby to avoid the misapplication of one staple on top of another.

While two forms of the invention are herein illustrated and described it is to be understood that further modifications may be made in the construction and arrangement of its parts without departing from the spirit or scope of the invention. Therefore, without limiting myself in this respect, I claim:

1. In a device of the type indicated, a magazine for holding a supply of fasteners and having a throat at one end through which the fasteners are driven, a driver reciprocable in the throat for driving fasteners therefrom, an arm at one side of the magazine connected to operate the driver, a fastener-clinching arm at the opposite side of the magazine from the driver-operating arm, said arms extending throughout substantially the entire length of the magazine, means for pivotally connecting the magazine and arms adjacent their rearward ends to adapt them for relative movement, an abutment on one of the arms, and a manually-operable lever pivotally connected to one of the arms and having a curved cam-face extending along the side thereof slidably engaging the abutment on the other arm for simultaneously moving the arms toward the magazine throughout their complete range of movement with a gradually increasing applied force.

2. In a device of the type indicated, a magazine for holding a supply of fasteners and having a throat at one end through which the fasteners are driven, a driver reciprocable in the throat for driving fasteners therefrom, an arm at one side of the magazine connected to operate the driver, a fastener-clinching arm at the opposite side of the magazine from the driver-operating arm, said arms extending throughout substantially the entire length of the magazine, means for pivotally connecting the magazine and arms adjacent their rearward ends to adapt them for relative movement, an abutment on one of the arms, and a force-multiplying lever pivotally connected to one of the arms and engaging the abutment on the other arm for simultaneously moving the arms toward the magazine, said lever having a curved cam-face extending along the side thereof and engageable with the abutment on said arm for operating the latter throughout its complete range of movement with a gradually increasing applied force.

3. In a device of the type indicated, a magazine for holding a supply of fasteners and having a throat at one end through which the fasteners are driven, a driver reciprocable in the throat for driving fasteners therefrom, an arm at one side of the magazine connected to operate the driver, a fastener-clinching arm at the opposite side of the magazine from the driver-operating arm, said arms extending thoughout substantially the entire length of the magazine, means for pivotally connecting the magazine and arms adjacent their rearward ends to adapt them for relative movement, an abutment on one of the arms, and a force-multiplying lever pivotally mounted on one of the arms for engaging the abutment on the other arm for simultaneously moving the arms toward the magazine, said force-multiplying lever comprising a relatively long portion adapted for manual operation and a relatively short portion having a curved cam-face extending along the side thereof and engageable with the abutment on the arm for moving the latter throughout its complete range of movement with a gradually increasing applied force.

4. In a device of the type indicated, a magazine for holding a supply of fasteners and having a throat at one end through which the fasteners are driven and an open side extending longitudinally thereof through which the fasteners may be supplied thereto, an arm overlying the open side of the magazine, said arm being adapted to be swung away from the magazine to expose the open side of the latter, a driver carried on said arm for reciprocation in the throat, a fastener-clinching arm at the opposite side of the magazine from the driver-carrying arm, means for pivotally connecting the magazine and arms for relative movement, an abutment on one of the arms, and a manually-operable lever pivotally connected to one of the arms and engaging the

abutment on the opposite arm for simultaneously moving the arms toward the magazine, said lever adapted to be disengaged from the abutment whereby to release the driver-carrying arm to adapt the magazine to be opened to receive a supply of fasteners through its open side.

5. In a device of the type indicated, a magazine for holding a supply of fasteners and having a throat at one end through which the fasteners are driven and an open side through which the fasteners may be supplied thereto, an arm overlying the open side of the magazine, a driver carried by said arm for reciprocation in the throat, a fastener-clinching arm at the opposite side of the magazine from the driver-carrying arm, means for pivotally connecting the magazine and arms for relative movement, an abutment on one of the arms, and a manually-operable lever pivotally connected to one of the arms and having a hooked end engaging the abutment on the opposite arm, said hooked end of the lever engageable with the abutment for simultaneously moving the arms toward the magazine to drive and clinch a fastener, and said lever being rockable to displace its hooked end from engagement with the abutment to release the fastener-applying arm.

6. In a device of the type indicated, a magazine for holding a supply of fasteners and having a throat at one end through which the fasteners are driven and an open side through which the fasteners may be supplied thereto, an arm overlying the open side of the magazine, a driver carried on said arm for reciprocation in the throat, a second arm at the opposite side of the magazine from the driver-carrying arm and having means for clinching the driven fasteners, means for pivotally connecting the magazine and arms for relative movement, an abutment on one of the arms, and a force-multiplying lever pivotally mounted on one of the arms and having a hooked end for engaging the abutment on the opposite arm, said lever having a curved cam-face at its hooked end for engagement with the abutment to simultaneously move the arms toward the magazine with a gradually increasing applied force, and said lever being rockable to displace its hooked end from engagement with the abutment to release the fastener-applying arm to adapt it to be swung away from the open side of the magazine to provide for placing the fasteners therein.

7. In a device of the type indicated, a magazine for holding a supply of fasteners and having a throat at one end through which the fasteners are driven and an open side through which the fasteners may be supplied thereto, an arm overlying the open side of the magazine, a driver carried on said arm for reciprocation in the throat, a fastener-clinching arm at the opposite side of the magazine from the driver-carrying arm, means for pivotally connecting the magazine and arms for relative movement, abutments at the opposite sides of one of the arms, and a force-multiplying lever pivotally mounted on another of the arms and having a hand-gripping portion and a bifurcated portion straddling the arm with the abutments, said bifurcated portions of the lever having hooked ends engaging said abutments and provided with curved cam-faces adapted to simultaneously move the arms toward the magazine with a gradually increasing applied force.

8. In a device of the type indicated, a magazine having an opening in its side extending longitudinally thereof through which fasteners may be supplied thereto, an arm movable toward and away from the magazine to close or expose the opening therein, a member positioned between the arm and magazine and overlying the fasteners in the latter to hold them seated therein, and a driver adapted to be operated by the arm, said arm being movable relative to the magazine to drive fasteners therefrom and movable away from the magazine to expose the open side of the latter to receive a supply of fasteners through the opening in its side.

9. In a device of the type indicated, a magazine having an opening in its side extending longitudinally thereof through which fasteners may be supplied thereto, an arm pivotally connected to the magazine for movement toward and away from the latter to close or expose the opening therein, a member positioned between the arm and magazine, a spring for yieldingly holding the arm in spaced relation to said member, and a driver operable by the arm, said arm being movable toward the magazine to drive fasteners therefrom and movable with said member away from the magazine to open the latter to receive a supply of fasteners through the opening in its side.

10. In a device of the type indicated, a magazine having an opening in its side extending longitudinally thereof through which fasteners may be supplied thereto, an arm movable relatively of the magazine for closing the opening therein, a plate positioned between the arm and magazine, a spring for yieldingly holding the arm in spaced relation to the plate, interlocking means on the arm and plate for limiting the upward movement of the arm with respect to the plate while permitting its downward movement relative thereto, and a driver operable by the arm to move toward said magazine to drive fasteners therefrom, said arm being movable away from the magazine to open the latter to receive a supply of fasteners through the opening in its side.

11. In a device of the type indicated, a magazine having an opening in its side extending longitudinally thereof through which fasteners may be supplied thereto, an arm movable relatively of the magazine for closing the opening therein, a plate positioned between the arm and magazine, interlocking means for connecting the plate to the magazine and the arm to the plate, said interlocking means arranged to limit the upward movement of the arm with respect to the plate while permitting its downward movement relative thereto, a driver operable by the arm, and means for sliding said plate longitudinally of the magazine to release it from interlocking engagement therewith whereby the arm and plate may be swung away from the magazine to expose its open side to receive a supply of fasteners.

12. In a device of the type indicated, a magazine having an opening in its side extending longitudinally thereof through which fasteners may be supplied thereto, an arm overlying the open side of the magazine, means for pivotally connecting the magazine and arm, a plate slidably mounted between the magazine and arm, means for yieldingly moving the plate forwardly of the arm, interlocking means for connecting the plate to the magazine and the arm to the plate, said interlocking means acting to limit the upward movement of the arm with respect to the plate while permitting its downward movement relative thereto, a driver operable by the arm, and means for sliding said plate against the action of the yielding means to release it from interlocking engagement with said magazine whereby the arm and plate may be swung away from the magazine to

expose its open side to receive a supply of fasteners.

13. In a device of the type indicated, a magazine having an opening in its side extending longitudinally thereof through which fasteners may be supplied thereto, an arm movable relatively of the magazine for closing the opening therein, a plate positioned between the arm and magazine overlying the fasteners to hold them seated in the magazine, a driver operable by the arm, a second arm having clinching means thereon, and a manually-operable lever operatively connecting the two arms to simultaneously move them toward the magazine to drive and clinch a fastener, said driver-operating arm and plate being movable away from the magazine to open the latter to receive a supply of fasteners through the opening in its side.

14. In a device of the type indicated, a magazine having an opening in its side extending longitudinally thereof through which fasteners may be supplied thereto, an arm movable relatively of the magazine for closing the opening therein, a plate positioned between the arm and magazine overlying the fasteners to hold them seated in the magazine, a driver operable by the arm, a second arm having clinching means, a power-multiplying lever connecting the two arms for simultaneously moving them toward the magazine to drive and clinch a fastener, and a spring for moving the driver-operating arm away from the plate and magazine and the clinching arm away from the magazine, said driver-operating arm and plate being movable away from the magazine to open the latter to receive a supply of fasteners through the opening in its side.

15. In a device of the type indicated, a magazine having an opening in its side extending longitudinally thereof through which fasteners may be supplied thereto, an arm overlying the open side of the magazine, a plate positioned between the magazine and arm and mounted to slide longitudinally thereof, interlocking means for connecting the plate to the magazine and the arm to the plate, said interlocking means being operable to limit the relative movement of the arm away from the plate while permitting it to move toward the latter, a driver operable by the arm, a second arm having clinching means, and a lever for simultaneously operating the arms toward the magazine to drive and clinch fasteners, said lever being operable to slide said plate longitudinally of the magazine to release it from interlocking engagement therewith whereby the driver-operating arm and plate may be swung away from the magazine to expose its open side to receive a supply of fasteners.

16. In a device of the type indicated, a magazine for holding a supply of fasteners, an arm mounted for movement toward and away from the magazine and having side walls overlying the sides of the magazine, one of the side walls of said arm having an opening therein, a driver operable by the arm for driving fasteners from the magazine, and a plate mounted on the magazine to overlie the fasteners contained therein and having a lug projecting laterally through the opening in the side wall of the arm for limiting the movement of the arm away from the magazine while permitting its movement toward the latter.

17. In a device of the type indicated, a magazine for holding a supply of fasteners, an arm mounted for movement toward and away from the magazine and having side walls overlying the sides of the magazine, one of the side walls of said arm having an opening therein with a notch at the edge thereof, a driver operable by the arm for driving fasteners from the magazine, a plate slidably mounted on the magazine and having a lug projecting laterally through the opening in the side wall of the arm for limiting the movement of the latter away from the magazine while permitting its movement toward the magazine, said lug on the plate cooperating with the notch at the edge of the opening in the arm to prevent movement of the latter away from the magazine until a full stroke is completed, and means operative upon completion of a full stroke for moving the plate rearwardly to release the lug from the notch to permit movement of the arm away from the magazine.

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