June 21, 1955 H. J. SPENCER 2,710,964

FASTENER APPLYING DEVICE

Filed Aug. 16, 1952 3 Sheets-Sheet 1

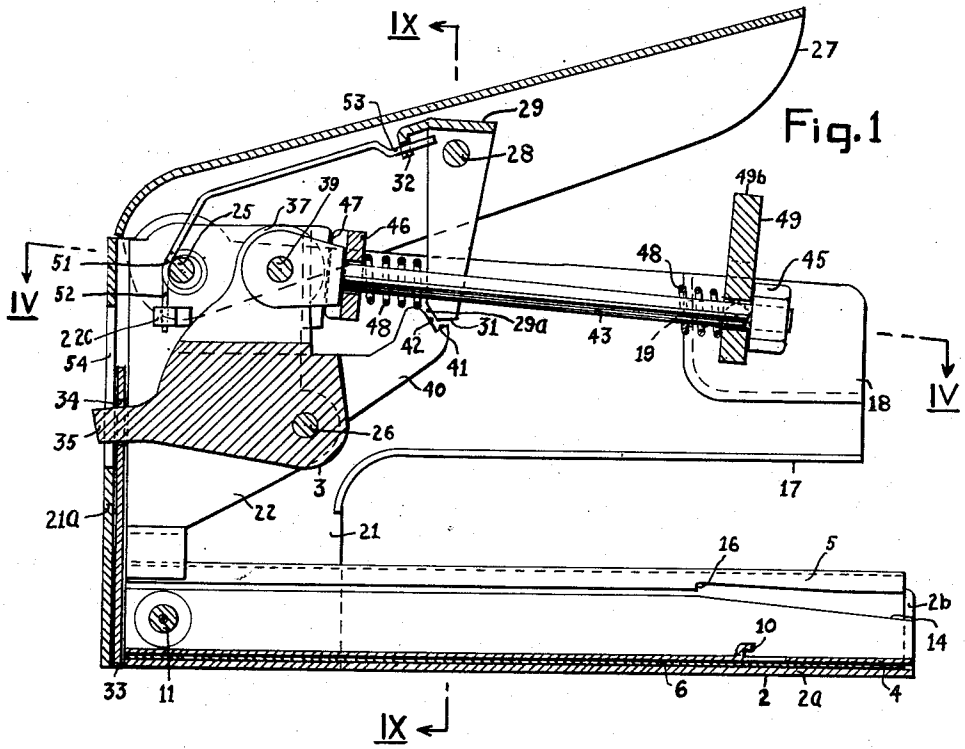


Fig.1

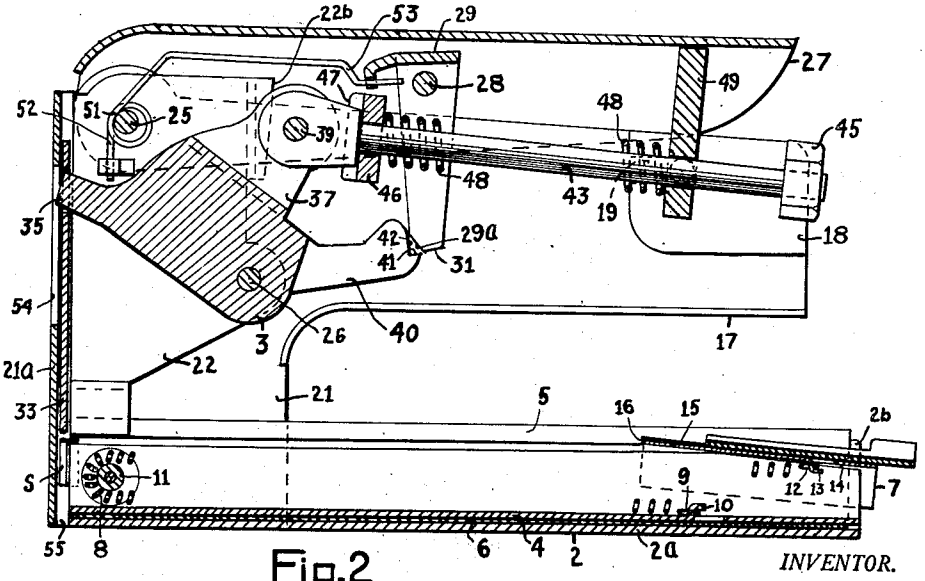


Fig.2

INVENTOR.

BY Herman J. Spencer

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FASTENER APPLYING DEVICE

Filed Aug. 16, 1952 3 Sheets-Sheet 2

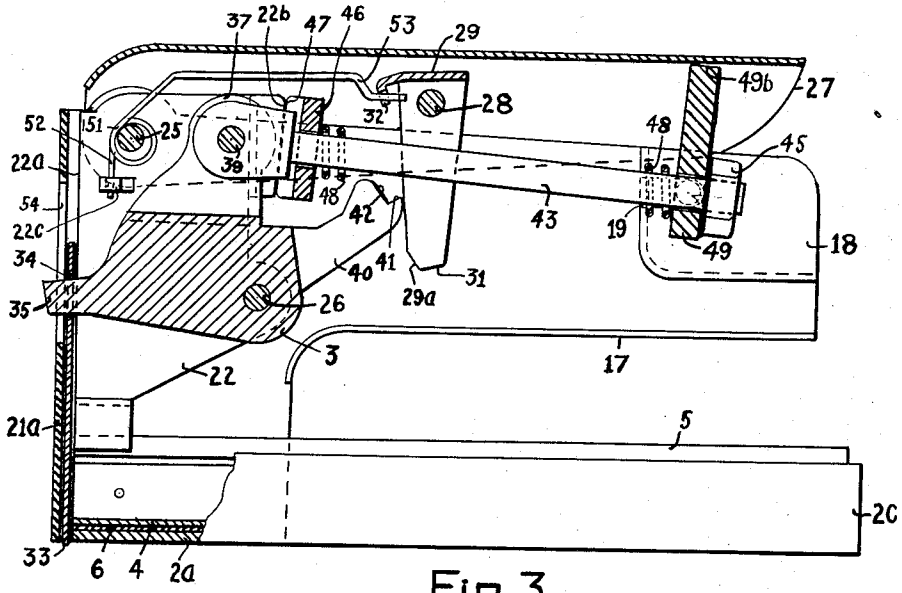


Fig.3

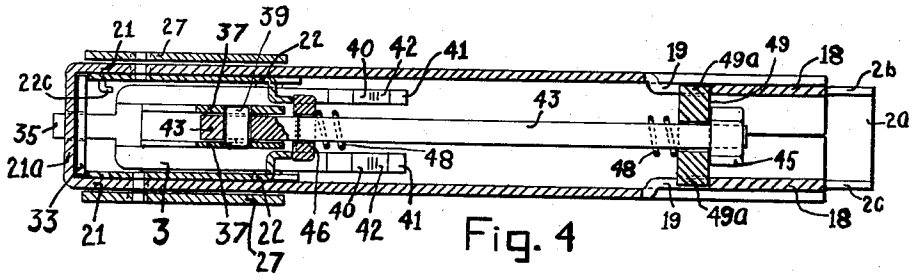


Fig. 4

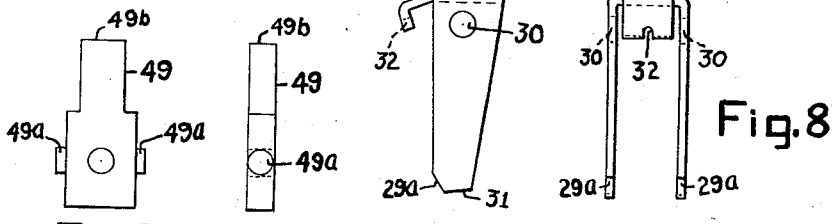


Fig.5 Fig.6 Fig.7 Fig.8

INVENTOR.

BY Herman J. Spencer

June 21, 1955 H. J. SPENCER 2,710,964

FASTENER APPLYING DEVICE

Filed Aug. 16, 1952 3 Sheets-Sheet 3

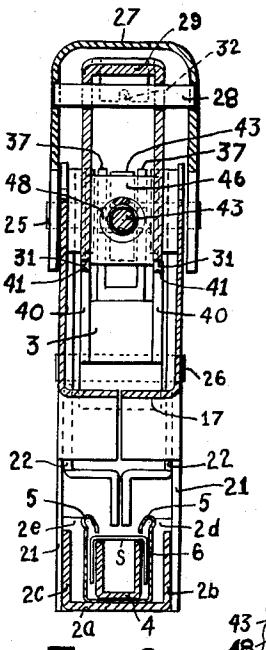


Fig. 9

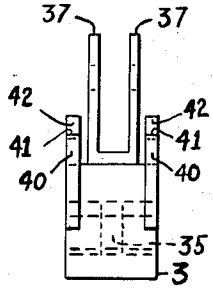


Fig. 10

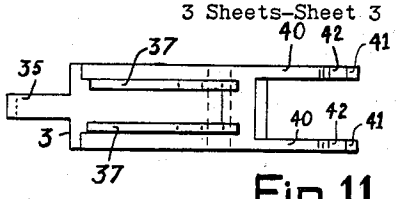


Fig. 11

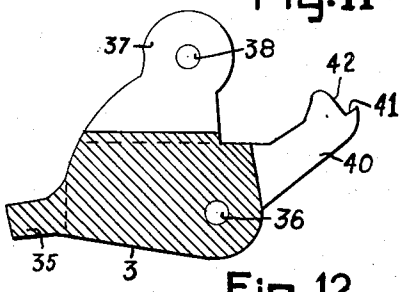


Fig. 12

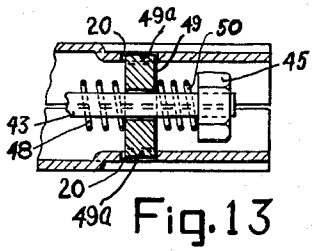


Fig. 13

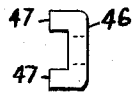


Fig. 14

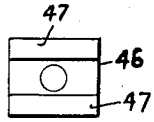


Fig. 15

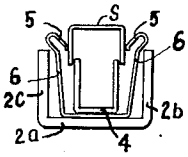


Fig. 16

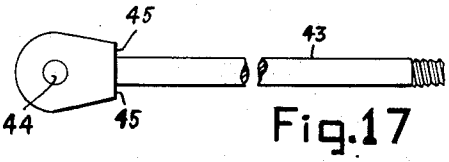


Fig. 17

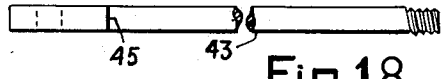


Fig. 18

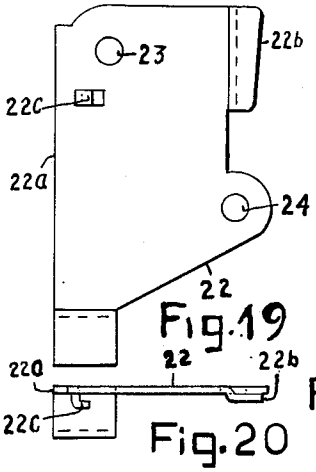


Fig. 19

Fig. 20

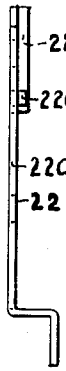


Fig. 21

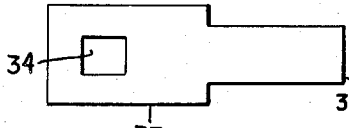


Fig. 22

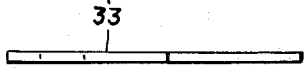


Fig. 23

INVENTOR.

BY *Herman J. Spencer*

United States Patent Office 2,710,964 Patented June 21, 1955

2,710,964

FASTENER APPLYING DEVICE

Herman J. Spencer, Ingomar, Pa.

Application August 16, 1952, Serial No. 304,828

4 Claims. (Cl. 1—49)

This invention relates to a fastener applying device such for example as a stapling or tacking device in which staples or other fasteners are fed to an ejection shute and are then ejected by a spring actuated fastener driver. The fastener driver is actuated by a spring in which energy is stored upon depression of a manually operated lever, the driver being raised as the manually operated lever is depressed and thereafter when energy is stored in the spring the driver is released so as to cause it to move downwardly and drive a fastener under the action of the spring.

One object of the invention is to provide a device small enough to fit into an ordinary size coat pocket and yet be powerful enough to do a good job of driving the fasteners.

Another object of the invention is to produce a device that can be economically made and yet ruggedly built from a design standpoint.

A further object is to provide means for loading fastener and removing jammed fasteners without removing any parts or having to open a gate as is necessary in many devices of this type.

In the accompanying drawings which illustrate a present preferred embodiment of my invention—

Figure 1 is a vertical longitudinal section through the device with the parts in their starting position;

Figure 2 is a view similar to Figure 1 but showing the operating lever as being fully depressed, with the driver having been raised to permit a fastener to be moved into the ejection shute below the driver and the driving spring as having been compressed;

Figure 3 is a view similar to Figures 1 and 2 but showing the driver as having been driven downward by action of the driving spring with the operating lever remaining in the depressed position shown in Figure 2. This figure also illustrates the driving spring as acting as a resilient means for stopping the driving motion of the driving mechanism;

Figure 4 is a horizontal longitudinal section taken on the line IV—IV of Figure 1, certain parts being omitted for clearness of illustration;

Figure 5 is a front elevation and Figure 6 is a side elevation of the spring guide support member;

Figure 7 is a side elevation and Figure 8 is a front elevation of the trigger;

Figure 9 is a vertical transverse section taken on line IX—IX of Figure 1;

Figure 10 is a rear elevation, Figure 11 a plan view and Figure 12 is a side elevation in section of the rocker arm;

Figure 13 is part of a view similar to Figure 4 but showing a variation in the means used to absorb the shock in stopping the driving motion of the driving apparatus;

Figure 14 is an end view and Figure 15 is a plan view of the shock absorber washer;

Figure 16 is a vertical transverse similar to Figure 9 with the upper part of the device omitted to illustrate

the manner in which a strip of staples is inserted into the staple magazine;

Figure 17 is a side elevation view and Figure 18 is a plan view of the spring guide support member;

Figures 19, 20 and 21 are, respectively, a side view, a top view and a front view of one of the frame plates;

Figure 22 is a plan view and Figure 23 is a side view of the driving blade.

Referring to the accompanying drawings, the base **2** of the machine constitutes a staple magazine in which a stick of staples is inserted and the individual staples are fed forwardly to a staple ejection shute underneath a staple driving blade and there acted upon by the driving blade as hereinafter explained. The staple magazine **2** is a slotted tube-like structure made of sheet metal and is substantially U-shaped in cross-section. It has a base **2***a*, see Figures 2 and 9, a vertical side well **2***b*, and a vertical side wall **2***c*. The stick of staples S is placed over a U-shaped staple guide **4**, as shown in Figure 16, and the stick is pressed downwardly so as to cam the hooked ends **5** of the resilient staple hold-down member **6** aside so as to allow the staples to be placed on the guide. Thereafter, the resilient hold-down members **6** snap over the staples so the latter will assume the position shown in Figure 9. The staples S are moved forwardly towards the ejection shute **55** along guide **4** by a staple pusher **7**, shown in Figure 2. The staple follower is of inverted U-shape in cross-section and is of the same configuration as the staples. It is moved forward by a coil spring **8**, one end **9** of which is secured to an upturned end **10** of the staple guide **4**. The spring passes around a pulley **11** located at the forward end of the staple magazine and is mounted on a shaft the ends of which fit in apertured bearings on the side walls of the staple guide **4**, and its other end **12** is secured to a downward turned lug **13** formed from the web of pusher **7**. The rear end **14** of the staple guide **4** is sloped downwardly and rearwardly so that the pusher can be tilted as shown in Figure 2, in which position the forward end **15** of the pusher fits into notch **16** formed in the hold-down member **6**. The staple pusher is moved to the tilted position shown in Figure 2 when a stick of staples is to be inserted into the staple magazine **2** or jammed staples are to be removed. In its normal and operative position the pusher **7** is horizontal and lies behind and in line with the stick of staples and below the inturned flanges **5** of the hold-down member **6**. In this position the pusher moves the staples S forwardly in the magazine to a position underneath the staple driving blade to be described.

The forward portion of the staple magazine is provided with two upstanding brackets **21** (Figures 1, 2 and 4) spaced transversely of the machine. The front of the machine is closed by a web portion **21***a* integral with the two side brackets **21**. The brackets **21** extend rearwardly and are formed inwardly to provide a lower handgrip **17** overlying the magazine **2**, see Figures 1 and 9. The rearwardly extending handgrip portion of brackets **21** are pressed inwardly at **18** to form pockets and are provided with slots **19** in Figures 1 and 4 or holes **20** as shown in Figure 13, respectively, for reasons to be described. Frame plates **22** (Figure 19) are secured to the inward sides of frame brackets **21**, the forward edges **22***a* of plates **22** act as a rear guide for the driving blade (Figure 4), plates **22** have inwardly formed portions **22***b* that form an obstruction means that will be described and one of the frame plates has a lug **22***c* formed inwardly that acts to hold a spring end in place, see Figures 3, 4, 19, 20 and 21. Frame plates **22** are pierced at **23** and **24** to receive pins **25** and **26** respectively and these holes line up with corresponding holes in brackets **21**.

The operating lever **27** which is of inverted U-shape has its side members pierced at its forward end and is pivoted thereby on pin **25** and intermediate its ends the lever's sides are pierced to receive pin **28**. A pawl **29** which is of inverted U-shape has its two sides pierced at **30** and is pivoted on pin **28** which is carried by the operating lever **27**. The lower edges **31** of the pawl's sides are adapted to engage correspondingly spaced arms **40** on rocker arm **3** to rotate the latter for reasons to be described and pawl **29** has an extension forwardly of its web portion bent downward and notched at **32** to receive one leg **53** of a spring **51**.

The driving blade **33**, see Figures 22 and 23, is preferably made from the same gage steel as the staple being used, the upper portion has an opening **34** adapted to receive the forwardly extending arm **35** of the rocker arm **3** and the blade is reciprocated in the device by arm **35** of the rocker arm **3**.

The body of rocker arm **3** has a drilled hole **36** and when in the device is pivoted on pin **26**, extending vertically from the rocker arm body are two centrally spaced arms **37** which are pierced at **38** to receive pin **39** and extending rearwardly from said body are two additional arms **40** spaced apart so as to be in line with and adapted to engage edges **31** on the pawl **29**.

The flat end of the spring guide bolt **43** is pivotally mounted through its hole **44** between arms **37** on a pin **39**, its bolt portion, which has a thread at its rear end to receive nut **45**, extends rearward, longitudinally in the device and is substantially in a horizontal position. A shock absorber washer **46** (Figures 3 and 4) is placed on the bolt portion of member **43** and slid forward to be stopped by shoulders **45**, a driving spring **48** is placed on the bolt with one end against washer **46**, the spring guide support block **49** is moved onto the bolt behind the driving spring **48** and nut **45** is then screwed on the threaded bolt end against the resistance of spring **48**. In the modification shown in Figure 13, it will be observed that a shock spring **50** is between block **49** and nut **45** for a reason to be explained later.

In the preferred form shown in Figure 1, 2, 3, and 4, reduced portions **18** are provided with open end slots **19** (Figure 4) into which lugs **49***a* (Figure 5) on support block **49** slide and are arrested at the rearward end of slots **19**. In the modified form shown in Figure 13, holes **20** are provided in reduced portions **18** to prevent lugs **49***a* from moving longitudinally yet permitting support block **49** to pivot.

Figures 1, 2 and 3 illustrate a spring **51** coiled around pin **25** with one leg of the spring **52** held by lug **22***c* and the other leg **53** of spring **51** engaging notch **32** on pawl **29** so as to urge pawl **29** clockwise on pin **28** which is secured to operating lever **27**. It will be apparent that pressure of spring leg **53** on pawl **29** will also urge operating lever **27** to pivot counter-clockwise on pin **25** which is supported in brackets **21**.

The operation of the fastener driving apparatus is as follows: Assume that a supply of staples S is in the staple magazine **2** and that the staple pusher **7** has been moved from the tilted position shown in Figure 2 to a horizontal position so that the staple pusher is operative to exert pressure through the spring **8** against the staples to feed them forwardly through the staple magazine **2**. The operating lever **27** is rotated clockwise on pin **25** until it assumes the position shown in Figure 2 where the web portion of the operating lever **27** has come to rest on the top **49***b* of the support block **49**. As the operating lever **27** moves from the position shown in Figure 1 to that shown in Figure 2, the lower edges **31** on the pawl **29** engage shoulders **41** on rocker arms **40**, thereby pivoting rocker arm **3** clockwise on pin **26**. It will be apparent that clockwise rotation of rocker arm **3** will raise the driver blade **33** through arm **35** and shift spring support bolt **43** rearwardly through cooperation in rocker arms **37** and pin **39**. It will also be apparent that spring **48** will be compressed to store energy as it is compressed between the shock absorber washer **46** as it travels with bolt **43** and the support block **49** which is held from moving rearwardly by its lugs **49***a* being in contact with the end of slots **19** (Figure 4), and that nut **45** will move away from support block **49** as the bolt **43** slides through support block **49**. Notice in Figure 2 that the vertical edges **42** on rocker arms **40** contact edges **29***a* on pawl **29** to urge pawl edges **31** to move off of rocker arm edges **41** when the pawl **29** through the operating lever **27** reaches the position shown in Figure 2, thereby releasing the rocker arm **3** so that the compressed spring **48** can expand to rotate the rocker **3** counterclockwise on pin **26**. Notice in Figure 2 that the lower end of the driving blade **33** has risen above the stick of staples and that a staple is in position beneath the driver **33**.

When rocker arm **3** is released from the pawl **29**, the driving end of spring **48** which end is against shock absorber washer **46** urges the rocker arm **3** to rotate counter-clockwise on pin **26** through the cooperation of support bolt shoulders **45** and pin **39** held in rocker arms **37** and thereby lower the driving blade **33** to drive a staple S by action of rocker arm **35** in the driver blade opening **34**. When the driving blade **33** reaches the position shown in Figure 1, the shock absorber edges **47** contact the edges **22***b* of frame plate **22** and the shock absorber and the driving end of the spring **48** are stopped from further urging of the rocker arm **3** in fastener driving direction and at this approximate point the nut **45** has moved with spring support bolt **43** to contact the rearward side of support block **49**.

It will be apparent from the above description that the driving spring can no longer urge the rocker arm **3** in fastener driving direction. However, the rocker arm **3** can still rotate in driving direction due to its driving momentum and as explained above, the driving end of spring **48** was stopped and therefore further movement of rocker **3** in fastener driving direction will pull nut **45** on support rod **43** through pin **39** on rocker arms **37** in further fastener driving direction, and thereby nut **45** will move support block **49** forwardly in slots **19** against the resistance of spring **48** to stop and cushion the end of the driving stroke.

In Figure 13 a shock spring **50** is shown to illustrate the nut **45** being pulled against and thereby compressing spring **50** against support member **49** held from moving in holes **20** to stop and thereby cushion the end of the driving stroke.

Note in Figures 1 and 2 that the extended direction of the force of driving spring **48** against rocker arm **3** during a driving stroke changes very little. However, it will be apparent that should arms **37** and holes **38** be placed 7° to the right of the vertical as shown in Figure 1 and 35° on the same side in Figure 2, the extended direction of spring **48**'s force against rocker arm **3** would increase considerably during a fastener driving stroke and that were this change moved to the left side of the vertical in Figures 1 and 2, the extended direction of spring **48**'s force against rocker **3** during a fastener driving stroke would decrease.

While I have illustrated and described preferred embodiments of the invention, it is to be understood that the invention may be otherwise embodied or practiced within the scope of the following claims.

I claim:

1. In a fastener device, a frame, a fastener driver reciprocably mounted in a driver guide, means for feeding fasteners into position to be driven by said driver, an operating lever pivoted to said frame, a rocker arm pivoted to said frame and operatively connected to said driver to actuate the latter, a spring guide extending longitudinally in the device operably supported at one end on said rocker arm and thereby movable with said rocker arm around the pivot of the latter on said frame, said spring guide's other end being operably supported by a guide

member, said guide member being mounted in said frame, a driving spring held in line by said spring guide and interposed between said supports of said spring guide, a releasable pawl means cooperating between said operating lever and said rocker arm to rotate the latter to thereby raise the driver to permit a staple to be fed into position beneath the driver on depression of said operating lever, said spring adapted to be compressed upon depression of said operating lever and said spring thereby exerts pressure on said rocker arm to rotate the latter counterclockwise to thereby lower the driver in staple driving direction, obstruction means adapted to release said pawl means from said rocker arm as said operating lever is depressed and said driver is raised and said rocker arm is rotated clockwise, thereby permitting said driving spring to expand to urge said rocker arm counterclockwise in fastener driving direction to apply a fastener.

2. Claim 1 and further characterized by abutment means on said spring guide, said abutment means moving away from said guide member on depression of said operating lever, a resilient shock means between said abutment means and said guide member adapted to be contacted by said abutment on said spring guide to stop the latter's movement in driving direction to thereby cushion the driving stroke of said driver.

3. In a fastener device, a frame, a fastener driver reciprocably mounted in a driver guide, means for feeding fasteners into position to be driven by said driver, an operating lever pivoted to said frame, a rocker arm pivoted to said frame and operably connected to said driver to actuate the latter, a spring guide in the device which has one of its ends operably supported on said rocker arm and thereby its one end is movable around the pivot of said rocker arm on said frame, said spring guide's other end being operably supported by a movable guide member, limiting means on said spring guide for limiting movement apart by said spring guide's supports, said guide member being mounted at the end in slots in said frame to permit movement of said guide member towards said rocker arm, cooperating means between said spring guide and at least one of the latter's supports to permit the latter to move towards the other and in relation to said spring guide, a driving spring held in line by said spring guide and interposed between said supports of said spring guide, a releasable pawl means cooperating between said operating lever and said rocker arm to rotate the latter clockwise to thereby raise the driver to permit a staple to be fed into position beneath said driver on depression of said operating lever, said spring adapted to be compressed upon depression of said operating lever and said spring thereby exerts pressure on said rocker arm to rotate the latter counterclockwise to thereby lower the driver in staple driving direction, obstruction means adapted to release said pawl means from said rocker arm as said operating lever is depressed and said driver is raised and said rocker arm is rotated clockwise to thereby permit said driving spring to expand to urge said rocker arm counterclockwise in driving direction to apply a fastener.

4. Claim 3 and further characterized by a shock absorber washer loosely mounted on said spring guide between one end of said driving spring and said spring guide's operable support on said rocker arm, said shock absorber washer thereby moving in a path around the pivot of said rocker arm when the latter is urged in driving direction by said driving spring, a stop on the device in the path of said shock absorber washer adapted to stop the latter's movement in driving direction and thereby stopping said one end of said driving spring, said limiting means adapted thereafter to contact and move said movable guide member towards said shock absorber washer to thereby compress said driving spring to cushion the driving stroke of the driver.

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