May 5, 1959 R. E. HAGER 2,884,635

HYDRAULIC STITCHER

Filed Jan. 11, 1956 4 Sheets-Sheet 1

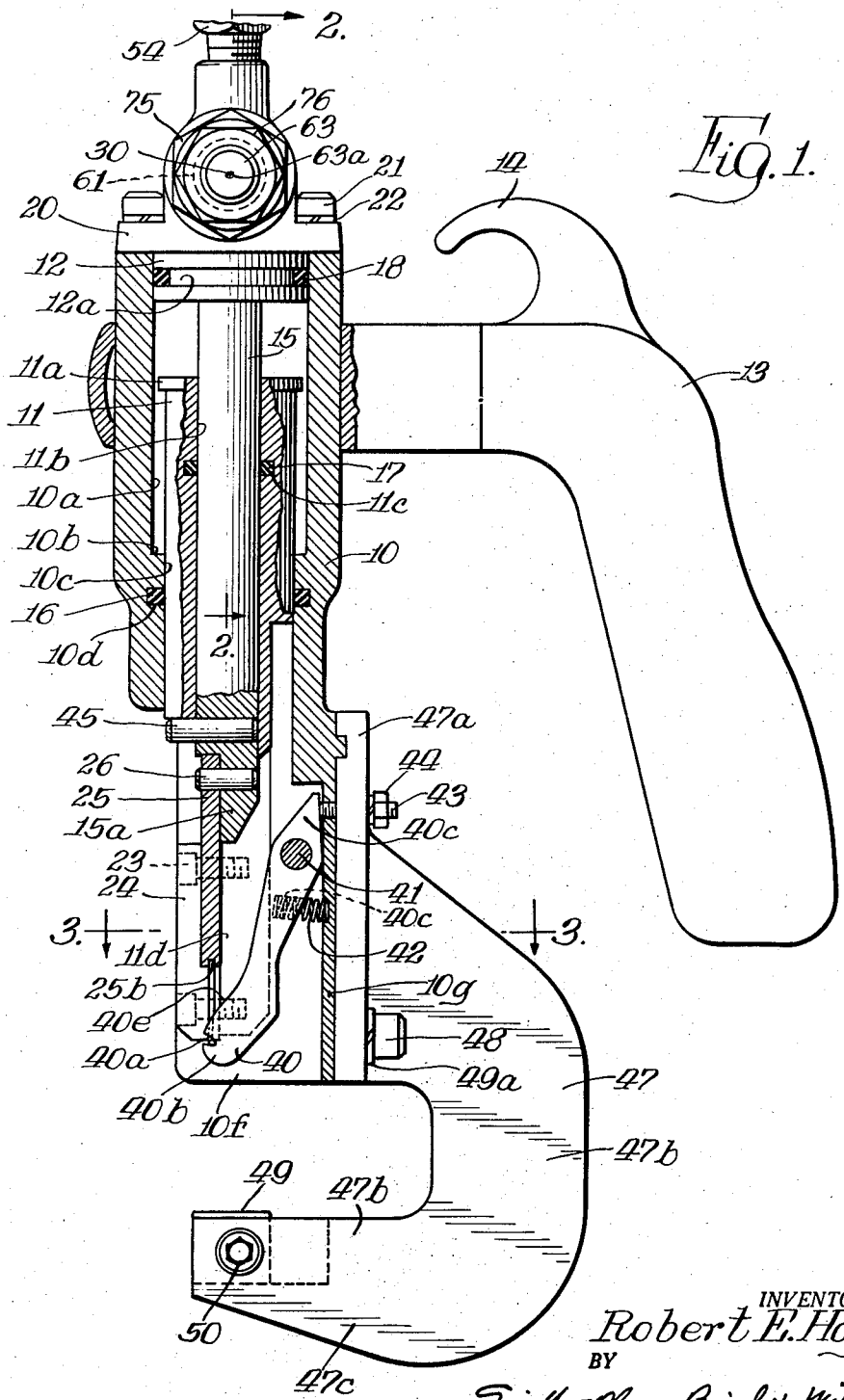

Fig. 1.

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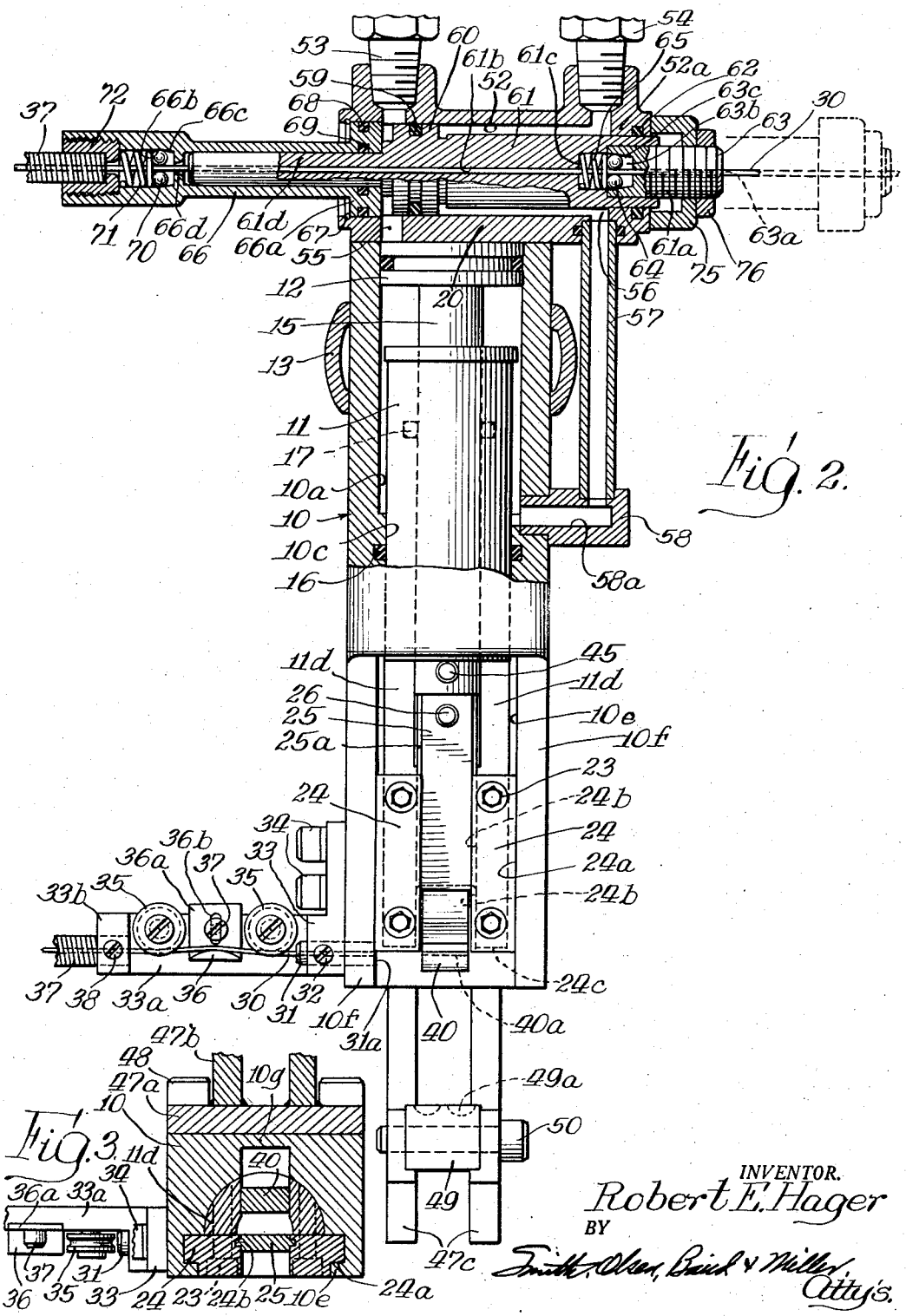

Fig. 2.

Fig. 3.

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HYDRAULIC STITCHER

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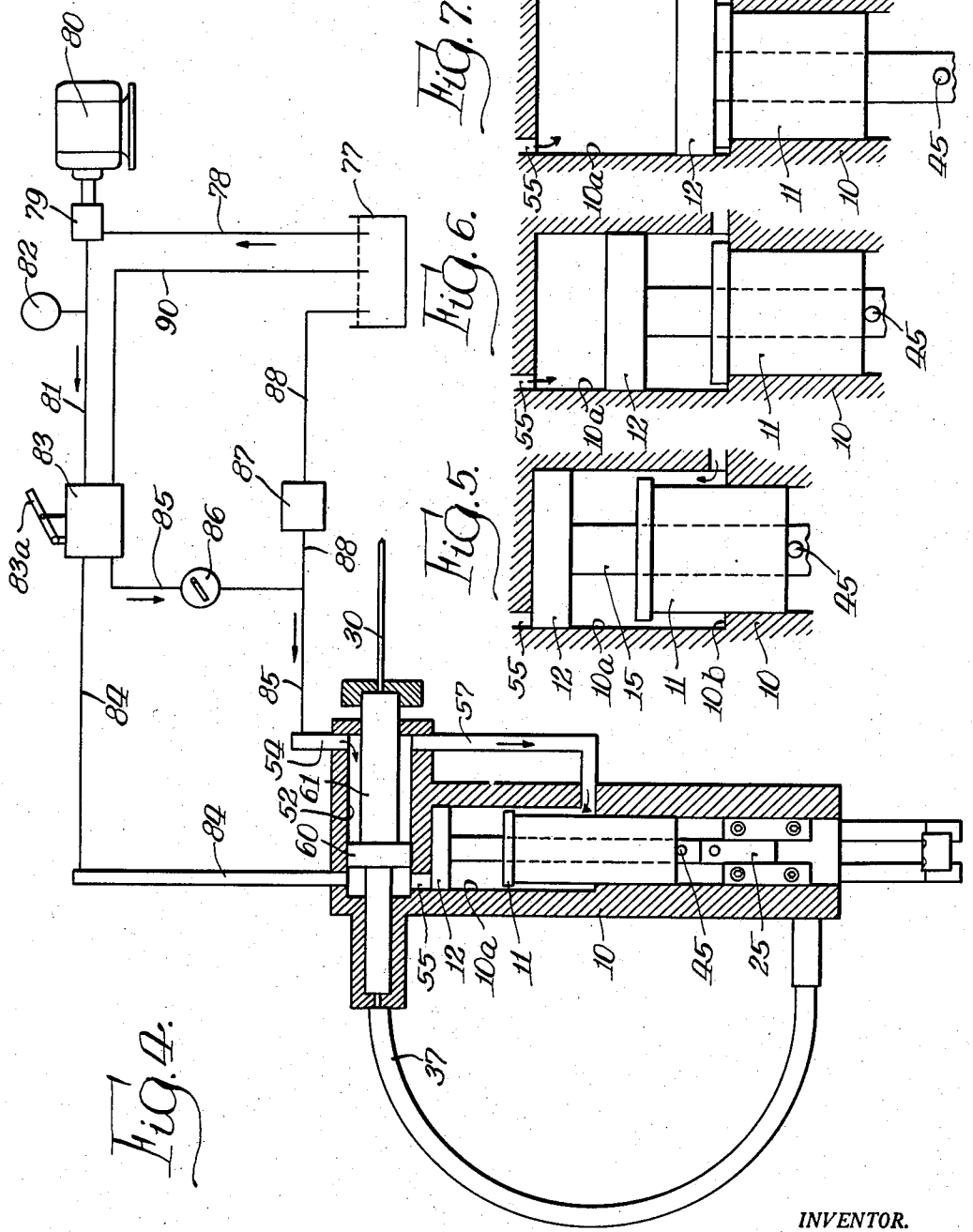

Fig. 4.

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

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HYDRAULIC STITCHER

Filed Jan. 11, 1956 4 Sheets-Sheet 4

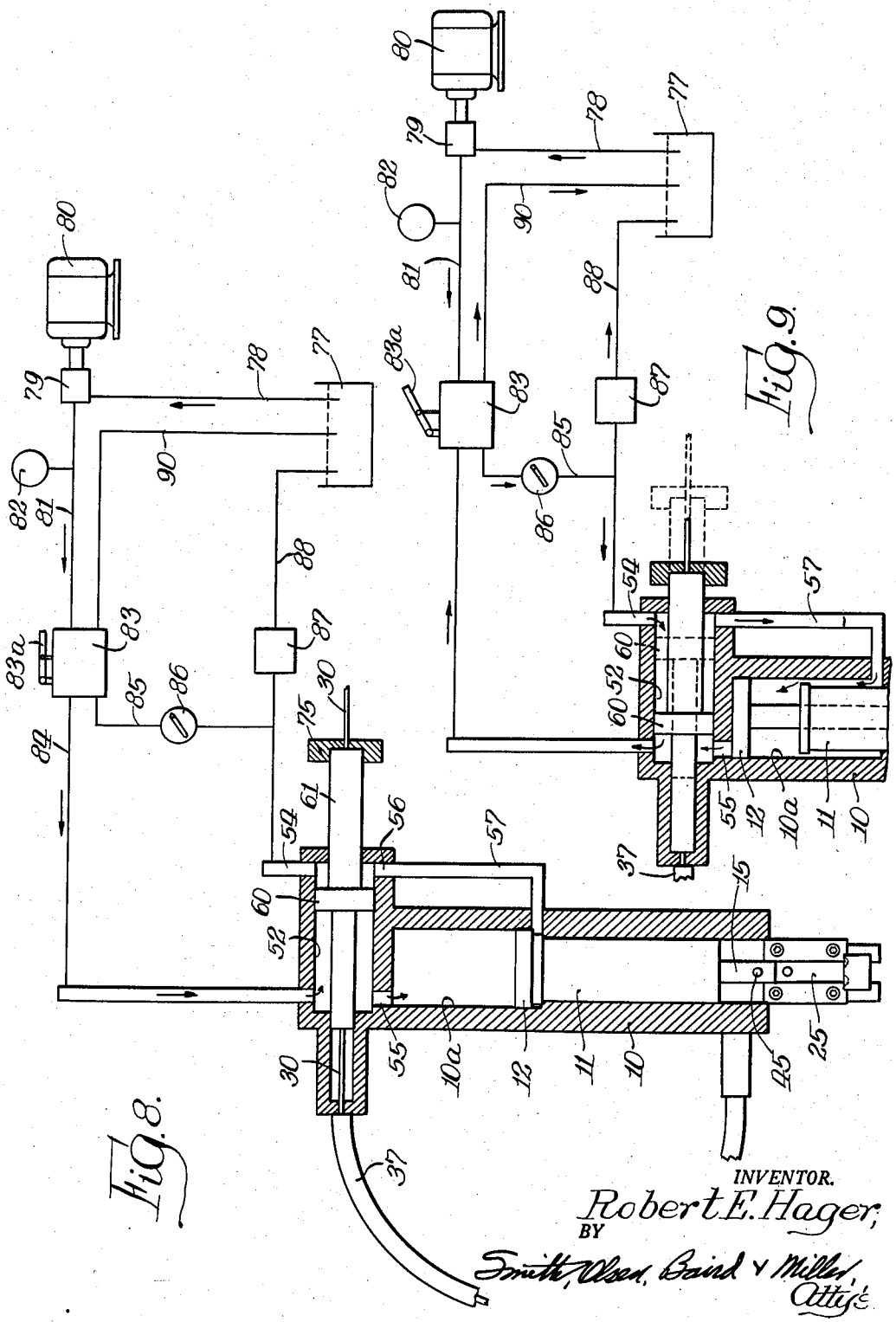

Fig. 8.

Fig. 9.

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HYDRAULIC STITCHER

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Application January 11, 1956, Serial No. 558,508

14 Claims. (Cl. 1—44.4)

This invention relates to stitching machines adapted for use in forming and driving metal staples made of sections of stitching wire and the purpose of the present invention is to provide an improved stitcher of this type which is operated by hydraulic power.

In machines of this type it is common practice to employ a pair of staple formers which descend toward the work and bend over an anvil the end portions of a length of stitching wire which has been cut from a supply, thereby forming a staple which is then driven into the work and clinched on the underside of the work. When such a machine is employed in stitching material which cannot be readily penetrated by the staple legs, such as heavy fibreboard, sheet metal and the like, it has been found desirable to cause the staple formers to bear on the work piece with substantial pressure in order to assure the proper driving and clinching of the staple. That result has been achieved by means of mechanical adjustments for varying the stroke of the staple formers or the position of the clinching anvil, but they have the disadvantages that the operation of the machine must be arrested in order to make the adjustments or else an adjustably positioned clinching anvil support must be provided.

The principal object of the present invention is to provide a stitching machine having formers operated by hydraulic pressure so that the required high degree of pressure of the formers on the work piece may be obtained while at the same time making it possible to regulate the former pressure by adjusting the hydraulic pressure without stopping the machine or adjusting the clinching anvil. A further object of the invention is to provide a stitching machine in which the staple former and the staple driver are both operated in proper timed relation by hydraulic pressure. Another object is to provide a stitching machine having a former and driver operated by a two pressure hydraulic system embodying means for varying the pressure applied to the former by adjusting an ordinary relief valve while the machine is in operation. Other objects relate to various features of construction and arrangement which will appear more fully hereinafter.

The nature of the invention will be understood from the following specification taken with the accompanying drawings in which one embodiment is illustrated. In the drawings,

Figure 1 shows a side elevation of the stitching unit of the improved hydraulic stitching mechanism of the present invention with a portion of the stitching device shown in vertical section;

Fig. 2 shows a front elevation of the stitching device illustrated in Fig. 1 with a portion thereof shown in vertical section on the line 2—2 of Fig. 1;

Fig. 3 shows a horizontal section taken on the line 3—3 of Fig. 1;

Fig. 4 shows a somewhat diagrammatic view of the hydraulic stitcher connected to the hydraulic pressure system by which it is operated and illustrating in their

retracted positions the pistons for operatiing the staple former and the staple driver;

Fig. 5 shows a somewhat diagrammatic vertical section through the cylinder of the stitching machine illustrating the pistons in their retracted positions shown in Fig. 4;

Fig. 6 is a sectional view similar to that of Fig. 5 showing the relative positions of the pistons for actuating the staple former and the staple driver after the staple former has reached the end of its working stroke;

Fig. 7 is a sectional view similar to those of Figs. 5 and 6 illustrating the relative positions of the pistons in the cylinder after the staple has been formed and driven;

Fig. 8 is a somewhat diagrammatic sectional view similar to that of Fig. 4 illustrating the relative positions of the parts after the hydraulic fluid has been admitted to the cylinder to cause the forward strokes of both of the pistons, while at the same time causing the retraction of the wire feeding piston; and

Fig. 9 is a somewhat diagrammatic sectional view similar to those of Figs. 4 and 8 illustrating the relative positions of the parts and the direction of flow of hydraulic fluid when the pistons have been returned to their retracted positions and after the wire feeding piston has been moved through a feeding stroke.

Before referring to the hydraulic system by which the stitching operations are effected, reference will be made to the stitching unit which is shown particularly in Figs. 1, 2 and 3. This unit comprises a frame or casing **10** having formed therein a cylinder **10***a* in which there is mounted a piston **11** for actuating the staple formers and another piston **12** for actuating the staple driver. This frame **10** has clamped thereon a handle **13** by which the stitcher may be moved about by the operator and this handle has formed on the upper end thereof a hook **14** by which the device may be suspended on a suitable support.

The piston **11** is mounted to slide in a tubular bore **10***c* formed in the lower part of the casing and it is provided at its upper end with an outwardly extending annular flange **11***a* which is of lesser diameter than the cylinder **10***a* and which is adapted to engage the shoulder **10***b* at the lower end of the cylinder when this piston is at the extreme lower or forward end of its stroke. The piston **11** is further provided with an internal cylindrical bore **11***b* which is slidably engaged by a piston rod **15** secured at its upper end to the piston **12**. In order to maintain fluid-tight connections between the relatively movable parts, the casing **10** is provided with an internal annular groove **10***d* in which there is mounted a packing ring **16** adapted to bear upon the outer surface of the piston **11**. Similarly, the piston **11** is provided with an internal annular groove **11***c* in which there is mounted a packing ring **17** adapted to bear upon the outer surface of the piston rod **15**. The piston **12** is also provided with an annular groove **12***a* in which there is mounted a packing ring **18** adapted to bear upon the surface of the cylinder **10***a*. The cylinder **10***a* is closed at its upper end by a top plate or cap member **20** which is secured to the upper end of the casing **10** by means of cap screws **21** upon which spring washers **22** are mounted.

The lower end of the piston **11** is bifurcated as shown at **11***d* and the arms which are thus formed are secured by studs **23** to the staple formers **24**. These staple formers are provided on their outer sides with grooves **24***a* which are engaged by ribs **10***e* formed on the depending side plates **10***f* of the casing **10**. The inner edges of the staple formers **24** are provided with longitudinal grooves **24***b* which are slidably engaged by ribs **25***a* formed on the lateral edges of the staple driver **25** which

is secured to the lower end of the piston rod **15** by means of a pin **26**.

When the staple formers **24** descend in response to hydraulic pressure in the cylinder **10***a*, they are adapted to engage the stapling wire **30** which is adapted to be fed through a sleeve **31** extending through one of the side plates **10***f* of the casing near the lower end thereof. This sleeve **31** is secured by a set screw **32** in a tubular passage formed in a bracket **33** which is secured to the adjacent side plate **10***f* by studs **34**. The bracket **33** has an outwardly extending arm **33***a* on which are mounted two grooved rollers **35** adapted to engage the upper side of the wire **30** and the lower side of the wire passes over a curved plate **36** having a flange **36***a* provided with an elongated slot **36***b* in which there is mounted a set screw **37** by which the elevation of the plate **36** may be varied so that this plate will cooperate with the rollers **35** in straightening the wire **30** as it approaches the sleeve **31**. The bracket **33***a* is provided at its outer end with a block **33***b* in which one end of a helically wound flexible tube **37** is secured by a set screw **38**. The stitching wire **30** is fed through the tube **37** in the manner hereinafter described so that its extremity is projected through the sleeve **31** into the path of the nearer one of the two formers **24**. As the former descends, its outer edge acts as a shearing die to cooperate with the inner end of the sleeve to shear the stitching wire and thus cut off a length or section of wire adapted to be formed into a staple.

As the formers **24** continue to descend, after cutting off the wire, the end portions of this length of wire are engaged by grooves **24***c* formed in the lower ends of the formers and these ends are then bent downwardly about an anvil **40** which is pivoted on a pin **41** secured in the side plates **10***f* of the casing, as shown particularly in Fig. 1. This anvil is provided at its lower end with a notch or recess **40***a* through which the stitching wire **30** is passed as it is projected through the sleeve **31**. This feeding movement continues until the extremity of the wire engages the side wall **10***f* which is opposite to the sleeve **31** and then, upon downward movement of the formers **24**, the ends of the section of wire which has been cut off by the initial downward movement are bent over the lower portion **40***b* of the anvil, thereby forming a U-shaped staple having legs which lie in the side grooves **24***b* of the formers. The anvil **40** is normally projected to the operating position shown in Fig. 1 by means of a coil spring **42** which is seated in a recess **40***c* formed in the anvil and in another recess formed in the back wall **10***g* of the casing. The operating position of the portion **40***b* of the anvil may be regulated by a set screw **43** which threadedly engages an aperture in the back wall **10***g* of the casing and which bears against the upper extremity **40***c* of the anvil. This set screw may be secured in adjusted position by a lock nut **44**.

The lower end of the piston rod **15**, which is actuated by the piston **12**, is provided with a projection **15***a* on which the previously described staple driver **25** is secured by the pin **26**. The staple driver **25** is of oblong rectangular form and its lower end is provided with a transversely extending groove **25***b* which is adapted to engage the top wall of the staple when the driver descends in response to the admission of hydraulic pressure to the region above the piston **12**. The staple formers normally descend in response to fluid pressure acting upon the piston **11** until the lower ends bear upon the work to be stitched or until the top flange **11***a* of the piston **11** engages the shoulder **10***b* of the casing. In the initial stages of the forward strokes of the pistons, the two pistons **11** and **12** move together with a relatively low pressure applied to the upper end of the piston **11** and with a higher pressure applied to the upper face of the piston **12**. They continue to move in unison with the lower end of the piston **11** engaging a pin **45** which is secured in the lower projecting portion of the piston rod **15**, and after the formers **24** have engaged the work, or after the flange **11***a* has engaged the shoulder **10***b*, the formers **24** remain stationary on the work and the piston **12** continues its downward movement under the influence of the pressure applied to the upper side thereof thus causing the driver **25** to drive the staple legs through the work.

In order to effect the clinching of the staple legs on the underside of the work piece, there is provided a bracket **47** comprising a plate **47***a* which is secured to the back wall **10***g* of the casing by means of cap screws **48**, the heads of which engage spring washers **49***a*. The bracket **47** comprises two parallel U-shaped plates **47***b* terminating in horizontal forward extensions **47***c* between which the clinching anvil **49** is secured by a bolt **50**. The clinching anvil **49** is mounted between the horizontally extending portions **47***b* of the parallel arms **47***c* of the bracket **47** and this anvil is provided on its upper side with curved recesses **49***a* which are adapted to be engaged by the ends of the staple legs as the staple is driven so that the legs are automatically curved inwardly toward each other and clinched on the underside of the work piece.

The top plate or cap member **20** has formed integrally therewith a cylinder **52** to one end of which hydraulic fluid under high pressure is admitted through an inlet fitting **53**. Hydraulic fluid under a comparatively low pressure is admitted to the other end of the cylinder **52** through a fitting **54**. The high pressure fluid entering the cylinder **52** through the fitting **53** is adapted to pass to the upper end of the cylinder **10***a*, above the piston **12**, through a port **55**. The low pressure fluid, which is admitted to the cylinder **52** through the fitting **54**, is adapted to pass downwardly through a port **56** which communicates with a tube **57** secured in the lower face of the plate **20** and arranged to communicate at its lower end with a fitting **58** which has a passage **58***a* communicating with the interior of the cylinder **10***a* around the piston **11** and beneath the piston **12**. The hydraulic fluid having two different pressures is thus admitted through these passages to the interior of the cylinder **10***a*, in the manner hereinafter described, in order to effect the sequential operation of the pistons **11** and **12** and the actuation of the formers **24** and the driver **25**.

The cylinder **52** serves not only as a means for conveying compressed fluid to the cylinder **10***a*, but also as a part of the feeding mechanism by which the stitching wire is fed through the tube **37** to the stitching position. For this purpose, there is provided in the cylinder **52** a reciprocating piston **60** which has a fluid-tight connection with the cylinder wall by means of a packing ring **59**. The piston **60** is formed integrally with a piston rod **61** which is journalled in a bearing formed in the end wall **52***a* of the cylinder where a fluid-tight joint is formed by the packing ring **62**. The end of the piston rod **61** opposite the piston **60** is provided with an inwardly extending bore **61***a* in which there is mounted a tubular guide member **63** having a central passage **63***a* through which the stitching wire **30** extends. This passage **63***a* is in alignment with the central passage **61***b* in the piston rod through which the stitching wire also extends. At its inner end, the guide member **63** is provided with a cavity **63***b* having an annular tapered wall **63***c* engaged by spherical balls **64** which are adapted to grip the wire **30** upon movement thereof toward the smaller end of the cavity **63***b*, a movement which is normally brought about by a coil spring **65** mounted in the cavity **61***c* which is formed in the piston rod **61** inwardly from the cavity **63***b*. When the piston **60** and the piston rod **61** are moved toward the right, as viewed in Fig. 2, the balls **64** are adapted to release the wire **30** but, upon movement of the parts **60** and **61** toward the left, the balls **64** grip the wire and effect a feeding movement thereof through the tube **37**.

A tubular member **61***d* which is formed integrally with the piston **60** and is slidably mounted in a cylindrical

tubular member **66** having at one end an enlargement **66***a* which seats within the end of the cylinder **52** where it is held in place by a locking ring **67**. The part **66***a* has a fluid-tight engagement with the wall of the cylinder **52** by means of a packing ring **68** and another packing ring **69** forms a fluid-tight connection between the extension **61***d* of the piston rod and the tube **66**. At its outer end, the tube **66** is enlarged and provided with a cavity **66***b* having at its inner end an inclined tapered wall **66***c* engaged by spherical balls **70**. A coil spring **71** normally forces the balls **70** toward the end wall **66***d* of the cavity. A threaded plug **72** engages the outer enlarged end of the tube **66** and this plug has a passage communicating with the tube **37** which is secured in an internally threaded recess formed in the plug. After a feeding movement of the piston **60**, toward the left as viewed in Fig. 2, the piston **60** is retracted toward the right and the balls **70** then grip the stitching wire **30** to hold it in the position to which it has been advanced by the previous feeding movement.

In order to vary the stroke of the wire feeding piston **60**, the guide member **63** is externally threaded and is threadedly engaged by a hollow nut **75** which is secured in adjusted position on the member **63** by means of a nut **76**. By varying the position of the hollow nut **75** on the member **63**, the position of the piston **60** when it is advanced to its extreme position toward the left, as shown in Fig. 2, may be varied with a corresponding variation in the feeding movement which is imparted to the stapling wire **30** by the balls **64**.

In Figs. 4, 8 and 9, there is shown diagrammatically the hydraulic system by which the pistons **11**, **12** and **60** are operated. As there shown, the hydraulic fluid, such as oil or water, is contained in a reservoir **77** connected by a conduit **78** to a pump **79** which is operated by an electric motor **80**. The motor is adapted to operate continuously when the pump is in use and the pump then withdraws fluid from the reservoir **77** and discharges it under a high pressure through the conduit **81**, the pressure in this conduit being indicated by a gage **82**. The conduit **81** communicates with a four-way valve **83** adapted to be operated by a handle **83***a*. When the valve **83** is in one position it is adapted to discharge fluid under high pressure through a conduit **84** which leads through the previously described fitting **53** to the cylinder **52** so that high pressure fluid may then enter through the port **55** to the chamber **10***a* above the piston **12**.

When the valve **83** is adjusted to another position the compressed fluid passes through a conduit **85** and a check valve **86** to the fitting **54** leading into the cylinder **52** at the right-hand end thereof as shown in the drawings. The fluid which is thus admitted through the conduit **85** is at a relatively low pressure due to the action of a pressure relief valve **87** which is connected in a conduit **88** leading from the conduit **85** back to the reservoir **77**. By adjusting the relief valve **87**, the pressure in the conduit **85** may be varied as desired and it is this fluid under this relatively low pressure which passes from the cylinder **52** through the pipe **57** and the fitting **58** to the cylinder **10***a* in the region between the pistons **11** and **12**.

When the stitching machine is at rest preliminary to the first stage of its operation, the pistons **11** and **12** are in the positions shown in Figs. 4 and 5 with the piston **12** at the upper end of the cylinder and with low pressure fluid acting upon both pistons so that they are separated until the piston **11** has moved downwardly into engagement with the pin **45**. When the valve **83** is then adjusted to admit high pressure fluid through the cylinder **52** and the port **55** to the upper end of the cylinder **10***a*, both pistons **11** and **12** are moved downwardly by the high pressure fluid which overcomes the low pressure fluid acting upon the underside of the piston **12**. Both pistons **11** and **12** then move downwardly until they reach the position shown in Fig. 6 at which time the formers **24** will have bent the ends of the section of stapling wire about the anvil **40** to form a U-shaped staple and the lower ends of the formers will be in engagement with the work piece to hold it firmly against the work piece resting on the bracket **47** and the clinching anvil **49**. Depending upon the character of the work piece, the downward movement of the piston **11** may terminate upon the engagement of the formers with the work piece before the flange **11***a* of that piston engages the shoulder **10***b* of the cylinder but, in Fig. 6, the cylinder **11** is shown at its extreme lower position with the flange **11***a* resting upon the shoulder of the casing.

With the work piece held by the formers pressing it against the bracket **47** and the anvil **49**, the high pressure fluid acting upon the upper side of the piston **12** causes the downward movement of this piston to continue. At this time the flow of fluid through the conduit **85** and the tube **57** is shut off by the valve and the fluid trapped in the cylinder between the pistons **11** and **12** is further compressed. Slight leakage through the pressure relief valve **87** to the reservoir permits a slight diminution of pressure. As the driver **25** is moved downwardly by the piston **12**, the anvil **40** is cammed out of the position shown in Fig. 1, against the compression of the spring **42**, by the engagement of the driver **25** with the upper inclined surface **40***e* of the anvil. The driver then engages the staple and drives it through the work piece with the result that the staple legs are clinched upon the clinching anvil **49**.

After the forward stroke of the driver has been completed, and the driving and clinching of the staple effected, the valve **83** is again adjusted to connect the conduit **84** through a conduit **90** to the reservoir **77** and low pressure fluid is again admitted through the check valve **86** and the conduit **85** to the space between the pistons **11** and **12** with the result that both pistons are again restored to the normal positions shown in Figs. 4 and 9 with the compressed fluid flowing in the direction indicated by the arrows in Fig. 9. The parts are then in readiness for a new operation of the stitching machine which is brought about by again operating the valve **83** to admit fluid to the conduit **81** through the conduit **84** to the upper end of the cylinder **10***a*.

If the formers **24** do not engage the work piece with sufficient pressure to hold the work piece rigidly in place during the stapling operation, the degree of this pressure may be regulated while the machine is in operation by the adjustment of the relief valve **87** so that the machine may be made to perform in the best possible manner without losing any time by stopping the operation of the machine to make an adjustment.

Although one form of the invention has been shown and described by way of illustration, it will be understood that it may be constructed by various other embodiments which come within the scope of the appended claims.

I claim:

1. A stitching machine comprising, means for supporting a length of stapling wire, a former for bending said wire about said supporting means to form a staple, a driver for driving said staple into the work, means including a piston for actuating said former, means including a second piston for actuating said driver, means for causing fluid of one pressure to actuate said first named piston, and means for causing a fluid of another pressure to effect the actuation of said second named piston.

2. A stitching machine comprising, an anvil for supporting a length of stapling wire, a former for bending said wire over said anvil to form a staple, a driver for driving said staple, a cylinder, a piston in said cylinder for actuating said former, a second piston in said cylinder for actuating said driver, means for admitting fluid under pressure to said cylinder between said pistons, and means for admitting fluid under a higher pressure to said cylinder on the side of said second named piston oppo-

site that side which is engaged by said first named fluid.

3. A stitching machine comprising, an anvil for supporting a length of stapling wire, a former for bending said wire over said anvil to form a staple, a driver for driving said staple, a cylinder, a piston in said cylinder for actuating said former, a second piston in said cylinder for actuating said driver, means for admitting fluid under pressure to said cylinder between said pistons, means for admitting fluid under a higher pressure to said cylinder on the side of said second named piston opposite that side which is engaged by said first named fluid, and means for adjusting the magnitude of said first named fluid pressure.

4. A stitching machine comprising, an anvil for supporting a length of stapling wire, a former for bending said wire over said anvil to form a staple, a driver for driving said staple, a cylinder, a piston in said cylinder for actuating said former, a second piston in said cylinder for actuating said driver, and means for separately supplying fluid under different pressures to said cylinder to actuate said pistons.

5. A stitching machine comprising, an anvil for supporting a length of stapling wire, a former for bending said wire over said anvil to form a staple and for engaging the work, a driver for driving said staple into the work, a cylinder, a piston in said cylinder connected to actuate said former, a second piston in said cylinder connected to actuate said driver, means for admitting compressed fluid to said cylinder between said pistons, means for limiting the relative separation of said pistons, and means for admitting compressed fluid having a higher pressure than said first named pressure to said cylinder on the side of said second named piston opposite that engaged by said first named fluid to produce working strokes of said pistons.

6. A stitching machine comprising, an anvil for supporting a length of stapling wire, a former for bending said wire over said anvil to form a staple and for engaging the work, a driver for driving said staple into the work, a cylinder, a piston in said cylinder connected to actuate said former, a second piston in said cylinder connected to actuate said driver, means for admitting compressed fluid to said cylinder between said pistons, means for limiting the relative separation of said pistons, means for admitting compressed fluid having a higher pressure than said first named pressure to said cylinder on the side of said second named piston opposite that engaged by said first named fluid to produce working strokes of said pistons, and means for shutting off the flow of said first named fluid to said cylinder when said second named fluid is so admitted.

7. A stitching machine comprising, an anvil for supporting a length of stapling wire, a former for bending said wire over said anvil to form a staple and for engaging the work, a driver for driving said staple into the work, a cylinder, a piston in said cylinder connected to actuate said former, a second piston in said cylinder connected to actuate said driver, means for admitting compressed fluid to said cylinder between said pistons, means for limiting the relative separation of said pistons, means for admitting compressed fluid having a higher pressure than said first named pressure to said cylinder on the side of said second named piston opposite that engaged by said first named fluid to produce working strokes of said pistons, and means for shutting off the flow of said second named fluid and exhausting that fluid from said cylinder when said driver reaches the end of its driving stroke.

8. A stitching machine comprising, an anvil for supporting a length of stapling wire, a former for bending said wire over said anvil to form a staple and for engaging the work, a driver for driving said staple into the work, a cylinder, a piston in said cylinder connected to actuate said former, a second piston in said cylinder connected to actuate said driver, means for admitting compressed fluid to said cylinder between said pistons, means for limiting the relative separation of said pistons, means for admitting compressed fluid having a higher pressure than said first named pressure to said cylinder on the side of said second named piston opposite that engaged by said first named fluid to produce working strokes of said pistons, and means for varying the magnitude of said first named pressure.

9. A stitching machine comprising, an anvil for supporting a length of stapling wire, a former for bending said wire over said anvil to form a staple and for engaging the work, a driver for driving said staple into the work, a cylinder, a piston in said cylinder connected to actuate said former, a second piston in said cylinder connected to actuate said driver, means for supplying fluid under pressure, means for admitting said fluid under low pressure to said cylinder between said pistons, and means for admitting said fluid at a higher pressure to said cylinder on the side of said second named piston opposite to that engaged by said low pressure fluid.

10. A stitching machine comprising, an anvil for supporting a length of stapling wire, a former for bending said wire over said anvil to form a staple and for engaging the work, a driver for driving said staple into the work, a cylinder, a piston in said cylinder connected to actuate said former, a second piston in said cylinder connected to actuate said driver, means for supplying fluid under pressure, means for admitting said fluid under low pressure to said cylinder between said pistons, means for admitting said fluid at a higher pressure to said cylinder on the side of said second named piston opposite to that engaged by said low pressure fluid, and means for varying the magnitude of said low pressure.

11. A stitching machine comprising, an anvil for supporting a length of stapling wire, a former for bending said wire over said anvil to form a staple and for engaging the work, a driver for driving said staple into the work, a cylinder, a piston in said cylinder connected to actuate said former, a second piston in said cylinder connected to actuate said driver, means for supplying fluid under pressure, means for admitting said fluid under low pressure to said cylinder between said pistons, means for admitting said fluid at a higher pressure to said cylinder on the side of said second named piston opposite to that engaged by said low pressure fluid, and means for limiting the movement of said first named piston in response to said low pressure.

12. A stitching machine comprising, an anvil for supporting a length of stapling wire, a former for bending said wire over said anvil to form a staple and for engaging the work, a driver for driving said staple into the work, a cylinder, a piston in said cylinder connected to actuate said former, a second piston in said cylinder connected to actuate said driver, means for supplying fluid under pressure, means for admitting said fluid under low pressure to said cylinder between said pistons, and means for shutting off the flow of said low pressure fluid to said cylinder and admitting said fluid at a higher pressure to said cylinder on the side of said second named piston opposite to that engaged by said low pressure fluid to effect a forward stroke of both of said pistons.

13. A stitching machine comprising, an anvil for supporting a length of stapling wire, a former for bending said wire over said anvil to form a staple and for engaging the work, a driver for driving said staple into the work, a cylinder, a piston in said cylinder connected to actuate said former, a second piston in said cylinder connected to actuate said driver, means for supplying fluid under pressure, means for admitting said fluid under low pressure to said cylinder between said pistons, means for shutting off the flow of said low pressure fluid to said cylinder and admitting said fluid at a higher pressure to said cylinder on the side of said second named piston opposite to that engaged by said low pressure fluid to effect a forward stroke of both of said pistons, and means

for exhausting said high pressure fluid from said cylinder.

14. A stitching machine comprising, an anvil for supporting a length of stapling wire, a former for bending said wire over said anvil to form a staple and for engaging the work, a driver for driving said staple into the work, a cylinder, a piston in said cylinder connected to actuate said former, a second piston in said cylinder connected to actuate said driver, means for supplying fluid under pressure, means for admitting said fluid under low pressure to said cylinder between said pistons, means for admitting said fluid at a higher pressure to said cylinder on the side of said second named piston opposite to that engaged by said low pressure fluid, means

including a reciprocating member for feeding said stapling wire to said anvil, means for actuating said member in one direction by said low pressure fluid, and means for actuating said member in the other direction by said high pressure fluid.

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