June 23, 1936. A. R. HAVENER 2,045,550

RIVETING MACHINE

Filed Nov. 20, 1934 3 Sheets-Sheet 1

Fig. 1.

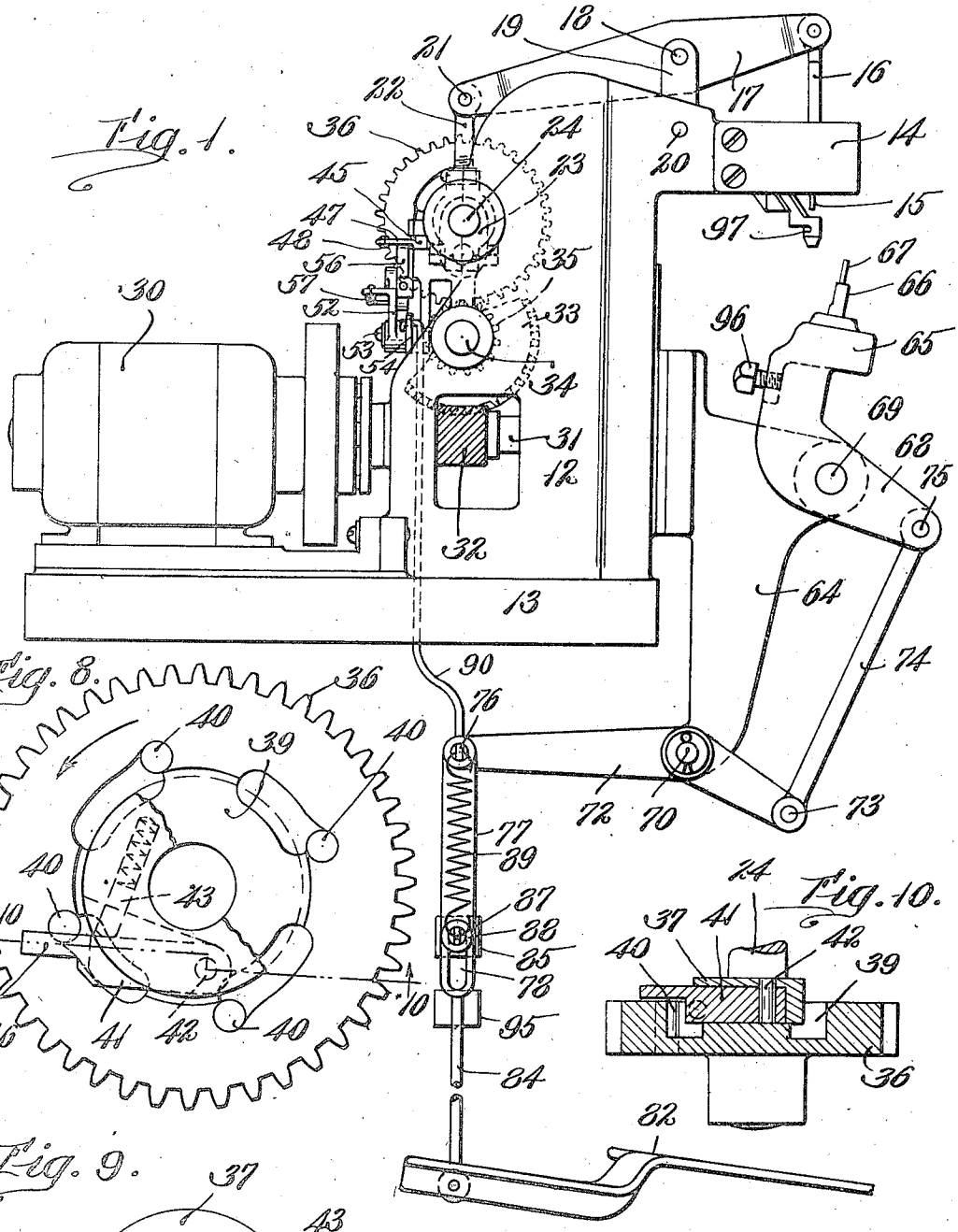
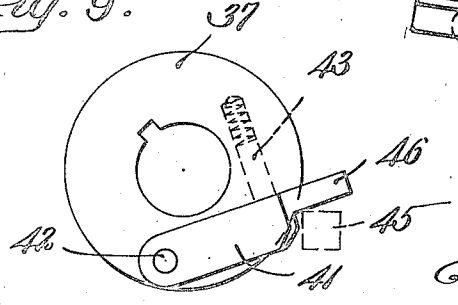


Fig. 8.

Fig. 10.

Fig. 9.



Inventor.
Arthur R. Havener
by Francis P. Dakin
Atty.

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Filed Nov. 20, 1934 3 Sheets-Sheet 2

Fig. 2.

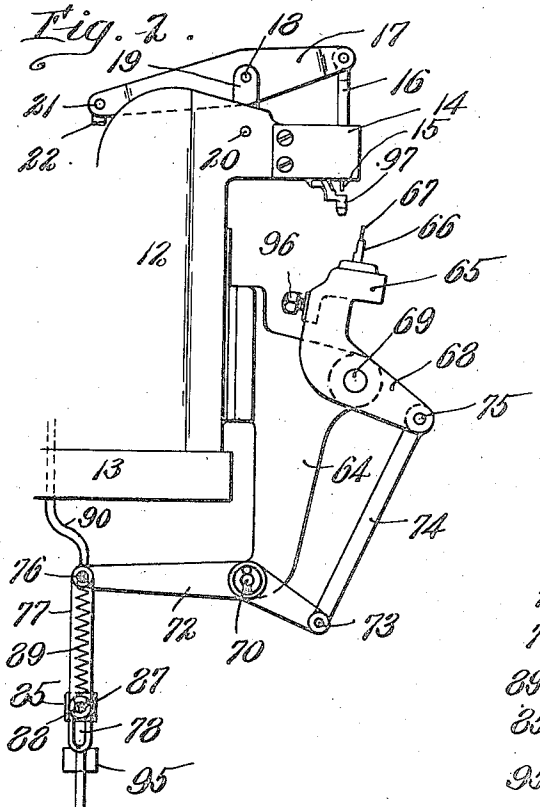


Fig. 3.

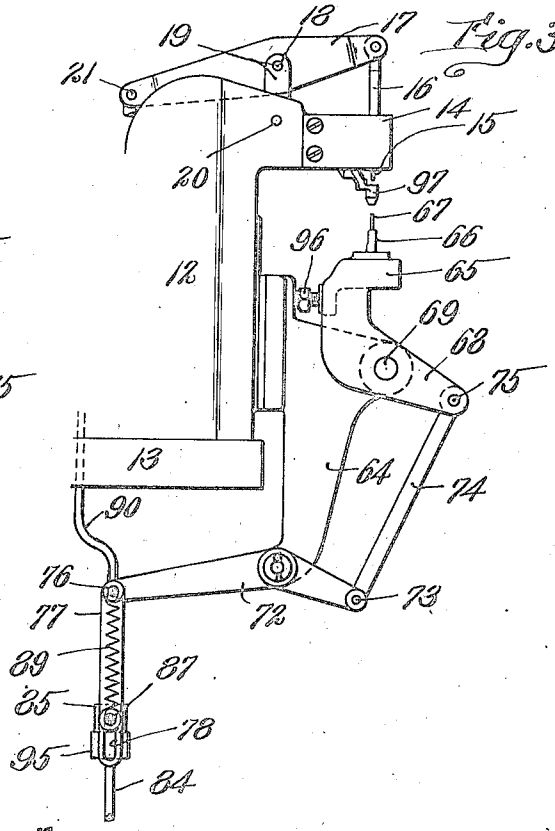
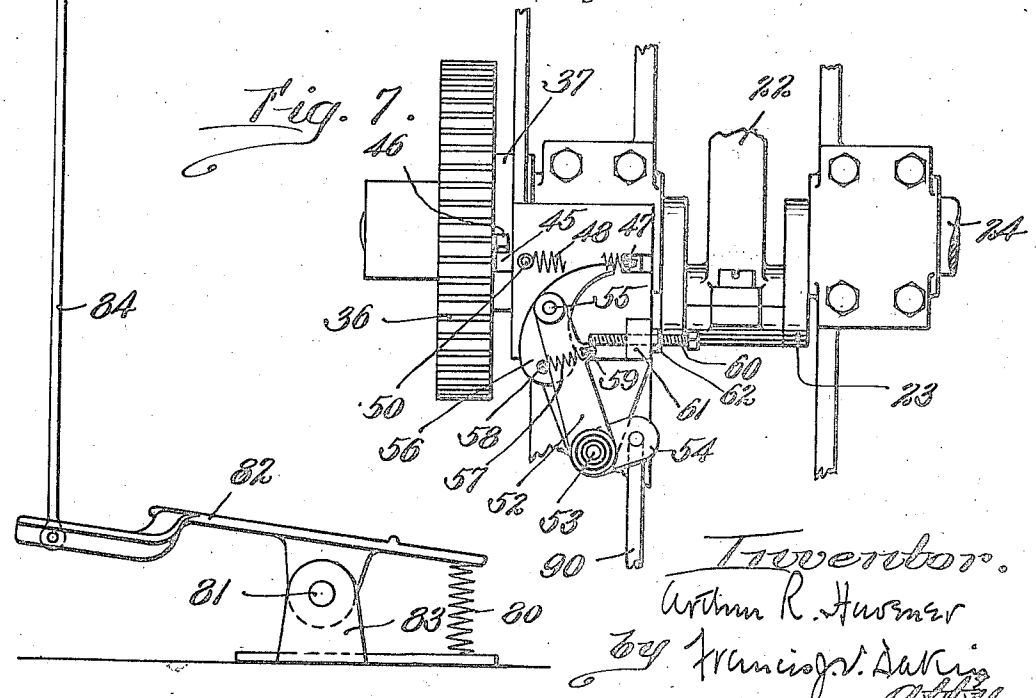


Fig. 7.



Inventor.
Arthur R. Havener
by Francis J. Darcy
Abby.

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Filed Nov. 20, 1934 3 Sheets-Sheet 3

Fig. 4.

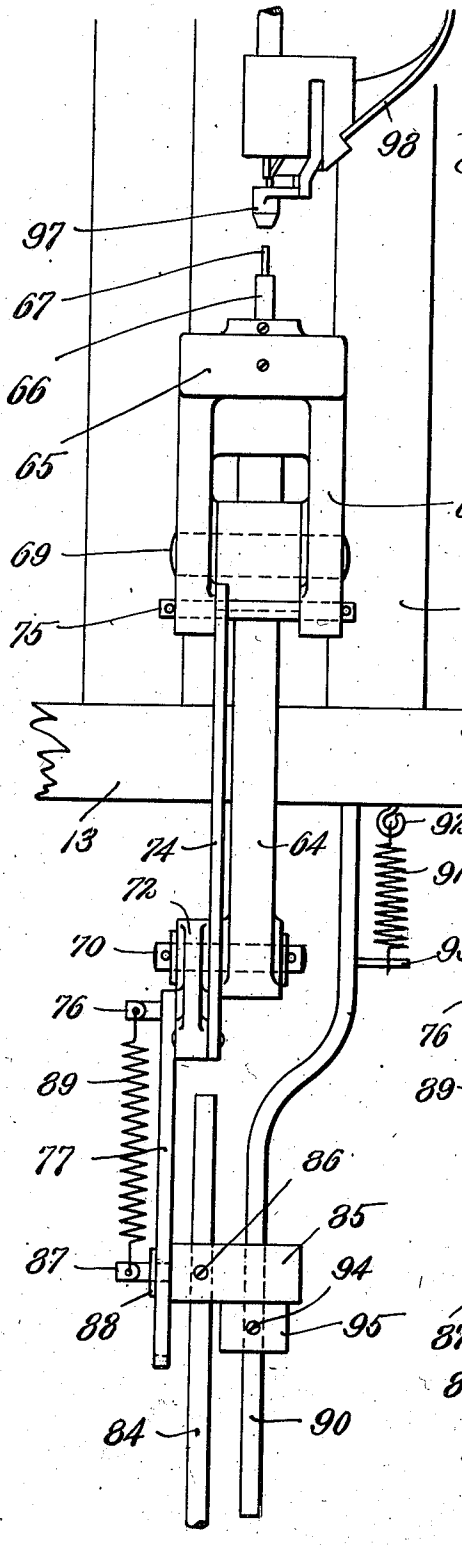


Fig. 6.

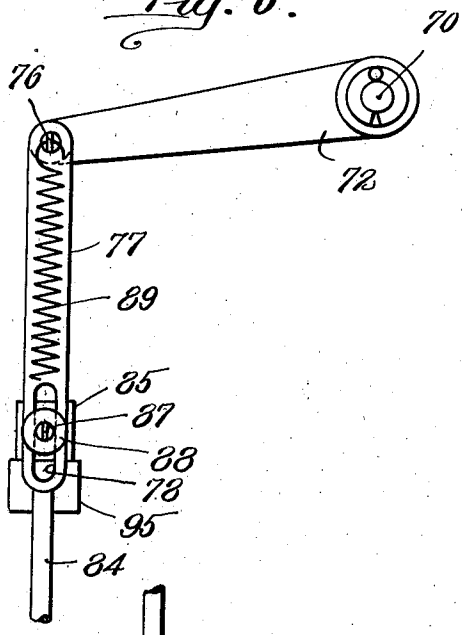
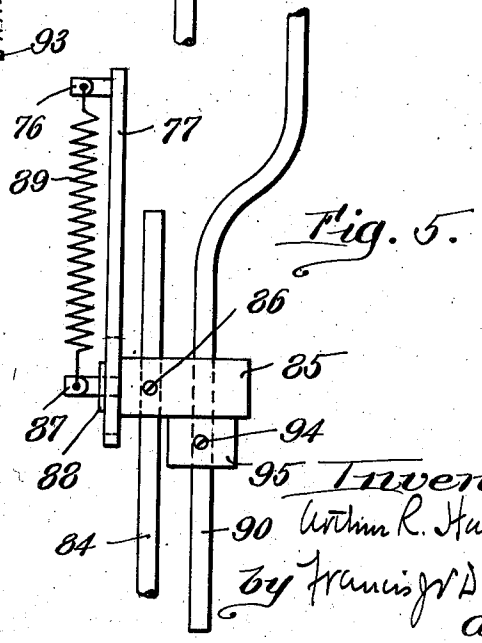


Fig. 5.



Inventor.
Arthur R. Havener
by Francis J. Darin
Atty.

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UNITED STATES PATENT OFFICE

2,045,550

RIVETING MACHINE

Arthur R. Havener, Wayland, Mass., assignor to Judson L. Thomson Manufacturing Company, Waltham, Mass., a corporation of Massachusetts

Application November 20, 1934, Serial No. 753,853

10 Claims. (Cl. 218—2)

This invention relates to riveting machines and more particularly to the support for the work in which the rivets are set.

In the use of riveting machines, it is generally customary for the operator to place by hand the work in proper position on a fixed work support and then to start the machine in operation to set the rivets by pressure on a foot-treadle. When the work is small in size, the danger of injury to the hands of the operator through a premature starting of the machine or in the operation of the machine is greatly increased. To avoid such injuries requires careful positioning and handling of the work which results in slowing down the speed of operation and the amount of work turned out, thereby increasing the cost of production.

One of the important objects of the invention is the provision of a work support for riveting and similar machines which is normally in an inoperative position for receiving the work and which is adapted to be moved into an operative position before the machine is started, thereby eliminating all danger of injury to the operator's hands.

Another object of the invention is the provision of means whereby the depression of the foot-treadle usually employed to start the machine first moves the work support from its normal position to an operative position before it functions to start the machine.

Other objects of the invention will be in part obvious and in part more particularly described hereinafter.

In the accompanying drawings illustrating one embodiment of my invention, Figure 1 is a left side elevation of a riveting machine having a work support constructed and adapted to be operated in accordance with my invention;

Fig. 2 is a similar view of the front portion of the machine showing the work support in normal inoperative position;

Fig. 3 is a view similar to Fig. 2 showing the work support in operative position preliminary to starting the machine;

Fig. 4 is a front elevation on an enlarged scale of the same;

Fig. 5 is a front elevation of the treadle-operated means for starting the machine, the parts being shown in starting position;

Fig. 6 is a side elevation of the same;

Fig. 7 is an elevation looking from left to right in Fig. 1 on an enlarged scale of the clutch mechanism of the machine;

Fig. 8 is a side elevation of the two clutch members with certain portions broken away;

Fig. 9 is a side elevation of the male clutch member; and

Fig. 10 is a horizontal sectional view on line 10—10 in Fig. 8.

Referring to Figure 1 of the drawings, 12 indicates the frame of the machine mounted on a base 13 and having an upper overhanging arm 14. A rivet driver 15 is mounted in the lower end of a slide 16, rectangular in cross section, which is reciprocated in suitable ways in the arm 14 by a lever 17 pivotally connected at one end to the upper end of the slide. The lever 17 is pivoted on a pin 18 in an arm 19 pivotally mounted at its lower end on a pin 20 set in the frame 12. The rear end of the lever 17 is pivotally connected by a pin 21 to a member 22, which at its lower end is mounted upon a crank 23 (Fig. 7) of a shaft 24 rotatably mounted in the frame. The member 22 is made up of two parts having a screw-threaded engagement with each other permitting the length of said member to be increased or decreased at will.

On the extended base 13 of the frame is mounted a motor 30 having a shaft 31 provided with a worm gear 32 which meshes with a gear 33 fixed to a shaft 34 rotatably mounted in the frame 12. A pinion 35, also fastened to the shaft 34, meshes with an idler gear 36 adapted for free rotation on the shaft 24 which constitutes the driving member of a two part clutch for rotating said shaft, the other or driven member 37 of said clutch being fastened to the shaft 24.

The driving member 36 is recessed on one side at 39 (Fig. 10) and provided with a plurality of pins 40 spaced at intervals around said recess and the driven member 37, projecting into said recess, carries a dog 41 pivotally mounted on a pin 42, which dog is held by a spring actuated pin 43 in position for engaging one of said pins as shown in Fig. 8 for locking the two parts of the clutch together in order to rotate the shaft 24 in the direction shown by the arrow.

The gear or driving member 36 is unlocked from the driven member 37 of the clutch by a slide 45 which is caused to engage the outer end 46 of the dog and move the same out of engagement with the pin 40 from the position shown in Fig. 8 to that shown in Fig. 9, which permits the driving member to rotate freely while the driven member of the clutch and the shaft 24 to which it is fastened remain stationary.

The slide 45 is mounted for reciprocation in a suitable way formed in the frame of the machine and is provided with an outwardly projecting arm 47. A spring 48, constantly under tension, is

attached at one end to said arm and at the other end to a pin 50 in said frame, which spring holds the slide in operative position for engaging the end of the dog to disconnect the two parts of the clutch (Figs. 1 and 7).

For withdrawing the slide from engagement with the end of the dog 41 to permit the spring actuated pin 43 to force the dog into engagement with a pin 40 to lock the two parts of the clutch together to start the machine, suitable means, adapted to be operated by a foot treadle, is provided (Fig. 7). A lever 52 is pivotally mounted at its lower end upon a pin 53 set in the frame and fastened to the lever is a short lateral arm 54 operatively connected to a foot treadle by means hereinafter described. Pivotally mounted on a pin 55 in the upper end of the lever 52 is a pawl 56 which is held in position for engaging the arm 47 on the slide by a spring 57 under tension connected at one end to a pin 58 set in the tail of the pawl and at its other end to a hook 59 on the lever. The pin 58 serves also as a stop engaging one side edge of the lever to hold the nose of the pawl in operative position for moving the slide to the right when the lever is turned by depressing the treadle. In this operation the nose of the pawl engages the arm and moves the slide to the right until the tail of the pawl strikes a screw 60 threaded in a projecting lug 61 on the frame when the further movement of the lever causes the nose of the pawl to disengage from the arm on the slide, permitting the spring 48 to return the slide instantly to operative position for disconnecting the two parts of the clutch at the end of one complete revolution. The screw 61 may be held in adjusted position by a set nut 62.

Pivotally mounted on a bracket 64 fastened to the front of the machine is a work support 65 carrying an anvil 66 within which is mounted a spring pressed pilot 67 for centering rivets of a tubular character during the setting process. The work support is provided with two depending parallel bell-crank arms 68 which receive between them the forward end of the bracket and are pivotally mounted on a pin 69 set in said forward end. Pivotally mounted on a pin 70 in the lower end of the bracket 64 is a lever 72, the forward end of which is pivotally connected by a pin 73 to a link 74, the upper end of which is connected by a pin 75 to the ends of the arms 68 of the work support. The rear end of the lever is connected by a pin 76 to an elongated flat link 77 having its lower end provided with a slot 78. The work support is held normally in an inoperative position by means hereinafter described.

For first throwing the work support into an operative position and then starting the machine, a foot treadle 82 is so connected to the lever 72 and to the clutch slide operating mechanism that a preliminary depression of the treadle moves the work support into operative position and a further depression starts the machine.

The foot treadle 82, which is pivotally mounted on a pin 81 in a floor support or bracket 83, is connected to the rear end of the lever 72 by a treadle rod 84, block 85 and spring 89. The block 85 is adjustably fastened on the rod by a screw 86 and is provided in one end with a pin 87 which projects through the slot 78 in link 77 and is slidably held therein by a washer 88. The spring 89 is connected at its lower end to the pin 87 in the block and at its upper end to the pin 76 in the lever 72. The spring is adjusted to normally hold the pin 87 in the upper end of the slot in the link. The link serves as a guide to prevent undue lateral movement of the block and upper end of the treadle rod. A spring 80 under tension and connected at one end to the bracket 83 and at its other end to the heel end of the treadle 82 holds the latter in raised position and through the instrumentality of the treadle rod 84, pin 87 and link 77 maintains the work support normally in inoperative position. Any other suitable means may be provided for this purpose.

The block 85 is also bored to receive loosely the lower end of a rod 90, the upper end of which is turned and inserted in a hole in the end of the arm 54 of the clutch slide operating mechanism. A spring 91 connected at one end to a screw eye 92 in the base 13 of the frame and at its other end to a pin 93 set in the rod 90 holds the latter in raised position. Fastened to the rod 90 by a screw 94 below the block 85 is a collar 95 adapted to be engaged by the block when the treadle is depressed for pulling the rod 90 downwardly to start the machine. By adjusting the distance between the block and the collar, the time of starting the machine in relation to the moving of the work support into operative position can be closely regulated. A screw stop 96 threaded into the rear face of the work support serves to adjust the operative position of the work support and anvil to the rivet driver.

The rivets used in the machine are of the well-known tubular type and are fed to a rivet holder 97 from a hopper (not shown) through a raceway 98, all of which are of a construction well known to those skilled in the art.

In the operation of the machine, the operator places the work, which has been previously punched, to receive the rivet, on the anvil 66 with the pilot 67 in the punched hole. At this time, the work support is in an inoperative position inclined toward the operator as shown in Figure 1. After the work has been properly positioned, the operator exerts a downward pressure on the foot treadle which pulls the treadle rod 84 and block 85 downwardly and through the spring 89 pulls the rear end of lever 72 downwardly which, through the link 74, turns the work support into an operative position. In this movement the spring is of sufficient strength to resist the downward pull so that the pin 87 remains in the upper end of the slot 78 in the link 77 (Fig. 3) until the stop 96 on the work support comes into engagement with the upper portion of the bracket 64. Further movement of the work support is stopped and the further depression of the foot treadle thereafter then distends the spring 89, the slot in the link permitting free movement of the pin 87 and therefore of the block 85, downwardly to engage the collar 95 and to pull the clutch rod 90 down to start the machine. The operator maintains the pressure on the treadle until the setting operation has been completed.

On the release of the pressure, the spring 80 operates on the treadle to throw the work support back to inoperative position. Since the clutch is a one revolution clutch, the machine cannot be operated for more than one setting operation without releasing the pressure on the treadle.

It will be observed that my invention entirely eliminates all possibility of injury to the operator's hands in the positioning of the work since the machine cannot be started until the work support has first been turned to an operative

position in alignment with the rivet driver. At the same time, it conduces to a rapid and accurate positioning of the work which increases the speed of the work and reduces the cost.

Although my invention is herein shown as embodied in a riveting machine, it is not to be limited thereto as it is capable of use in connection with other machines of that general class.

What I claim is:

1. In a machine of the class described, the combination of a work support having a pair of depending bell-crank arms, said arms being pivotally mounted for moving said work support from a normally inoperative to an operative position, a foot treadle and treadle rod and means carried by said rod whereby a depression of the said treadle first moves the work support to operative position and then starts the machine in operation.

2. In a machine of the class described, the combination of a work support having a pair of depending bell-crank arms, said arms being pivotally mounted for moving said work support from a normally inoperative to an operative position, a foot treadle and treadle rod, means carried by said rod whereby a depression of the said treadle first moves the work support to operative position and then starts the machine in operation, and means for returning said work support to inoperative position when the pressure on said treadle is released.

3. In a machine of the class described, the combination of a work support having a pair of depending bell-crank arms, said arms being pivotally mounted for moving said work support from a normally inoperative to an operative position, a foot treadle, a treadle rod, means carried by said rod whereby a depression of the said treadle first moves the work support to operative position and then starts the machine in operation, and a spring for returning said work support to inoperative position when the pressure on said treadle is released.

4. In a machine of the class described, the combination of a work support having a pair of depending parallel bell-crank arms pivotally mounted, means for holding said work support normally in an inoperative position, a lever operatively connected at one end to said arms, a foot treadle, a treadle rod, resilient connections between said treadle rod and the other end of said lever whereby a partial depression of said treadle turns said work support into operative position and means carried by said rod whereby a further depression of said treadle starts the machine in operation.

5. In a machine of the class described, the combination of a work support having a pair of depending parallel bell-crank arms pivotally mounted, means for holding said work support normally in an inoperative position, a pivotally mounted lever operatively connected at one end to said arms, a foot treadle, resilient connections between said foot treadle and the said other end of said lever including a treadle rod and a spring, said spring being of sufficient strength without distension to turn said work support to operative position when said treadle is partially depressed and being distensible to permit further depression of said treadle after said work support has reached operative position and means carried by said treadle rod whereby said further depression of said treadle starts the machine in operation.

6. In a machine of the class described, a work support having a pair of parallel depending bell-crank arms, said arms being pivotally mounted for moving said work support into and out of operative position, a lever for controlling the movement of said work support, a foot treadle, a treadle rod, connections between said lever and said treadle rod whereby whenever said treadle is depressed said work support is turned into operative position, said connections including a spring to permit further depression of said treadle after said work support has reached operative position, said spring being of sufficient strength to turn said work support into operative position, means carried by said treadle rod and operated by the further depression of said treadle for starting the machine and a spring for raising said treadle and returning said work support to a normally inoperative position after the pressure on said treadle is released.

7. In a machine of the class described, a work support provided with a pair of parallel depending bell-crank arms, said arms being pivotally mounted, a lever operatively connected at one end to said arms for moving said work support into and out of operative position, a foot treadle, resilient connections between said foot treadle and the other end of said lever including a treadle rod and a spring intermediate said rod and said lever, said spring being of sufficient strength without distension to operate said lever to turn said work support into operative position on a preliminary depression of said foot treadle, said spring permitting further depression of said foot treadle after said work support has reached operative position, a guide link connected at its upper end to said lever and provided with a slot through which said rod is connected to said spring and means operated by said further depression of said foot treadle for starting the machine in operation, said means comprising a block fixed to said treadle rod, a starting rod having its end loosely mounted in said block and having a collar adjustably secured thereto and adapted to be engaged by said block on the further depression of said foot treadle.

8. In a machine of the class described, a pivotally mounted work support, a lever operatively connected at one end to said work support, a foot treadle, resilient connections between said foot treadle and the other end of said lever including a treadle rod and a spring intermediate said rod and said lever, said spring being of sufficient strength without distension to operate said lever to turn said work support into operative position on a preliminary depression of said foot treadle, said spring permitting further depression of said foot treadle after said work support has reached operative position, a guide link connected at its upper end to said lever and provided with a slot through which said rod is connected to said spring, means carried by said treadle rod and operated by said further depression of said foot treadle for starting the machine in operation and a spring for raising said treadle and returning said work support to a normally inoperative position after the pressure on said treadle is released.

9. In a machine of the class described, the combination of a work support having a pair of depending bell-crank arms, said arms being pivotally mounted for moving said work support into and out of operative position, a lever pivotally mounted between its ends and connected at one end to said arms, a foot treadle, a treadle rod,

a spring connecting said treadle rod with the other end of said lever, said spring being of sufficient strength without distension to turn said work support to operative position when said treadle is partially depressed and being distensible to permit further depression of said treadle after said work support has reached operative position, a block fastened to the upper end of said treadle rod and provided with a vertical bore, a starting lever having its lower end passed through the bore in said block and having a collar adjustably fastened thereto below said block in position to be engaged by said block on the further depression of said treadle for starting the machine in operation.

10. In a machine of the class described, the combination of a work support having a pair of depending bell-crank arms, said arms being pivotally mounted for moving said work support into and out of operative position, a lever pivotally mounted between its ends and connected at one end to said arms, a foot treadle, a treadle rod, a spring connecting said treadle rod with the other end of said lever, a block fastened to the upper end of said treadle rod and provided with a vertical bore, a starting lever having its lower end passed through said bore and having a collar adjustably fastened thereto below said block in position to be engaged by said block on the final depression of said treadle for starting the machine in operation.

ARTHUR R. HAVENER.