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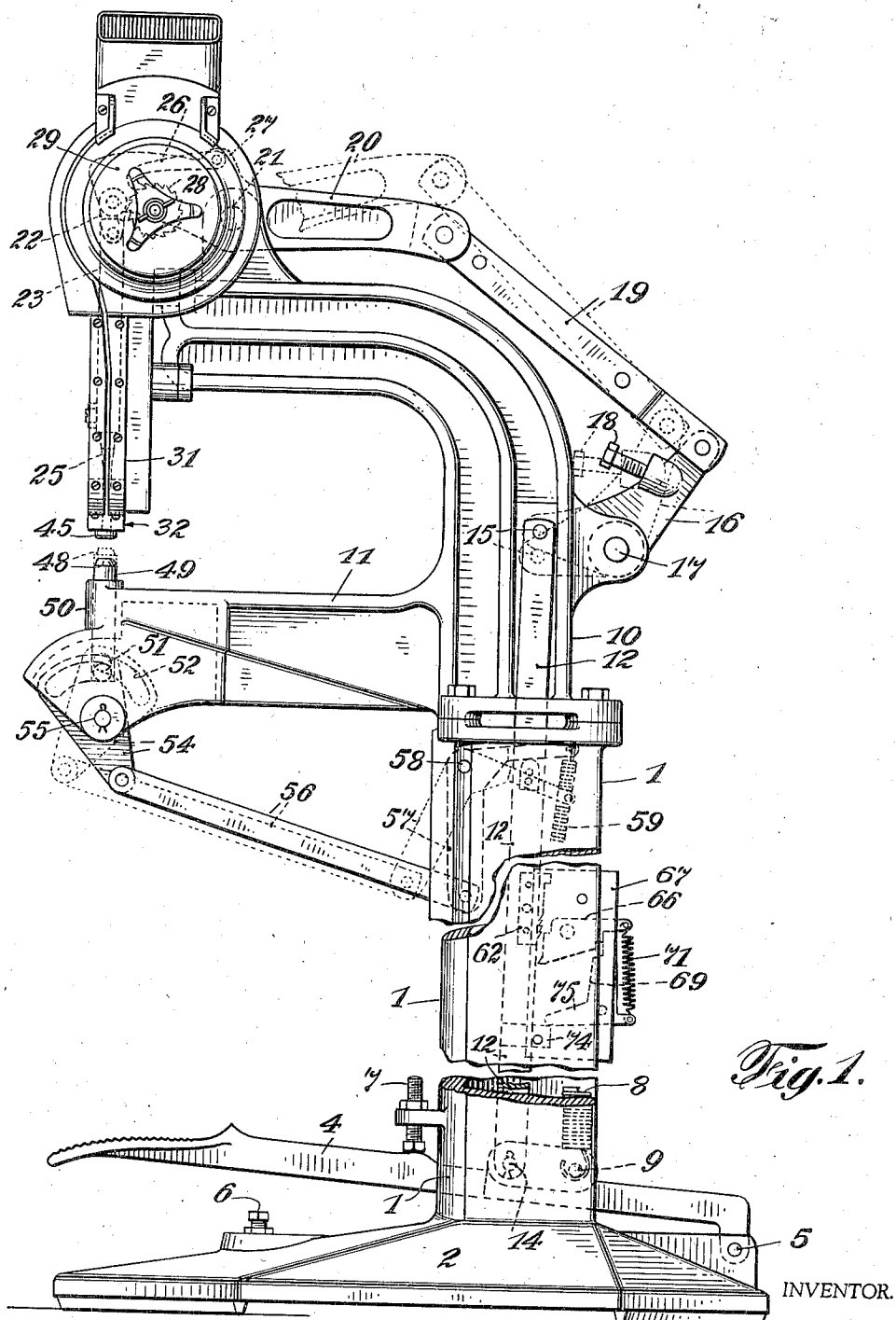
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2,127,357

RIVETING MACHINE

Filed March 24, 1937

4 Sheets-Sheet 1



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RIVETING MACHINE

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4 Sheets-Sheet 2

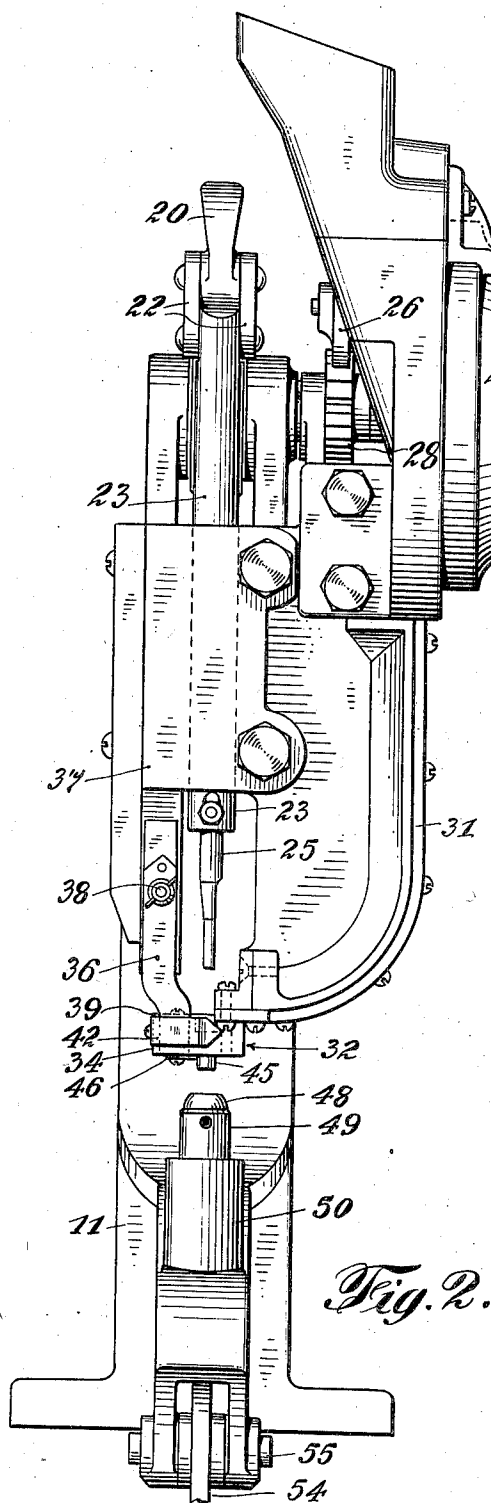


Fig. 2.

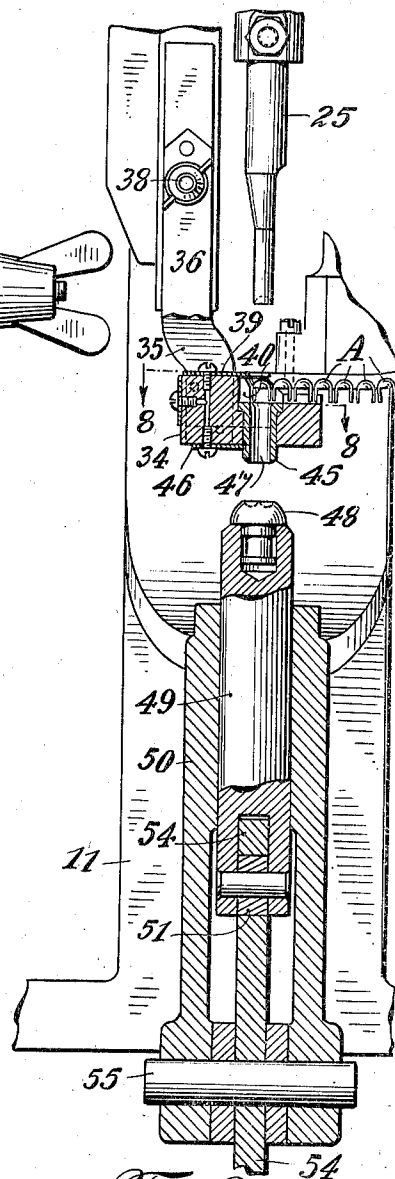


Fig. 3.

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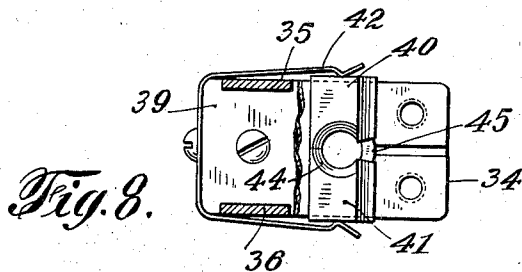
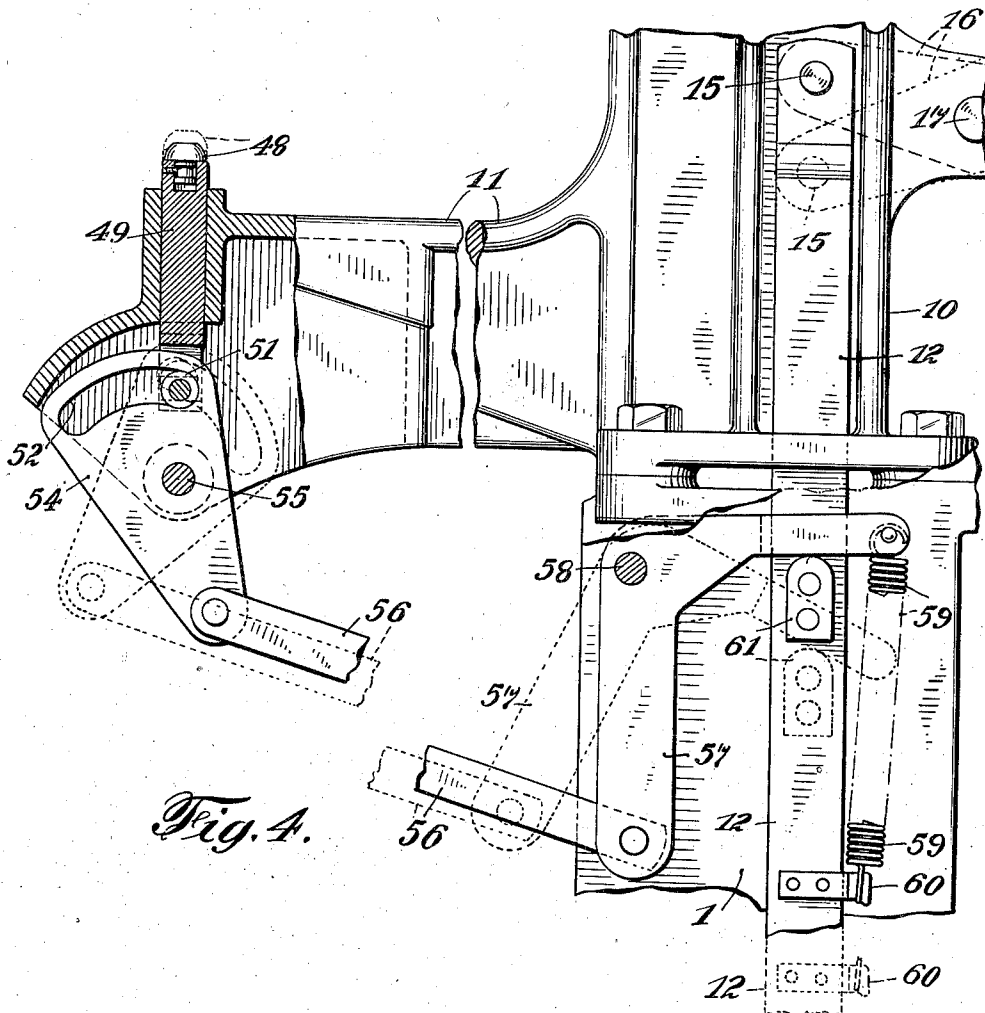
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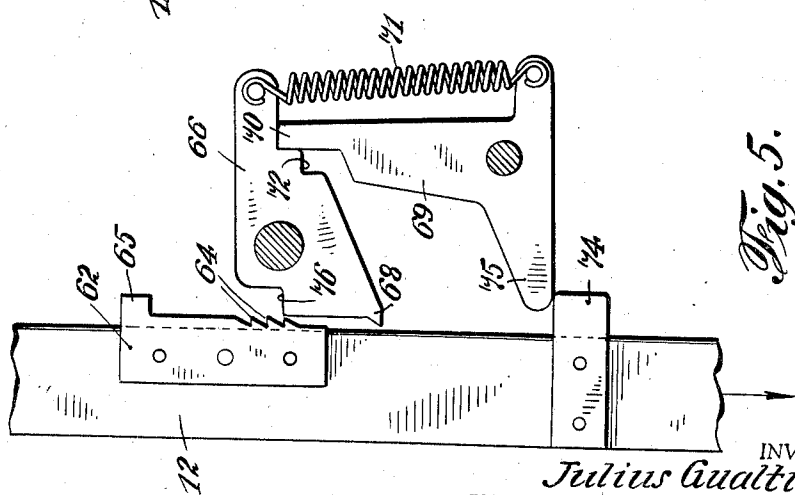
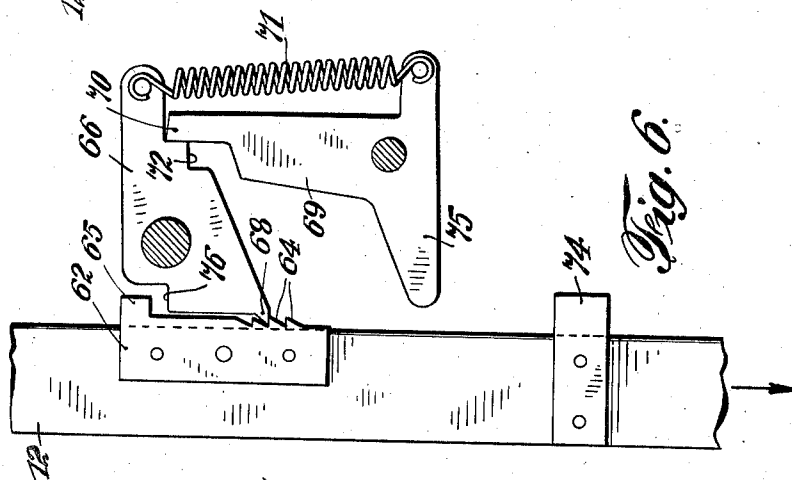
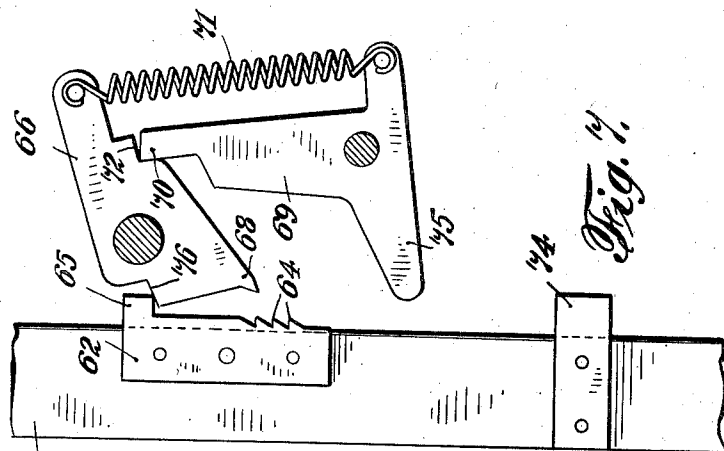
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RIVETING MACHINE

Filed March 24, 1937

4 Sheets-Sheet 4



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2,127,357

RIVETING MACHINE

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3 Claims. (Cl. 1—3)

The present invention relates to a manually operated machine for setting small rivets.

The present invention is embodied in a machine wherein the riveting operation when once started must be continued through to the finish. This prevents the possibility of partially operating the machine so as to start a rivet without completing the riveting operation and then operating the machine a second time. This would result in two rivets being simultaneously driven down by the plunger and the machine would be jammed or a false riveting operation would occur in which neither rivet would be properly set.

Another feature of the present invention is an automatic operation of the relation between the setting plunger and the riveting anvil which accommodates materials of different thicknesses without making special adjustments. With the present machine, thin materials may be riveted together and in the next operation, thicker materials may be used without making any adjustments of the machine.

Other and further objects of the present invention will in part be obvious and will in part be pointed out hereinafter by the accompanying drawings forming a part of the specification.

The disclosure herewith is to be understood as illustrative and not in the limiting sense, and like characters are used to designate like parts throughout the several figures of the drawings.

Fig. 1 is an elevational view of the device showing the pedestal thereof broken in order to shorten the drawing by omitting an unimportant portion of the pedestal.

Fig. 2 is a front view of the setting head.

Fig. 3 is a detail front view similar to Fig. 2 showing the rivet chute and rivet pocket in section, and also showing in section portions of the anvil plunger and cam with its supporting plate.

Fig. 4 is a detail view showing the mechanism for automatically operating the anvil to adjust the same for different thicknesses of material, and showing a portion of the anvil and frame in section.

Fig. 5 is a detail view illustrating the full stroke mechanism in its normal position prior to the operation of the machine.

Fig. 6 is a detail view illustrating the full stroke mechanism in operation during the descending movement of the main operating bar.

Fig. 7 is a detail view illustrating the full stroke mechanism at the completion of the full down stroke of the main operating bar.

Fig. 8 is a detail view taken on line 8—8, Fig. 3.

Referring now to the drawings and more espe-

cially to Fig. 1, the pedestal frame 1 is provided with a base 2 which carries a pedal lever 4 pivoted to the base by a pivot 5. An adjustable lower stop 6 is provided to limit the downward movement of the pedal lever 4 and an adjustable upper stop 7 limits the upper movement of this pedal 4 as it is raised by the powerful raising spring 8 which is anchored at one end by the pivot 9 to the lever 4 and is anchored at the other end to an anchor (not shown) carried by the pedestal frame so that when the pedal 4 is depressed, the spring 8 is stressed and raises the pedal against the stop 7 as soon as pressure is released from the pedal. This is a common construction in the art and need not be more specifically illustrated in order for one skilled in the art to understand the same.

A head frame 10 carries rivet feed mechanism, operating mechanism for the plunger and other essential parts. This head frame also comprises an arm 11 which carries the anvil as will later be explained. The main operating bar 12 is pivoted to the pedal lever 4 by the pivot 14 at its lower end and at its upper end is pivoted by a pivot 15 to a bell crank 16 which is mounted on a stub shaft 17 on the head frame 10. This bell crank 16 is provided with a stop 18 which is adapted to contact the head frame 10 when a full stroke is made. The outer end of the bell crank 16 carries a thrust link 19 which connects with a plunger lever 20 which is pivoted on the stub shaft 21 mounted in the top of the head frame 10. The forward end of the plunger lever is connected by a link 22 with a vertically reciprocating plunger bar 23 which carries at its lower end a setting plunger 25. A dog 26 is carried by an offset 27 on the plunger lever 20 and engages a ratchet wheel 28 mounted on a shaft which carries a feed cup 29 that receives rivets from a hopper 30 to feed the same in the manner well known in the art, and since this construction is not a special feature of the present invention and is very well known in the art, further description and illustration are not necessary to a complete understanding thereof to one skilled in the art. It is sufficient to point out that rivets A escaping from the feed cup 29 descend by gravity down the rivet chute 31 to a rivet pocket 32.

The rivet pocket 32 comprises a block 34 carried upon a pair of arms 35, 36 supported by the front plate 37 mounted on the head frame 10. These arms 35 and 36 are held in place by a thumb nut 38 in order that the rivet pocket 32 may be easily removable so that it may be changed to accommodate different sizes and types of rivets.

The block 34 (see Figs. 2, 3, and 8) carries a pocket plate 39 which rests upon a pair of sliding jaws 40 and 41 and holds these jaws in position on the block 34. The sliding jaws 40 and 41 are urged into contact by a spring 42 carried on the block 34. The sliding jaws 40 and 41 have a conical opening 44; substantially one-half of said opening being carried by each of said jaws. A rivet A sliding down the rivet chute 31 by gravity moves into position beneath the setting plunger 25 with the head of the rivet resting in the conical opening 44. When the machine is operating to set a rivet, the setting plunger 25 moves downwardly and contacts with the head of the rivet, thus forcing the jaws 40 and 41 outwardly against the action of the spring 42 as the rivet is pushed downwardly through the conical opening by the setting plunger 25. As the rivet A leaves the sliding jaws 40, 41, it drops into a pocket bushing 45 which is held in place in the block 34 by the lock plate 46 carried on the block 34. The opening 47 in the pocket bushing 45 is of such size as will correctly guide the rivet A in its descending movement.

An important feature of the present invention is the mechanism for operating the anvil against which the rivet is set and attention is directed to Figs. 1 and 4. The setting anvil comprises an anvil head 48 which is removably set in the anvil plunger 49 in order that the anvil head may be changed to suit different types of rivets being used in the machine. The anvil plunger 49 is mounted to reciprocate vertically in a boss 50 on the forward end of the frame arm 11, and this boss 50 is located beneath the rivet pocket 32. The lower end of the anvil plunger 49 is provided with an anti-friction roller 51 which is mounted within a cam slot 52 in the cam plate 54 which is mounted upon a stub shaft 55 carried by the forward end of the frame arm 11 beneath the boss 50. The lower end of the cam plate 54 is pivotally connected to a thrust link 56 which at its other end is connected with a bell crank 57. This bell crank 57 is mounted on a stub shaft 58 which is carried by the pedestal frame 1 and the outer arm of the bell crank connects with a coil spring 59 which has its lower end connected to an anchor 60 carried by and offset from one side of the main operating bar 12. A lifting lug 61 is also mounted on the main operating bar 12 and is adapted to contact the under side of the outer arm of the bell crank 57 to which the coil spring 59 is attached. As the main operating bar 12 descends, when the pedal lever 4 is depressed, the coil spring 59 acts on the bell crank 57 to swing the same clockwise (Figs. 1 and 4) and thereby through the link 56 to swing the cam plate 54 clockwise. This causes the cam slot 52 to raise the anvil plunger 49 through the connection of the anti-friction roll 51. This raising operation is occurring at the same time the setting plunger 25 is descending. The anvil plunger 49 continues to rise until the anvil head 48 tightly clamps the work between the anvil head 48 and the lower end of the pocket bushing 45. This clamping operation is completed before the plunger 25 contacts with the rivet A so that when the plunger descends to push the rivet A through the sliding jaws 40, 41 and to set the same securely in the work, the work has been tightly clamped in position. It will be observed that the amount of lift permitted to the anvil plunger 49 is dependent upon the thickness of the work between the anvil head 48 and the bottom of the pocket bushing 45. When the up-

ward movement of the anvil plunger 49 is stopped due to the thickness of the work, the coil spring 59 is stressed and the anvil head 48 is securely held against the work to receive pressure of the setting plunger 25 which is necessary to clench the rivets A in position in the work. As the main operating bar 12 rises, the lifting lug 61 contacts the under portion of the outer arm of the bell crank 57 and swings the bell crank 57 counter-clockwise thereby, through link 56, swinging the cam plate 54 counter-clockwise and lowering the anvil plunger 49 to normal position. It will be observed that this mechanism automatically accommodates this machine to work of different thicknesses without special adjustment of the anvil or plunger.

Another important feature of this invention resides in the full stroke mechanism whereby but a single rivet at a time may be set when the machine is operated. Referring now more especially to Figs. 1, 5, 6, and 7, a ratchet plate 32 is riveted on the main operating bar 12. This full stroke device is positioned on the main operating bar 12 below the coil spring 59 so as not to interfere. The ratchet plate 32 is provided with rack teeth 64 and a release lug 65. A dog 66 is mounted upon a carrier plate 67 which is attached to the pedestal frame 1 and the dog is provided with a tooth 68 adapted to cooperate with the rack teeth 64. A lock plate 69 is also pivoted on the carrier plate 67 and is provided with an upper end 70 against which the dog 66 is normally held by a coil spring 71 extending between an arm of the lock plate 69 and the dog 66. The under part of the dog 66 is provided with a holding shoulder 72 which also cooperates with the upper end 70 and the lock plate 69, as will be explained. An operating lug 74 is adapted to contact with an arm 75 on the lock plate 69 to swing the lock plate 69 as the main operating bar 12 is raised to normal position by the raising spring 8 when pressure is released from the pedal 4.

Fig. 5 illustrates the full stroke mechanism in normal position prior to the depression of the pedal 4. It will be noted there is a free space provided between the tooth 68 on the dog 66 and the rack teeth 64. This free space corresponds to the movement of the setting plunger 25 prior to its contacting with a rivet A in position between the sliding jaws 40 and 41. As soon as the plunger 25 contacts with the head of the rivet, the dog 66 engages the first rack tooth 64 and if pressure on the pedal 4 is released, the dog 66 prevents the raising spring 8 from returning the parts to normal position; in other words, the parts are arrested in a partial cycle of operation requiring the pedal 4 to be depressed a full stroke after which it may be returned to normal. Fig. 6 illustrates the parts during the middle portion of the cycle of setting the rivet in the work. As the full stroke of the pedal 4 is completed, the release lug 65 on the ratchet plate 32 contacts with the shoulder 76 on the dog 66 and swings the dog to disengage the tooth 68 from the rack teeth 64. At the same time, the coiled spring 71 is effective to move the upper end 70 of the lock plate in the holding shoulder 72 on the dog 66. The ratchet mechanism is now ineffective and the raising spring 8 may operate to raise the main operating bar 12 to return the parts to normal position. As the main operating bar 12 rises, the operating lug 74 contacts with the arm 75 on the lock plate and swings the lock plate 69 clockwise, thereby removing the end 70 of the lock plate 69 from the holding

shoulder 72 on the dog 66. The spring 71 now operates to bring the under operation of the dog 66 into contact with the arm 70 and the parts are again in normal position. It is to be observed that the parts are not returned to normal position until the rack teeth 64 have passed beyond the zone of operations of the dog tooth 68 which occurs at or near the end of the rivet setting operation.

From the foregoing mechanism, it will be observed that when once a rivet is started from the rivet pocket, the riveting operation must be completed before a second rivet can be displaced from the pocket by the plunger 25. It will also be observed that the rivets in the rivet chute 31 cannot descend into position in the rivet pocket 32 until the plunger 25 is raised sufficiently to clear the pocket to permit a rivet to be dropped into place in the conical opening 44 in the sliding jaws 40 and 41.

A cycle of operations of a machine is as follows:

The operator depresses the pedal 4 until the same contacts with the stop 6. This draws downward the main operating bar 12 which causes the bell crank 16 to swing counter-clockwise (Fig. 1) until the stop 18 contacts with the head frame 10. The swinging of the bell crank 16 pushes the thrust link 19 upwardly to oscillate the plunger lever 20 which through the links 22 forces the plunger bar 23 downward and causes the setting plunger 25 to engage the head of a rivet A in the conical opening 44 of the sliding jaws 40 and 41. A continued movement of the setting plunger 25 forces the rivet A through the jaws 40 and 41 which yield outwardly against the tension of the spring 42, thereby carrying the rivet downwardly through the pocket bushing 45.

While the plunger 25 has been descending downwardly, the downward movement of the main operating bar 12, has applied sufficient pull to the coil spring 59 to hold the arm of the bell crank 57 in engagement with the lifting lug 61, thereby swinging clockwise (Fig. 4) the bell crank 57. This movement of the bell crank 57 has pushed forward the thrust link 56 which oscillates the cam plate 54 on its pivot 55. The oscillation of the cam plate has caused the cam slot 52 to operate on the roller 51 to raise the anvil plunger 49 and to clamp the work between the anvil head 48 and the lower end of the bushing 45 before the setting plunger 25 has displaced the rivet A from between the pocket member 40 and 41. This occurs before the stop 18 has contacted the frame 10. When the work has been tightly clamped between the anvil head 48 and the bushing 45, the further descent of the main operating bar 12 stretches the coil spring 59 and the tension of this spring acting through the connected parts to the cam plate 54 and the anvil head 48 tightly holds the work in place against the bushing 45 ready to receive the rivet. It will be observed that the axis of the stub shaft 55 for the cam plate 54 is directly vertically in line with the pressure delivered against the anvil plunger 49 so that the anvil head 48 is rigidly and unyieldingly held in position to receive the thrust necessary to securely set the rivet A. This is a feature of substantial importance where rivets are set through heavy work and considerable pressure on the setting plunger 25 is necessary to properly clinch the rivets.

Since it is desirable that the machine shall be operated at a full stroke for each operation thereof, a full stroke mechanism which is positive in its operation, (Figs. 5, 6, and 7) is provided to

prevent a careless operator from making a partial stroke and then releasing pressure on the pedal 4. This full stroke mechanism comes into operation during the downward movement of the main operating bar 12 and comprises rack teeth 64 which are normally engaged by a swinging dog 68 that rides over these teeth during the downward movement of the main operating bar 12. Prior to the final downward movement of the main operating bar and after the rivet has been set in the work, a release lug 64 (see Fig. 7) contacts with a shoulder 76 on the dog 66 and rocks the same counter-clockwise to disengage the teeth of the dog from the rack teeth 64. A coil spring 71 extends between a locking plate 69 and the dog 66 and normally tends to swing the dog clockwise and the locking plate counter-clockwise. When the dog is swung counter-clockwise by the release lug 65, the locking plate swings counter-clockwise to bring the upper end 70 thereof beneath a holding shoulder 72 on the dog 66. This positively locks the dog in its disengaged position relative to the rack. The parts are securely held in this relation until the operator releases pressure from the pedal 4 when the raising spring 8 raises the pedal and thereby lifts upwardly the main operating bar 12 to restore the parts to normal position. As the main operating bar travels upwardly, an operating lug 74 on the main operating link 12 comes into engagement with an arm 75 on the locking plate 69 to swing the same clockwise and disengage the upper end 70 from beneath the holding shoulder 72. The spring 71 now rotates the dog 66 clockwise to normal position until the upper end 70 of the locking plate comes beneath the arm on 66 (see Fig. 5) and the parts are now in normal position whereby the tooth 68 will engage the rack teeth 74 at the next operation of the machine.

As the parts are restored to normal position by the lifting spring 8, the plunger lever 20 is rotated in a clockwise direction and during this operation, a dog 26 carried by this plunger lever 20 engages a ratchet wheel 28 to rotate the same clockwise and thereby rotate the feed cup 29 to agitate rivets therein and cause the same to be fed into the rivet chute 31. Thus so long as the supply of rivets continues, rivets A will be fed in position as shown in Fig. 3 ready for the next operation of the machine.

The present machine is an efficient and simple mechanism for setting rivets in materials of different thicknesses without special adjustment of the machine and also is constructed in such manner as to perform satisfactory work with the careless operator who may not apply sufficient force to complete a full cycle of operations, then releases the pressure and applies a heavy operating force on the pedal 4. The machine is so constructed that it will not function for a second operation until the first cycle is completed.

What is claimed is:

1. In a rivet setting machine, the combination of a plunger for setting rivets, an anvil against which said plunger operates to set rivets in work, a stationary member through which said plunger operates above said anvil, means to operate said plunger, an oscillating cam to raise and lower said anvil, the pivot for said cam being substantially at right angles to the line of movement of said plunger, devices connecting said means to said cam to operate said cam to raise said anvil when said plunger is moving toward said anvil whereby work is clamped between said anvil and said stationary member before said plunger is

effective to set a rivet in the work, one of said devices comprising a spring member.

2. In a machine for setting rivets, the combination of a rivet setting plunger, means to
5 reciprocate said plunger, an anvil mounted for reciprocation beneath said plunger, a stationary member above said anvil, an oscillating cam associated with said anvil and mounted on a pivot
10 aligned with the axis of reciprocation of said plunger and said anvil, and means comprising a spring member operatively connecting said plunger reciprocating means with said cam whereby said spring is effective to raise said
15 anvil and said stationary member while said plunger is moving toward said anvil and prior to the effective operation thereof to set a rivet in the clamped work.

3. In a riveting machine, the combination of
20 rivet setting means; a rivet pocket in the path of said rivet setting means; feed means to feed a

single line of rivets to said pocket whereby the end rivet of said line rests in said pocket; means to operate said rivet setting means to cause the same to displace a rivet in said pocket and set the same
5 in work; and ratchet means adapted to prevent the return of said rivet setting means after the rivet has been removed from said pocket and prior to the completion of the rivet setting operation, said ratchet means comprising a rack bar, a swinging
10 dog adapted to engage said rack bar, a lug on said rack bar adapted to swing said dog to disengage said dog from said rack bar when the riveting operation is completed, a swinging
15 locking plate adapted to hold said dog in disengaged position, an operating lug on said rack which engages said locking plate to release said dog at substantially the upper limit of travel of said rack bar, and a spring connecting said dog and said locking plate.

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