Dec. 5, 1961 J. B. VILMERDING 3,011,534

FASTENER HOLDING AND DRIVING DEVICE

Filed Aug. 26, 1959 2 Sheets-Sheet 1

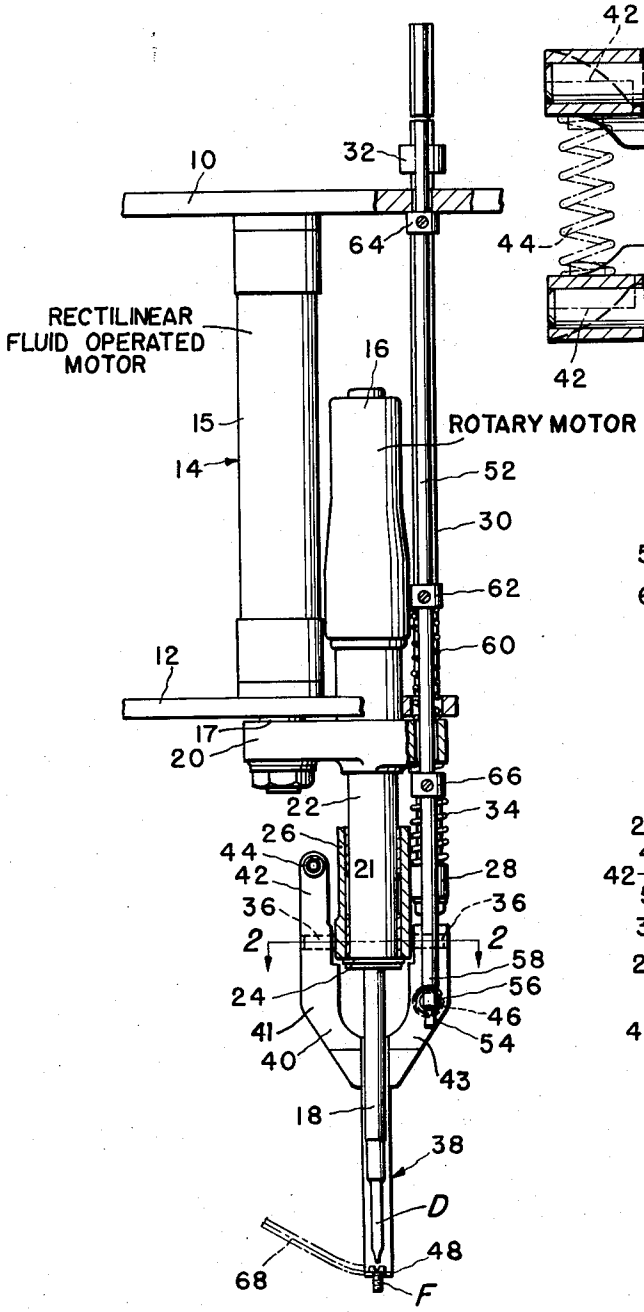



FIG. 1

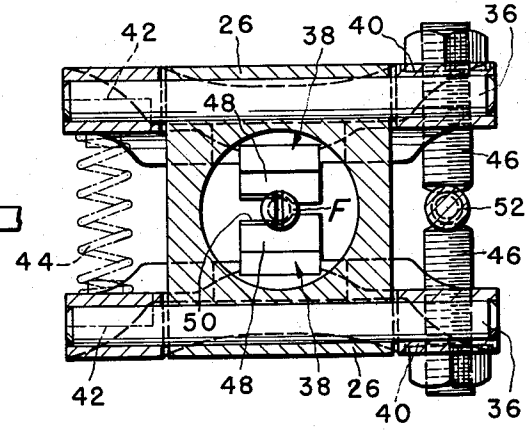



FIG. 2

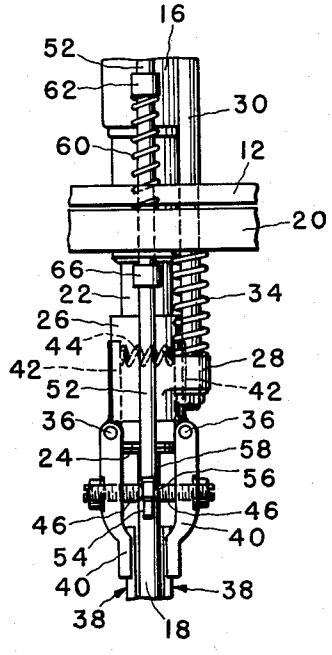



FIG. 3

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FASTENER HOLDING AND DRIVING DEVICE

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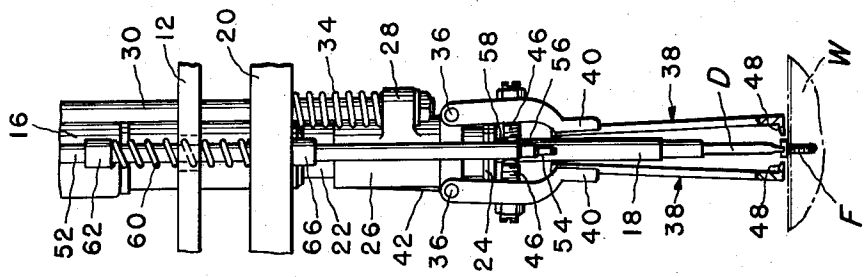



FIG. 6

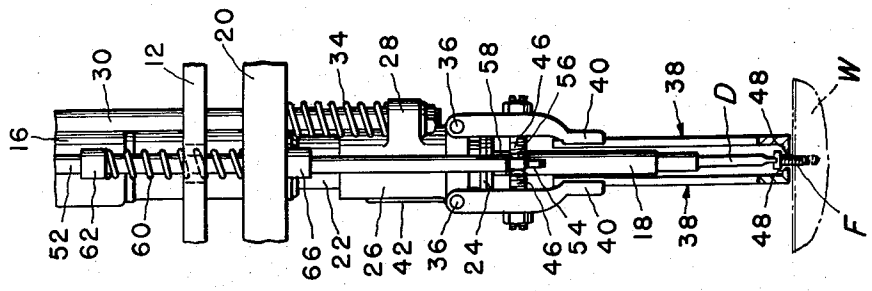



FIG. 5

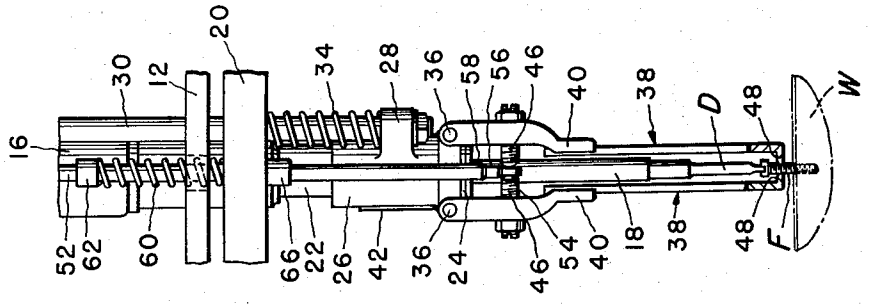



FIG. 4

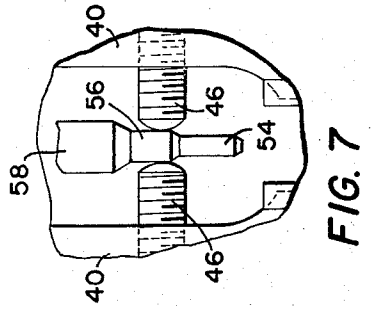



FIG. 7

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# FASTENER HOLDING AND DRIVING DEVICE

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5 Claims. (Cl. 144—32)

This invention relates to machines for driving fasteners and more specifically to a fastener holding arrangement therefor.

An object of this invention is to provide a simplified device for holding automatically fed fasteners for power driving machines.

Another object of this invention is to provide a simplified control sequencing arrangement for fastener holding devices for power driving machines.

These and other objects will become apparent by referring to the following specification and the accompanying drawings in which

FIGURE 1 is an elevational view of the driving head of a machine including a fastener holding arrangement in accordance with the invention,

FIG. 2 is a sectional view of the fastener holding device taken along the plane 2—2 of FIG. 1,

FIG. 3 is an end elevation of a portion of FIG. 1,

FIGS. 4, 5 and 6 are views similar to FIG. 3 with the machine and the holding device in various operated positions, and

FIG. 7 is an enlarged, broken-away showing of cam rod end 58 and followers 46.

Only the driving or tool head portion of the machine is shown comprising the spindle and the spindle holding bracket together with the spindle driving motor and the head motor. Two plates 10 and 12 of the framework are shown as being spaced and mounting an axial drive motor 14. This motor 14, being of a conventionally known type, is in the form of an expansible piston and cylinder arrangement wherein the cylinder 15 is held between plates 10 and 12 of the machine and the movable piston (not shown) has its rod end 17 connected to a bracket 20 which is connected to a movable tool head 21. The spindle drive motor 16 is of a commonly known rotary type and is mounted on top of the bracket 20 and extends through an opening in the plate 12. The tool head 21 comprises a tubular portion 22 which houses a part of the spindle 18. The spindle 18 extends downwardly from the forward end of the tool head 21 and carries a driver D adapted to engage and rotate a fastener F. A carrier 26, in the form of a sleeve, is slidably received on the tubular portion 22 and is limited in its upward travel by the bracket portion 20, and in its downward travel by a stop 24 at the end of the tubular housing. The carrier 26 has a lug 28 which receives the end of a stroke rod 30. The rod 30 extends upwardly through openings in the bracket 20 and the plates 10 and 12. A spring 34 encircles the portion of the rod 30 between the bracket 20 and the lug 28 and tends to urge the carrier 26 into abutment with the stop 24. The rod 30 has an adjustable collar 32 near the end remote from the lug 28 to limit the movement of the carrier 26. A pair of legs 38 is positioned forwardly of carrier 26 in face to face relationship with each other and provided with cooperating profiles to form an opening therebetween in axial alignment with spindle 18 to permit spindle 18 to move longitudinally between legs 38. Each leg 38 extends rearwardly into a yoke portion 40, the latter having opposing arms 41, 43 pivotally connected to carrier 26 by pivot pins or trunnions 36, see FIGS. 1–3. Each of the yoke arms 41 has a spring arm 42 extending rearwardly of the associated yoke pivot 36, spring arms 42



cooperating with each other to engage a compressed spring 44 which constantly urges spring arms 42 away from one another and causes yoke portions 40 and legs 38 to pivot about pivots 36 toward one another. Each of the yoke arms 43 of yoke portions 40 is provided with inwardly directed extensions cooperating with each other to form an adjustable cam follower 46. At the bottom of the legs 38 are flanges forming feet portions 48 turned in toward one another in face to face relationship, each having a profile to form a keyhole slot type opening 50.

A cam rod 52 having three stepped cam surfaces 54, 56 and 58 at its lower extremity extends upwardly through openings in the bracket 20 and the plates 10 and 12. The lower end of the rod 52 may be continuously tapered in place of having the three progressively reducing surfaces. A collar 62 is spaced upwardly from the bracket 20 and retains one end of a spring 60 which encircles the rod 52 and abuts the top of the bracket at its lower end. The spring 60 tends to urge the cam rod 52 upwardly, the upward movement of the rod being limited by a second collar 64 which abuts the bottom of the plate 10 of the machine structure. With the collar 64 abutting the plate 10, a third collar 66 is locked to the cam rod 52 and is spaced from the bottom of the bracket 20.

With the tool head in the inoperative position, as shown in FIGS. 1 and 3, the motor 14 is deenergized with the bracket 20 drawn upwardly to the plate 12. The spring 34 encircling the stroke rod 30 is holding the carrier 26 against the stop 24 while the spring 60 bearing against the top of the bracket 20 and the collar 62 urges the cam rod to its uppermost position in which the collar 64 abuts the plate 10 and the collar 66 is spaced from the bottom of the bracket 20 with the cam followers 46 riding on the intermediate cam surface 56. When the cam followers 46 ride on the cam surface 56, the legs 38 are spread slightly from one another sufficient to open the keyhole slot type opening 50 to allow the passage of a fastener from the chute 68 through the neck portion of the slot (see FIG. 2).

To drive a fastener into the work, the motor 16 is started to rotate the driver D. The motor 14 is energized to move the tool head 21 downwardly. Due to the force of the spring 34 bearing against the bottom of the bracket 20 and the lug 28, the complete device (carrier 26 and legs 38) moves downwardly with the bracket 20. The cam rod 52, however, due to the force of the spring 60 maintains its original position until the bracket 20 engages the collar 66. When this position is reached, the carrier 26 and legs 38 have moved relative to the cam rod 52 such that the cam followers 46 have now moved to the smallest cam surface 54. Since the cam surface 54 is smaller in diameter than the cam surface 56, the force of the spring 44 urges the legs 38 towards one another and closes the opening 50 sufficiently to reduce the neck portion thereof to keep the fastener F from sliding out.

Further movement of the tool head moves the spindle 18, the carrier 26 and legs 38 as well as the cam rod 52 forwardly toward the work until the fastener F initially engages such work. As the fastener engages the work, the fastener stops and with further forward motion of the rotating spindle, the driver D engages the fastener and rotates it (see FIG. 4).

Further driving of the tool head 21 towards the work by the motor 14 and rotation of the driver D by the motor 16 causes the fastener F to start to thread into the work W, and, move the cam rod, carrier 26 and legs 38 forward towards the work until the collar 32 engages the plate 10 and stops the advancement of the carrier 26 and legs 38 just prior to contact of the work W by the feet portions 48. Continued advancement of the tool head 21 towards the work causes the bracket 20 to move down-

wardly carrying the cam rod 52 with it while the carrier 26 and legs 38 are so stopped by the collar 32. Thus, there is a relative displacement between the carrier 26 and the bracket 20 which moves the cam rod 52 relative to the cam followers 46. The followers 46 again engage the cam surface 56 causing the legs 38 to move away from one another against the force of the spring 44 while the spring 34 maintains the collar 32 in contact with the plate 10 and the feet portions 48 are almost in contact with the work W (see FIG. 5).

Further driving by the tool head 21 to completely drive the fastener F into the work W advances the cam rod 52 together with the bracket 20 and the spindle housing 22 towards the work and causes the largest cam surface 58 to enter between the cam followers 46. Since the surface 58 is larger in diameter than is the surface 56, the legs 38 are moved still further away from one another until the sides of the feet portions 48 are removed from under the fastener head and out of the path of the driver D so the driver can fully drive the fastener F into the work (see FIG. 6).

Raising of the tool head 21 including the bracket 20 causes the cam rod 52 to raise while the spring 34 holds the collar 32 in contact with the plate 10 until the carrier 26 again abuts the stop 24. The cam rod 52 also is carried upwardly due to the force of the spring 60 until the collar 64 abuts the plate 10. At that point, the cam rod stops and the bracket 20, carrier 26 and legs 38 continue to move upwardly until the bracket engages the plate 12. At that point, the cam followers again have moved on to the cam surface 56 opening the slot 50 to permit the entry of another fastener F.

Having described the invention, I claim:

1. In a fastener driving machine, a tool head movable toward the work having a fastener driver extending from the forward end of said tool head adapted to drive fasteners, a sleeve longitudinally movably connected to the tool head and having a stop to limit the forward movement of said sleeve, spring means urging said sleeve in the direction of the work, a pair of members pivotally connected to said sleeve and having portions in face to face relationship and so profiled as to form an opening therebetween for the reception of a fastener, a rod connected to the machine having an abutment spaced from the tool head and a cam portion reducing in size in the direction of the work, said cam portion positioned such to engage said pair of members, said pair of members being movable toward the work with the tool head and relative to said cam portion to pivot such members toward one another to reduce the opening to hold a fastener therein as said tool head moves to contact said abutment, said rod and said pair of members movable towards the work with said tool head such that the said stop contacts said sleeve to limit the movement of said pair of members towards the work, and said cam portion is movable relative to said pair of members to pivot such members away from one another to enlarge the opening to release a fastener as said tool head moves toward the work and relative to said sleeve to drive such fastener.

2. In a fastener driving machine, a tool head movable toward the work having a fastener driver rotatable relative to said tool head and extending from the forward end of said tool head adapted to drive fasteners, a pair of members movably connected to the tool head and having portions in spaced face to face relationship forming an opening for the reception of a fastener, biasing means to constantly urge said portions of said members towards each other, a cam positioned for engaging said members, said members movable in the direction of movement of said tool head and relative to said cam to hold a fastener,



and said cam being movable in the direction of movement of said tool head and movable relative to said members to urge said portions of said members away from each other against the action of said biasing means to release the fastener.

3. In a fastener driving machine, a tool head movable toward the work having a fastener driver rotatable relative to said tool head and extending from the forward end of said tool head adapted to drive fasteners, a sleeve carried by the tool head and having limited slidable movement relative to said tool head, spring means urging said sleeve in the direction of the work, a pair of members being pivotally connected to said sleeve and having portions in face to face relationship forming an opening therebetween for the reception of a fastener, a cam member having a cam portion engaging said pair of members and an abutment spaced from and adapted to contact the tool head, and said cam portion and said pair of members adapted to move relative to one another by the movement of the tool head toward the work to control the relative positions of said portions to hold and release a fastener.

4. In a fastener driving machine, a tool head movable toward the work having a fastener driver extending from the forward end of said tool head adapted to drive fasteners, a sleeve connected to the tool head, members pivotally connected to said sleeve and having portions in face to face relationship disposed in the path of movement of the fastener driver forming an opening therebetween for the reception of a fastener, biasing means to constantly urge said portions of said members towards each other, a cam member having a cam portion reduced in size in the direction of the work and positioned to engage said members, and said cam portion being adapted to move toward the work with the tool head to pivot said members away from each other against the action of said biasing means to release the fastener.

5. In a fastener driving machine, a tool head movable toward the work having a fastener driver extending from the forward end of said tool head adapted to drive fasteners, a carrier connected to the tool head, spring means urging said carrier in the direction of the work, a pair of members pivotally connected to said carrier and having portions so profiled as to form an opening therebetween for the reception of a fastener, a cam movable in the direction of movement of said tool head positioned for engaging said members for pivoting the members to vary the size of the opening, and said members movable in the direction of movement of said tool head and relative to said cam to pivot toward one another to reduce the opening and hold a fastener therein, said portions being disposed in the path of movement of said fastener driver, an abutment connected to said carrier adapted to be engaged by movement of the tool head to prevent contact of the work by such members, and the cam being movable relative to said members to move such members away from one another to move said portions out of the path of movement of said fastener driver and release the fastener as said fastener driver drives such fastener.


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