

June 16, 1959

J. G. WRIGHT ET AL

2,890,453

FASTENER FORMING AND INSERTING MACHINE

Original Filed June 18, 1956

3 Sheets-Sheet 1

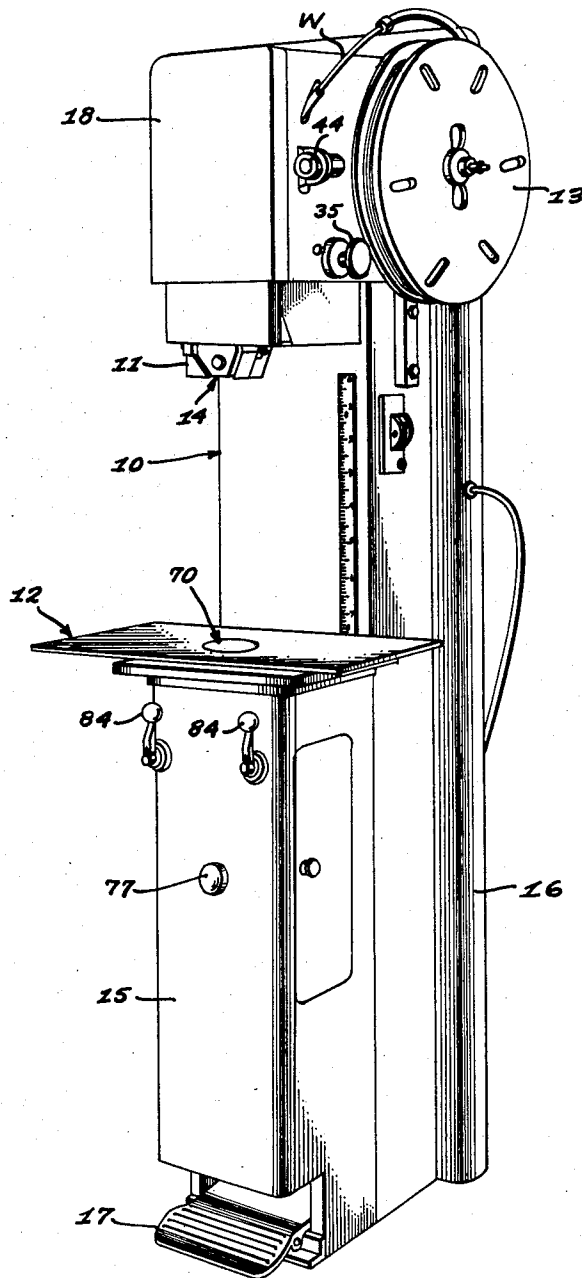


Fig. 1

INVENTORS
JOHN G. WRIGHT,
GEORGE M. WYNN &
BY ROBERT H. HUTCHESON

Parrott & Richards
ATTORNEYS

June 16, 1959

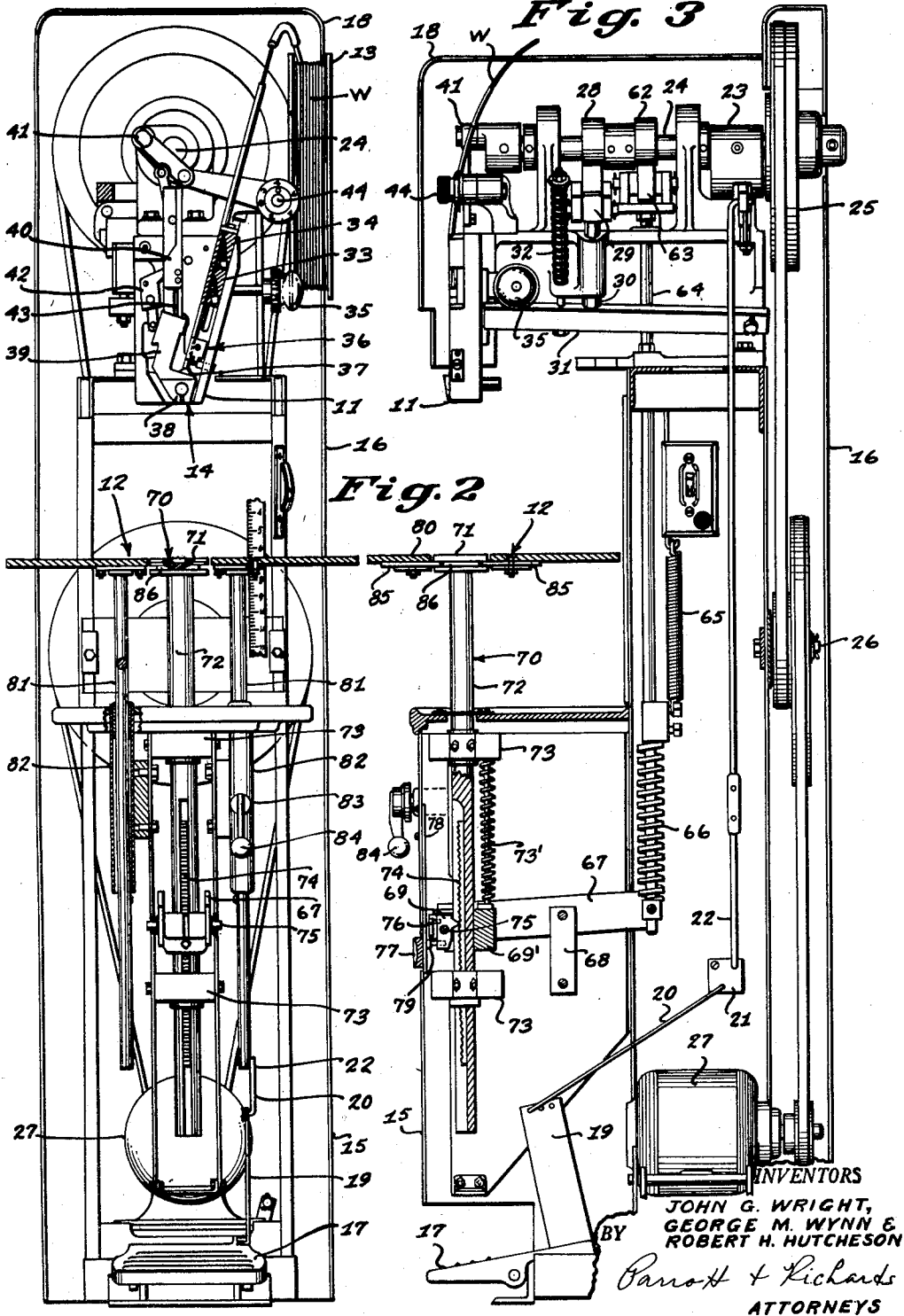
J. G. WRIGHT ET AL

2,890,453

FASTENER FORMING AND INSERTING MACHINE

Original Filed June 18, 1956

3 Sheets-Sheet 2



June 16, 1959

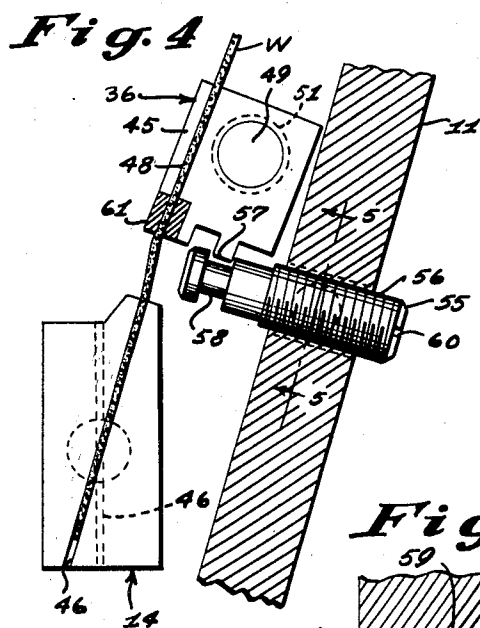
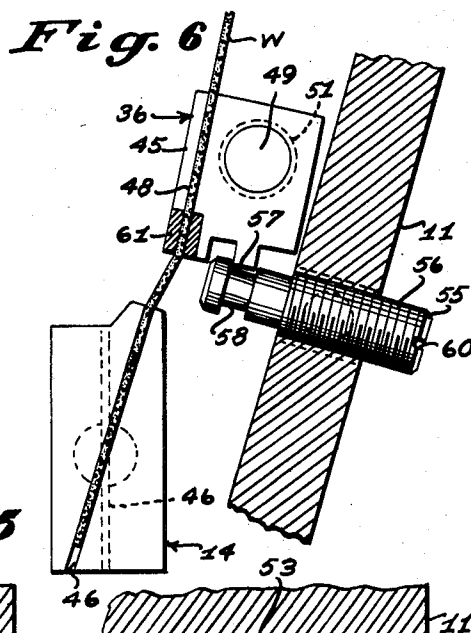
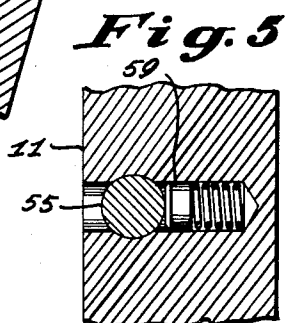
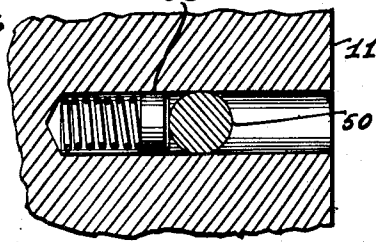
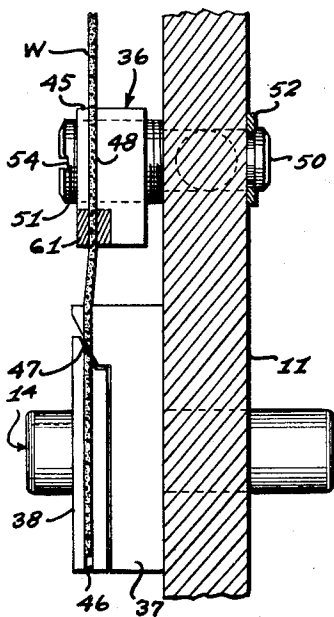
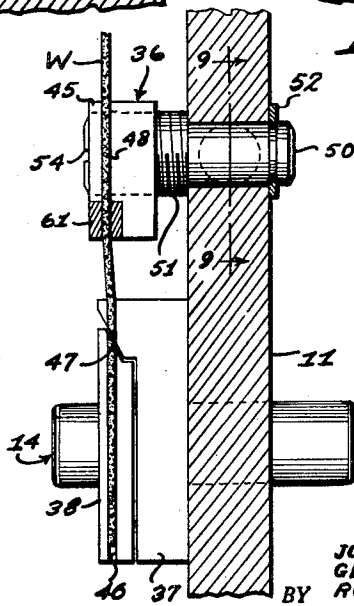
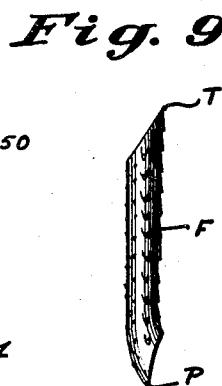
J. G. WRIGHT ET AL

2,890,453

FASTENER FORMING AND INSERTING MACHINE

Original Filed June 18, 1956

3 Sheets-Sheet 3



INVENTORS
JOHN G. WRIGHT
GEORGE M. WYNN &
BY ROBERT H. HUTCHESON
Parrott & Richards
ATTORNEYS

1

2,890,453

FASTENER FORMING AND INSERTING MACHINE

John G. Wright, George M. Wynn, and Robert H. Hutcheson, Atlanta, Ga., assignors to The Auto Soler Company, a corporation of Georgia

Original application June 18, 1956, Serial No. 591,891. Divided and this application June 6, 1958, Serial No. 741,983

2 Claims. (Cl. 1—15)

This invention relates to fastener forming and inserting machines of the type arranged for forming fasteners from a continuous length of wire and inserting the fasteners formed in work to be secured, and this application is a division of copending application Serial No. 591,891, filed June 18, 1956.

In particular, the present invention provides an improved means for directing the wire as it is fed to have fasteners formed therefrom by which the resulting fasteners can be conditioned for consistent straight driving. In addition, a work supporting means is provided according to the present invention that is uniquely arranged for supporting work to be secured advantageously to have the fasteners inserted therein.

These and other features of the present invention are described in detail below in connection with the accompanying drawings, in which:

Fig. 1 is a perspective view of a fastener forming and inserting machine embodying the present invention;

Fig. 2 is a front elevation corresponding generally to Fig. 1, but partly cut away and partly in section to show the relative arrangement of the operating elements;

Fig. 3 is a right side elevation corresponding generally to Fig. 2;

Fig. 4 is an enlarged fragmentary detail illustrating the arrangement of the wire directing means provided according to the present invention;

Fig. 5 is a sectional detail taken substantially on the line 5—5 in Fig. 4;

Fig. 6 is a further detail corresponding to Fig. 4 but showing a different adjusted position of the wire directing means;

Fig. 7 is an enlarged fragmentary sectional detail related right angularly to the details shown in Figs. 4 and 6 to illustrate further the arrangement of the wire directing means provided by the present invention;

Fig. 8 is a further enlarged fragmentary detail corresponding generally to Fig. 7 but showing the wire directing means in a still different adjusted position;

Fig. 9 is a sectional detail taken substantially on the line 9—9 in Fig. 8; and

Fig. 10 is an exaggerated illustration of a fastener such as is formed by the machine illustrated in the drawings.

The fastener forming and inserting machine shown in the drawings, for purposes of illustration, is a machine arranged especially for nailing in woodworking operations and the like, although it should be noted that the features of the present invention are equally well adapted for use in other specific forms of fastener inserting machines, such as those arranged particularly for shoe repair work and the like.

Referring first to Fig. 1 of the drawing, the nailing machine shown comprises generally a suitable frame structure 10 arranged to support an operating head 11 above a work supporting means 12 so that wire W may be fed from a reel supply carried on the frame structure 10 at 13 through the operating head 11 to have successive

2

fasteners formed therefrom by a knife assembly at 14 and inserted in work carried by the supporting means 12 as the machine is cyclically operated.

The frame structure 10 is made up of a lower housing portion 15 on which the work supporting means 12 is carried, a rear column portion 16 in which a driving connection is arranged from an operating foot pedal 17, and an upper housing portion 18 in which the previously mentioned operating head 11 is arranged. The lower housing portion 15 and rear column portion 16 are arranged at their lower ends so as to adapt the frame structure 10 to support the machine on a floor or similar surface.

Figs. 2 and 3 show the arrangement of the operating elements contained within the frame structure 10. Starting with the previously mentioned operating foot pedal 17, which is pivotally mounted for access from the front of the machine at a recessed lower end of the frame structure housing portion 15, this foot pedal 17 is linked through an angle arm 19 and connecting rod 20 to a pivot plate 21 from which an actuating rod 22 extends upwardly within the frame structure column portion 16 to a clutch mechanism at 23 for an operating shaft 24 carried in the upper frame structure housing portion 18 and by which the cyclic fastener forming and inserting operations are actuated.

Depression of the forward end of the foot pedal 17, results in pulling downwardly on the actuating rod 22 to trip the clutch mechanism 23 and connect the rear end of the operating shaft 24 with a drive pulley 25 which is in turn connected through a compound pulley at 26 to a drive motor 27. Rotation of the operating shaft 24 through this drive connection upon tripping of the clutch mechanism 23 from the foot pedal 17 results in a cyclic operation of the machine during which a selected length of the wire W is fed to the knife assembly 14, the knife assembly 14 is actuated to cut the length of wire W fed thereto and thereby form a fastener, and the fastener thus formed is driven from the knife assembly 14 for insertion.

Feeding of the wire W to the knife assembly 14 is effected from a cam carried on the operating shaft 24 at 28 which acts to displace a lever arm structure 29 arranged substantially as disclosed in U.S. Patent No. 2,636,168 to depress an actuating rod 30 extending downwardly to bear on a lever arm 31 that is biased upwardly at 32 and that extends forwardly to operate a movable wire feed block 33. The wire W is trained from the reel supply 13 to this movable wire feed block 33 through a similar stationary feed block 34 which serves the purpose of holding the wire W against retraction during operation of the movable feed block 33. The wire W is fed upon downward displacement of the movable feed block 33 which is effected by actuation of the lever arm 31 from the operating shaft cam 28 through the previously noted arrangement, and it will be seen that the length of wire W fed will depend upon the stroke of the movable feed block 33, so that the feeding length can be adjusted by adjusting the extent to which the lever arm structure 29 is displaced which can be provided for by arranging an operating knob at 35 to set the lever arm structure 29 at a selected position in relation to the operating shaft cam 28 through any suitable means comparable to that disclosed in the above noted U.S. Patent No. 2,636,168.

The wire W fed in this manner is directed through a guide means 36 to the knife assembly 14 which comprises a stationary blade member 37 and a match movable blade member 38 formed with complementary fastener forming shearing edges adapted to cut the wire W diagonally to form a pointed fastener F as illustrated in Fig. 10; the knife assembly 14 being further formed with a passageway adapting the blade members 37 and 38 to receive and position the wire W in relation to the

above noted shearing edges as illustrated generally in Figs. 4, 6, 7 and 8, and as disclosed in detail in U.S. Patent No. 2,684,490.

The movable blade member 38 of knife assembly 14 is arranged with an extending cam arm portion 39 for operation from a plunger 40 that is reciprocated by a crank mechanism 41 carried at the forward end of the operating shaft 24. This movable blade member 38 is normally positioned in relation to the stationary blade member 37 by a return cam device at 42 (see U.S. Patent No. 2,566,104 for detailed disclosure) so as to arrange the knife assembly 14 for receiving the wire W at the passageway formed therein. Upon downward reciprocation of the plunger 40, however, the movable blade member 38 is shifted through its cam arm portion 39 to cause fastener forming action of the blade member shearing edges and to position the movable blade member 38 in relation to the stationary blade member 37 to receive a driving tip 43 carried at the lower end of plunger 40 to drive the fastener just formed from the knife assembly 14 into work positioned thereat. It will be seen that the plunger 40 may be adjusted for selecting a desired driving depth by adjusting the throw of the crank mechanism 41 which may be done from an adjusting knob 44 through any suitable adjustment means comparable to that disclosed in the previously noted prior Patent No. 2,636,168.

The knife assembly 14 when operated in the above described manner forms a fastener F such as is illustrated in Fig. 10, which is characterized by pointed ends that are formed when the wire W is cut diagonally. Such diagonal cutting naturally results in forming the trailing and leading fastener points at opposite sides of the fastener F so that if nothing more is done the resulting fastener is quite difficult to drive straight with any consistency, because the leading fastener point tends to veer off due to its sidewise disposition, and the opposite disposition of the trailing end point makes it difficult to drive the fastener F straight from this end. For this reason, the knife assembly 14 has heretofore been adapted, as disclosed in U.S. Patents Nos. 2,520,521 and 2,684,490, to displace the leading fastener end inwardly towards the central axis as indicated in Fig. 10 at P, and this arrangement has greatly improved the straight driving characteristics of the fastener F.

Also, it has been found, as disclosed in U.S. Patent No. 2,566,104, that a stationary guide block can be arranged to direct the wire W into the knife assembly 14 so as to remove any residual curvature in the wire W as delivered from the reel supply 13, and further to impart a cast to a fastener length of the wire W that results in curving the resulting fastener F lengthwise to dispose the trailing end T more nearly in axial alignment with the leading point P thereof and thereby further enhance the straight driving characteristics of the fastener F. This result was accomplished, according to the above noted U.S. Patent No. 2,566,104, by arranging the stationary guide block at a position misaligned with the passageway formed in the knife assembly 14 to receive the wire W therein for forming the fastener F, and this arrangement has worked well in situations where substantially uniform operating conditions were encountered. That is, where the work in which the fasteners were to be inserted was of a substantially uniform character, and where the length of fastener F and size of wire W from which it was to be formed did not vary substantially. However, where a variety of operating conditions must be dealt with, as in a nailing machine, there has continued to be great difficulty in providing for dependable straight driving of the above noted type of fastener F.

According to the present invention, this difficulty is eliminated by providing a wire guide means 36 that is adjustably mounted for selective shifting from a position of alignment with the passageway in the knife assembly

14 in either direction longitudinally and transversely with respect to the direction of movement of the movable blade 38 so as to be able to make the necessary correction for obtaining straight driving under any conditions. The arrangement of this guide means 36 in accordance with the present invention is illustrated in detail in Figs. 4 to 8, inclusive, of the drawings, in which the knife assembly 14 is shown more or less diagrammatically with the wire receiving passageway therein indicated at 46 and the position of the fastener forming shearing edges at 47, the guide means 36 comprising a wire guide block 45 being mounted in spaced relation above the knife assembly 14 in the operating head 11 to direct the wire W thereto.

For this purpose, the guide block 45 is arranged with a wire directing passageway 48 formed therethrough and is mounted for pivotal adjustment about a fixed axis at 49 extending perpendicular to the direction of movement of the movable blade member 38. This fixed axis at 49 is arranged toward the end of the guide block 45 at which the entrance end of the directing passageway 48 opens and is located to allow alignment of the passageway 48 with the knife assembly passageway 46, and to space the discharge end of the guide block passageway 48 from the entrance end of the knife assembly passageway 46 at a distance approximating the length of the knife assembly passageway 46 from its entrance end to the position of the knife assembly shearing edges at 47.

The fixed axis at 49 for the guide block 45 is formed by a pivot stud 50 having a threaded length at 51 on which the guide block 45 is carried. The remaining length of the pivot stud 50 is of reduced diameter and is rotatably secured in the operating head 11 by a retaining ring 52, with a friction plug 53 arranged in the operating head 11 as shown in Fig. 9 to bear on the remaining length and thereby hold the pivot stud 50 at an adjusted position, while allowing intended adjustment readily from a slotted end 54 so as to provide for shifting the wire guide block 45 in either direction transversely of the direction of movement of the movable blade member 38 as illustrated in Figs. 7 and 8.

Provision for the other adjustment of the guide block 45 longitudinally of the direction of movement of the movable blade member 38 is made by means of an adjustment stud 55 mounted in the operating head 11, at a threaded length 56 thereof, in right angular relation with respect to the axis of the pivot stud 50 and extending to engage the guide block 45 slidably at the end thereof adjacent the discharge end of the directing passageway 48 for shifting the guide block 45 about the pivot stud 50 while leaving the guide block 45 free for shifting transversely thereto along the threaded length 51 of pivot stud 50. For this purpose the lower end of the guide block 45 is notched to form a transverse rib 57 thereat, and the extending end of the adjustment stud 55 is peripherally grooved at 58 to receive this rib 57. The adjustment stud 55 is also held against casual rotation in the operating head 11 by a friction plug 59 arranged as shown in Fig. 5, which nevertheless allows intended adjustment of the stud 55 from a slotted end 60 for shifting the wire guide block 45 in either direction longitudinally with respect to the direction of movement of the movable blade 38 as illustrated in Figs. 4 and 6.

By this arrangement, the wire guide block 45 may be adjusted readily to compensate for any operating condition that is encountered. Starting from a neutral position at which the wire directing passageway 48 in the guide block 45 is aligned with the knife assembly passageway 46, any tendency of the fastener F to curve off to the right upon driving can be corrected by shifting the guide block 45 to the left as shown in Fig. 4. Likewise, adjustment of the guide block 45 in the opposite direction, as shown in Fig. 6, will correct any tendency of the fastener F to drive crookedly to the left. Similarly, shifting of the guide block 45 rearwardly or

5

forwardly as illustrated, respectively, in Figs. 7 and 8, will correct for any respective crooked driving tendency of the fastener F either forwardly or rearwardly, and it will be apparent that combinations of these longitudinal and transverse adjustments can be employed when necessary. It may also be noted that the longitudinal shifting of the guide block 45 by the adjustment stud 55 will result in rotating the guide block 45 slightly on the threaded length 51 of the pivot stud 50 so as to change slightly the relative adjustment thereon. However, this unintended adjustment will normally be so slight as not to be noticed, and whenever it is noticeable it can immediately be corrected by readjustment of the pivot stud 50. The straight driving correction made by adjusting the wire guide block 45 in this manner results from the cast that is impressed on the wire W as it is fed to the knife assembly passageway 46 from the misaligned discharge end of the guide block passageway 48, and a hardened insert 61 should be provided at the discharge end of the guide block passageway 48 to withstand the wearing action of the wire W at this point. The foregoing wire guide arrangement may also be used to advantage, even though the straight-driving difficulties are not usually as great, with knife assemblies arranged to form blunt-pointed fasteners, as disclosed in U.S. Patent No. 2,566,104.

In order to support effectively the work in which the fasteners F are to be inserted, it is common in machines of the sort presently being described to arrange the work supporting means 12 not only for positioning the work at the knife assembly 14 but also for actuation so that it is shifted in the work supporting direction to clamp the work tightly against the knife assembly 14 as each fastener F is inserted. Such actuation of the work supporting means 12 is provided in the presently described machine along the lines disclosed in U.S. Patent No. 2,571,984, by means of a cam 62 carried on the operating shaft 24 to displace a lever arm structure 63 so as to depress a downwardly extending actuating rod 64 that is normally biased upwardly by a tension spring at 65 and that carries a compression spring 66 on its lower end to bear against an adjacent end of a lever 67 fulcrumed intermediate its length at 68 in the lower frame structure housing portion 15 and carrying a pawl element 69 at its other end. This pawl element 69 is arranged to engage and hold the work supporting means 12 at a selected work supporting position and to connect this supporting means 12 for shifting in work supporting direction from the operating shaft cam 62 upon each revolution of the operating shaft 24 to actuate a fastener forming and inserting operation.

The work supporting means 12 is arranged according to the present invention to comprise a primary support member, as indicated generally by the reference numeral 70, which is formed by an anvil member 71 having a relatively long shank 72 that is slidably carried in spaced guide members 73 mounted in the lower frame structure housing portion 15 to provide for a substantial range of adjustment of the anvil member 71 to a selected work supporting position. The anvil member shank 72 is fitted with a rack 74 in a length corresponding to the range of adjustment provided for the anvil member 71, and it is this rack 74 at which the pawl element 69 engages the work supporting means 70, the pawl element 69 being pivotally carried at the forward end of lever 67 as indicated at 75 and biased as indicated at 76 for engaging the rack 74 to hold the anvil member 71 against retraction from a selected work supporting position and likewise to transmit the actuating force from the operating shaft cam 62 to shift the anvil member 71 in the work supporting direction during insertion of a fastener F.

It will be seen that the pivoted and biased arrangement of the pawl element 69 is such as to maintain the anvil member 71 free for upward adjustment whenever

6

desired, and that the pawl element 69 only holds the anvil member 71 against retraction or downward adjustment. In order to provide for retraction of the anvil member 17, a depressible abutment member 77 is arranged at the front of the lower frame structure housing portion 15 so as to be exteriorly accessible, and is mounted interiorly of the housing portion 15 on a leaf spring 78 at a position laterally adjacent the pawl element 69 and in relation to the head of a stud 79 extending therefrom so that this normally stationary release member 77 may be selectively operated to pivot the pawl element 69 against the bias thereon and thereby release the anvil member 71 for retraction from a selected supporting position readily whenever desired.

The work supporting means 12 is also arranged according to the present invention with a work table 80 surrounding the anvil member 71. That is, the work table 80 is formed with a generally central clearance aperture in which the anvil member 71 may be disposed or through which it may be extended. This work table 80 is fitted with supporting posts 81 that are slidably arranged within the lower frame structure housing portion 15 in sleeve members 82 slidably carrying the supporting posts 81 for adjustment of the work table 80 in a range coextensive with the range of adjustment provided for the anvil member 71, and a screw clamp 83 is arranged at each of the sleeve members 82 for manipulation from operating handles 84, disposed exteriorly at the front of the lower housing portion 15, for selectively clamping the supporting posts 81 to hold the work table 80 at an adjusted position independently of the anvil member 71. The work table 80 is also fitted with pivoted key bars 85 that may be positioned selectively to extend within a peripheral groove 86 formed in the anvil member 71 to engage the work table 80 at a level disposition with the anvil member 71 for adjustment and operation as a unit therewith, the screw clamps 83 being released when the work table 80 is engaged with the anvil member 71 in this manner. By this arrangement, the anvil member 71 and work table 80 can be adjusted independently or together for handling work in a variety of ways and for accommodating work of various sorts and shapes readily.

The present invention has been described in detail above for purposes of illustration only and is not intended to be limited by this description or otherwise except as defined in the appended claims.

We claim:

1. In a fastener forming an inserting machine of the type arranged for forming fasteners from a continuous length of wire and inserting said fasteners in work to be secured, means for supporting such work during insertion of said fasteners comprising an anvil member provided with a relatively long shank, means on said machine slidably carrying said shank for a substantial range of adjustment of said anvil member to a selected supporting position, a rack mounted on said shank in a length corresponding to the range of adjustment of said anvil member, a pawl element engaging said rack, said pawl being pivoted and biased for holding said anvil member against retraction from a selected supporting position and being mounted on means carried by said machine for shifting said pawl, and thereby in turn shifting said anvil member, in work supporting direction during insertion of each fastener in said work, and a depressible abutment member mounted on said machine laterally adjacent said pawl element for selective operation to pivot said pawl element against the bias thereon and thereby release said anvil member for retraction from a selected supporting position.

2. In a fastener forming and inserting machine of the type arranged for forming fasteners from a continuous length of wire and inserting said fasteners in work to be secured, means for supporting such work during insertion of said fasteners comprising an anvil member provided with a relatively long shank, means on said machine

7

slidably carrying said shank for a substantial range of adjustment of said anvil member to a selected supporting position, means for releasably holding said anvil member against retraction from a selected supporting position and for shifting said anvil member in work supporting direction during insertion of each fastener in said work, a work table surrounding said anvil member and provided with supporting posts, means on said machine slidably

8

carrying said supporting posts for adjustment of said work table in a range coextensive with the range of adjustment of said anvil member, means for selectively clamping said supporting posts to hold said work table at an adjusted position independently of said anvil member, and means carried by said work table for selectively keying said work table to said anvil member for movement therewith.

No references cited.