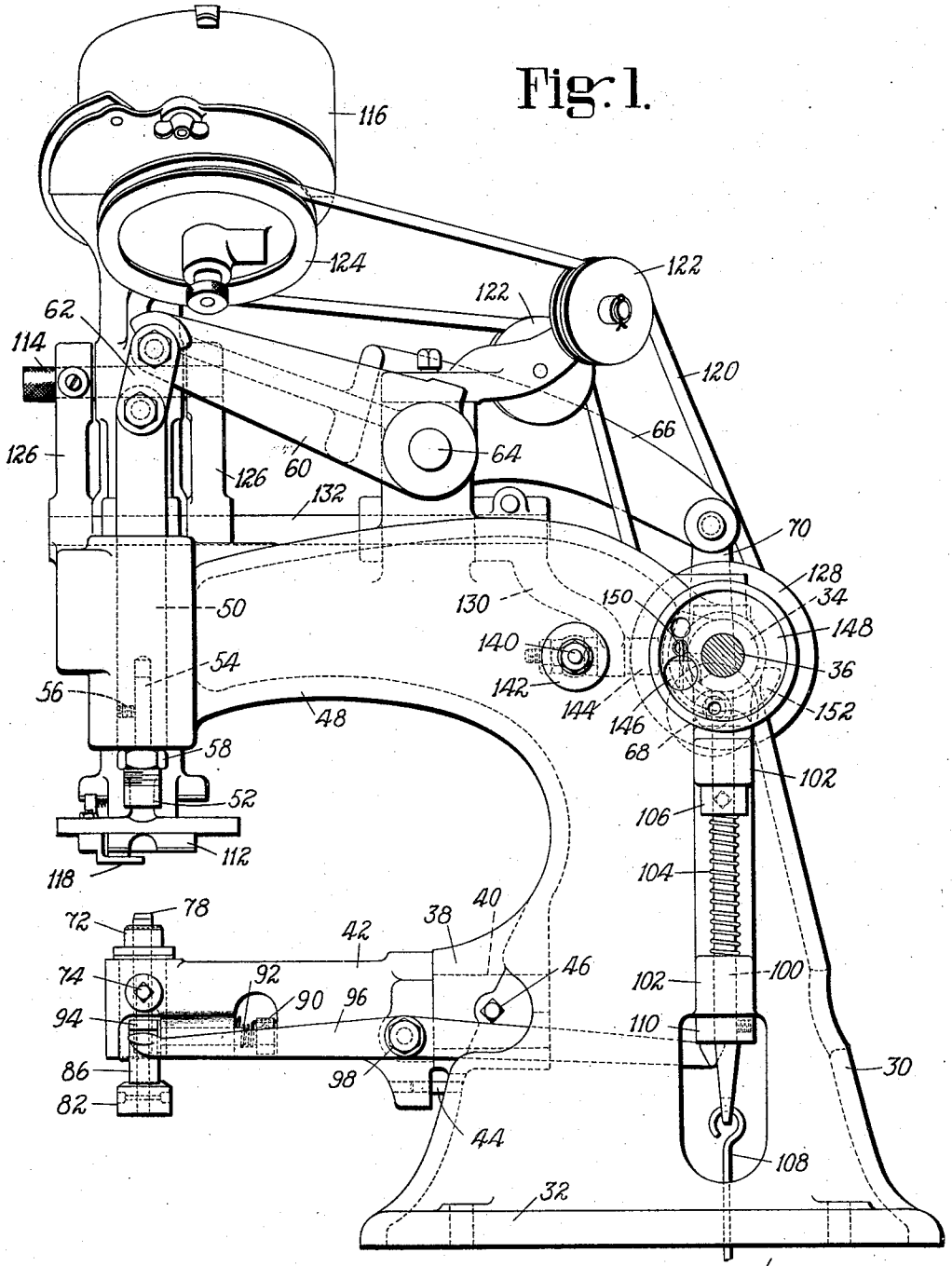
Oct. 11, 1932. M. D. PHELAN 1,882,031

FASTENER INSERTING MACHINE

Filed Jan. 30, 1931 2 Sheets-Sheet 1

Fig. 1.



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FASTENER INSERTING MACHINE

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Fig. 2.

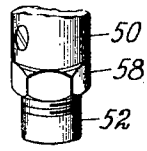
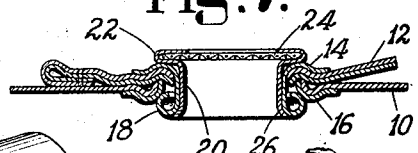


Fig. 7.



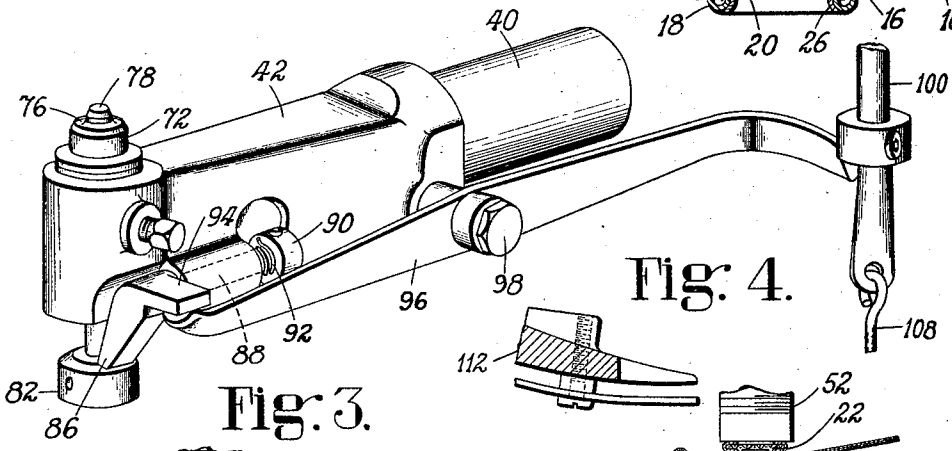


Fig. 3.

Fig. 4.

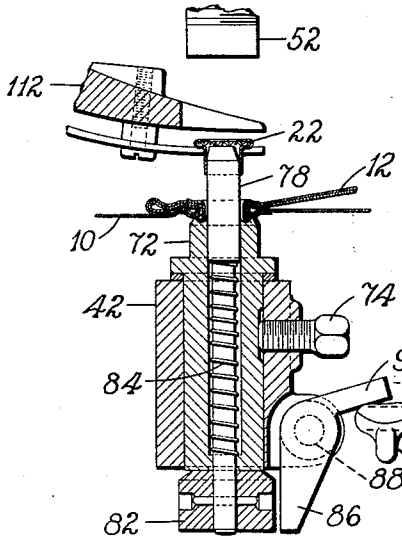


Fig. 5.

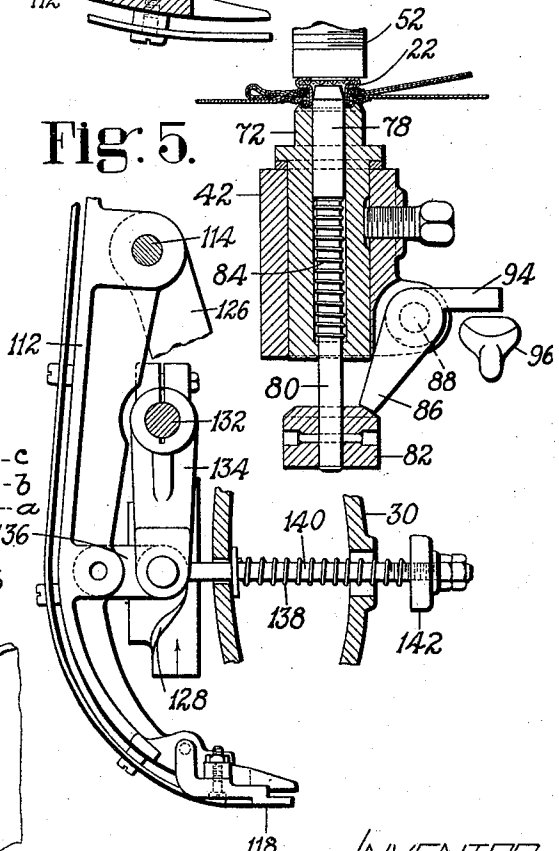
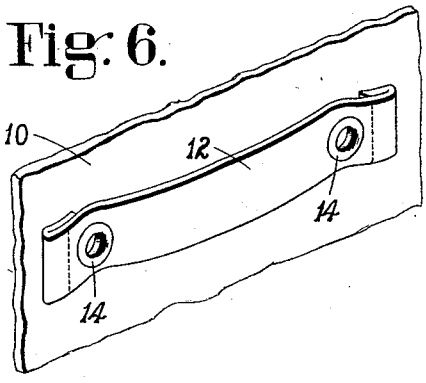


Fig. 6.



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UNITED STATES PATENT OFFICE

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FASTENER-INSERTING MACHINE

Application filed January 30, 1931. Serial No. 512,384.

This invention relates to fastener-inserting machines and is herein disclosed as embodied in a machine constructed and arranged to insert tubular fasteners of ductile metal having flanges and crowns at one end. Fasteners of the type above mentioned are similar to grommets in that they are provided with flanges at one end and are adapted to be upset and clenched at the other end, but in a strict sense they are not grommets since the crown at the flanged end closes the barrel even though the crown, as herein shown, is made of foraminous material. Fasteners of this type are used, for example, in the manufacture of mattresses.

Many mattresses are provided with loops or straps at their sides by which they may be lifted and carried. It has become common to attach such straps to the mattress ticking with grommets that extend through the ticking as well as through the straps. If grommets are used for this purpose, they must be large to insure strong connection of the straps to the ticking. Consequently, there is danger that the stuffing with which the mattresses are filled will work out through the holes in the grommets. Fasteners of the type referred to above are especially suitable for closing grommets, as well as for other purposes which need not be explained herein, since they are substantially like grommets except that they are closed at the flanged end.

For clenching crown fasteners of the type referred to above, it has been common to use power-operated machines similar to those used for inserting eyelets and grommets, but it has heretofore been necessary, when operating on crown fasteners, to place them manually in the articles of work. The reason for this manual insertion of crown fasteners is that no upsetting mechanism capable of operating on such fasteners has been so organized as to be also capable of cooperating with any known type of automatic fastener-supplying means.

In view of the conditions above set forth, an object of the present invention is to provide an improved fastener-inserting machine capable of inserting and clenching crown fasteners presented to the inserting mechanism by automatic fastener-supplying means, to the end that the operator will not be required to handle the fasteners.

Accordingly, a feature of the invention consists in a fastener-inserting machine comprising a spindle, a raceway arranged to present thereto the open end of a tubular fastener having a flange and a crown at its other end, mechanism for relatively moving said raceway and the spindle to place the fastener on the spindle, and mechanism arranged to insert and clench the fastener thus lodged on the spindle.

In the illustrated machine, the cooperative upsetting tools are arranged one above the other, the lower tool being stationary and the spindle being telescopically arranged therein and projecting upwardly therefrom. The lower tool is provided with an annular upsetting surface for engaging and clenching the unflanged end of a fastener which is inserted by downward movement of the upper tool while the fastener is lodged on the spindle of the lower tool. The fasteners are supplied to the spindle by automatic means comprising a raceway, the delivery end of which is movable to and from a position in register with the spindle.

In former fastener-inserting machines provided with automatic means for supplying fasteners to a spindle projecting from one of the upsetting tools, it has been necessary to set a machine in operation to insert the spindle into a fastener. Moreover, if a machine is provided with a driving clutch, it is jarred when started suddenly in consequence of tripping the clutch. Then, if the machine is not rigily fastened to a supporting bench, or if the bench itself is not quite rigid, the jarring incidental to a sudden start may shake the machine and a fastener about to be picked by the spindle.

Since, under conditions such as those mentioned, there is some likelihood that the spindle would foul the fastener, another object of the present invention is to provide, in a fastener-inserting machine operated by a driving clutch, for inserting a spindle into a fastener while the machine is at rest, or other-

wise stated, while the driving clutch is disengaged.

To this end, and in accordance with another feature of the present invention, the illustrated machine embodies a novel organization comprising a manually controlled clutch by which the fastener-supplying means and the fastener-inserting mechanism are operated, and a spring-projected spindle initially restrained in a retracted position by a latching device so connected to the manually operative clutch-controlling means that when the latter is operated it will first trip the spindle and will subsequently trip the clutch, although but one motion of the manually operative means is required to trip both devices. Thus, the spindle is projected into a fastener before the machine is jarred by the action of the clutch, although the tripping of the clutch occurs so soon after the spindle has been tripped that no perceptible interval of time elapses between the entrance of the spindle into the fastener and the automatic operation of the fastener-supplying means and the fastener-inserting mechanism.

Referring to the accompanying drawings,

Fig. 1 is an elevation of the right-hand side of a fastener-inserting machine embodying the present invention, omitting the pulley by which the operating shaft is driven;

Fig. 2 is a perspective view including the fastener-inserting tools, the spindle and manually operated means by which the spindle is controlled;

Fig. 3 is a vertical section including the fastener-inserting tools, the spindle and the delivery end of a raceway by which fasteners are supplied to the spindle;

Fig. 4 is a view similar to Fig. 3 but representing the fastener-inserting tools in the act of clenching a fastener;

Fig. 5 is a front elevation of a portion of the raceway and the mechanism by which the raceway is operated;

Fig. 6 is a perspective view representing a typical example of work, such as a piece of mattress ticking, to which a lifting strap is secured by grommets; and

Fig. 7 is a sectional view on a larger scale of an example of work such as that included in Fig. 4.

Referring first to Figs. 6 and 7, an element 10 of sheet material, such as mattress ticking, is provided with a lifting strap 12, the end portions of which are secured thereto by grommets 14 and washers 16 of well-known construction applied in a well-known manner, the barrels of the grommets extending through the strap 12 and through the sheet material 10, and being clenched against the washers 16 with what is known as a roll clench 18. The flanges of the grommets lie on the strap 12 while the washers 16 lie on what will be, in a completed mattress, the inner surface of the ticking.

Grommets 14 of a size suitable for work of this kind are so large that the stuffing of a mattress would be exposed by, and might work out through, the holes therein. Consequently, it is the practice to close these holes with crown fasteners. A crown fastener of the type commonly used for this purpose is illustrated in Figs. 3, 4 and 7. Such a fastener is made of ductile sheet metal and comprises a tubular barrel or body portion 20, a double or folded flange 22 at one end thereof, and a crown 24 at the flanged end. As shown in Fig. 7, the lower end of the barrel portion 20 has been upset and clenched against the roll clench 18 of the grommet 14 whereby the crown fastener is secured to the grommet with its flange 22 lying on the flange of the grommet. The lower end of the barrel 20 is initially formed without the flaring portion 26 to provide for inserting it through the barrel of the grommet 14. The crown 24 is represented as a disk of woven wire fabric of fine mesh adapted to prevent the stuffing of a mattress from working out and at the same time permitting air to pass through the interstices between the wires of which it is fabricated.

The machine hereinafter described is organized to insert such crown fasteners into grommets previously applied to articles of work. The general organization of the illustrated machine is similar to that of the machine illustrated and described in United States Letters Patent No. 1,369,021, granted February 22, 1921, on application of P. R. Glass, although the machine illustrated herein comprises certain features and combinations not embodied in the patented machine.

Referring to Fig. 1, the main frame 30 of the machine is provided with a flat base 32 by which it may be mounted on a bench and is provided with bearings (one of which is indicated at 34) in which a horizontal operating shaft 36 is journaled. A boss 38 formed on the frame is provided with a socket to receive the shank portion 40 of a stationary horizontal horn 42 which is secured to the frame by a dowel 44 and a set-screw 46. The upper part of the frame 30 is formed to provide an arm 48 that overhangs the horn 42 and provides a bearing for a vertically movable plunger 50. This plunger carries at its lower end a movable fastener-inserting tool 52, the lower end of which is flat and horizontal to engage the flange 22 at the upper end of a crown fastener. A shank 54 formed on the tool 52 projects into a socket formed in the plunger 50 and is secured therein by a set-screw 56, but the pressure required to upset and clench the barrel of a crown fastener is sustained by a nut 58 which engages a screw-thread formed on the tool 52 and also engages the lower end of the plunger 50, thus relieving the set-screw 56 from the operating pressure.

The plunger 50 is operated by a lever 60 to which it is connected by a pair of links, one of which is represented at 62 and masks the other when viewed from the side. The lever 60 is mounted on a fulcrum pin 64 and is provided with an arm 66 which projects to the rear of the machine. A crank pin 68 carried by the shaft 36 operates the lever 60, 66 through the medium of a link or pitman 70.

The fastener-inserting tool 52 is arranged to cooperate with a stationary lower tool 72 affixed to the horn 42 by a set-screw 74. The upper end of the tool 72 is provided with an annular surface 76 formed to upset and clench the barrel of a crown fastener to produce the formation indicated at 26 in Fig. 7. This tool is also provided with an upstanding spindle 78 arranged in telescopic relation thereto, the spindle serving initially to maintain a previously inserted grommet 14 in substantially concentric relation to the tool 72 and thereafter serving to take a crown fastener from the fastener-supplying means and to guide the crown fastener into the grommet to which it is to be secured. The spindle is provided with a shank 80 which extends below the tool 72 and below the horn 42, the lower end of the shank being provided with a collar 82 by which its operation may be controlled and by which its upward movement is limited.

The spindle is normally projected upwardly by a compression spring 84 enclosed in the tool 72 but is initially restrained in its lower position as represented in Figs. 1, 2 and 4, in which position its upper end projects above the tool 72 only far enough to occupy a hole in an article of work to which a crown fastener is to be applied. For this purpose the horn 42 is provided with a latch or tripping member 86 arranged to overlie and engage the upper face of the collar 82. The latch 86 is provided with a horizontal stem or rock-shaft 88 which is journaled in a boss formed on the horn 42, the stem being provided with a head or collar 90 at its rear end. A torsion spring 92 encircles the stem 88 and acts normally to swing the latch 86 to its operative position as shown in Figs. 2 and 4. For this purpose, one end of the spring 92 is inserted into a socket in the collar 90 and the other end bears against a side surface of the horn 42. The relation of the parts is such that when the spindle is depressed by the upper tool 52 the collar 82 at the lower end of the spindle is carried slightly below the lower extremity of the latch 86, whereupon the latch is moved to its operative position by the spring 92 and thus restrains the spindle in its depressed position until the latch is retracted by manually operative means hereinafter described.

A lug or finger 94 formed on the latching device projects laterally and overhangs the forward end of a tripping lever 96 mounted on a fulcrum stud 98 projecting from the horn 42. Thus, as shown in Figs. 1 and 2, the assemblage comprising the horn 42, the lower tool 72, the spindle 78, the latching mechanism and the tripping lever 96 is organized to remain intact with all the elements thereof in their cooperative relations whether the assemblage be secured to the frame 30 or detached therefrom.

When the horn assemblage is attached to the frame 30, the tripping lever 96 constitutes an element of a manually operative means by which the spindle 78 is operated. As shown in Fig. 1, a vertical rod 100 is arranged to slide up and down in bosses 102 projecting from the frame 30. A compression spring 104 surrounds the rod 100 and exerts its pressure upwardly against a collar 106 affixed to the rod. The lower end of the rod is connected to a treadle (not shown) by a wire link 108. The rod 100 is provided with another collar 110 which overlies the rear end of the tripping lever 96 in such manner that when the rod 100 is depressed by the treadle the collar 110 will operate the lever 96 to trip or release the spindle 78 (see Fig. 3). The spring 84 is thus permitted to project the spindle upwardly into the barrel of a crown fastener presented thereto flange uppermost as shown in Fig. 3. Moreover, as hereinafter explained, the operating movement of the lever 96 is utilized for the additional purpose of tripping a clutch that operates the fastener-inserting mechanism and the fastener-supplying means.

The fastener-supplying means of the machine illustrated herein is of the same type, and is operated in the same manner, as that of the machine illustrated and described in said Letters Patent No. 1,369,021. Referring to Fig. 5 of the present case, the crown fasteners are supplied to the spindle 78 by a raceway 112 mounted on a horizontal pivot pin 114 and provided at its upper end (see Fig. 1) with a hopper 116 from which the fasteners are fed by a rotary brush (not shown). The lower end of the raceway is movable laterally to and from a position between the movable inserting tool 52 and the stationary clenching tool 72 and is provided with a spring-pressed detent 118 by which the lowermost fastener is arrested at a position in register with the spindle. Rotation for operating the brush in the hopper 116 is transmitted from the shaft 36 by a belt 120 which runs over idle pulleys 122 and around a driven pulley 124 secured to the shaft of the hopper brush.

As shown in Fig. 1, the raceway 112 is arranged between two spaced supporting brackets 126 formed on the overhanging arm 48 of the frame, the pivot pin 114 extending through the brackets 126 and through the interposed portion of the raceway.

The mechanism for operating the raceway

comprises a cam 128 carried by the shaft 36, a lever 130 operated by the cam, a horizontal rock-shaft 132 to the rear end of which the lever 130 is affixed, a lever 134 affixed to the rock-shaft near its forward end, and a link 136 connecting the lever 134 and the raceway. The cam 128 is effective only to retract the delivery end of the raceway from its fastener-presenting position, the movement in the opposite direction being derived from a compression spring 138 (Fig. 5) surrounding a rod 140 pivotally connected to the lever 130 and extending horizontally therefrom through holes formed in the frame 30. The left-hand end of the spring 138 is seated against a portion of the frame while the right-hand end is seated against a collar 142 carried by the rod 140. A cam roll 144 carried by the lever 130 is thus maintained against the cam 128 by the spring 138.

The operating shaft 36 is provided with an automatic clutch of the type illustrated and described in United States Letters Patent No. 1,351,138, granted August 31, 1920, on application of R. B. Smith. This clutch comprises a continuously rotating driving member (not shown), such as a pulley, loosely mounted on the shaft 36 and provided with one or more driving lugs, any one of which may be engaged by an axially movable clutch-pin 146 carried by the driven member 148 of the clutch. The clutch-pin 146 is normally projected to its clutching position by a compression spring 150 embedded in a socket in the driven member 148. One end of the clutch-pin 146 carries a segmental head 152 that embodies a wedge formation, the inclined surface of the head being arranged to cooperate with the upper end of the vertical rod 100 to disengage the driven member 148 of the clutch from the driving member by retracting the pin 146. When the manually operative rod 100 is in its normal position represented in Fig. 1, its upper end stands in the path of rotation of the wedge-shaped head 152 and in this position it is effective to disengage the clutch and arrest the rotation of the shaft 36. On the other hand, when the rod 100 is depressed by the treadle it first trips the spindle 78 as hereinbefore described and thereafter trips the clutch, thereby initiating the automatic operation of the fastener-inserting mechanism and the fastener-supplying means.

In using the illustrated machine for inserting crown fasteners, the operator will first place an article of work on the lower tool 72, as shown in Fig. 3, the spindle 78 being initially restrained or latched in its lower position as represented in Figs. 1 and 2. The delivery end of the raceway initially occupies the position represented in Fig. 3, in which position it supports a crown fastener, flange end uppermost, in register with the spindle. When all is in readiness for the insertion of a crown fastener, the operator depresses the treadle, thereby projecting the spindle 78 upwardly into the crown fastener and subsequently tripping the operating clutch.

The two horizontal broken lines *a* and *c* at the right of Fig. 3 represent respectively the lowest position and the highest position of the upper surface of the forward end of the tripping lever 96, while the intermediate broken line *b* represents the level at which the lever trips the spindle. The distance from *a* to *c* corresponds to the downward movement of the controlling rod 100 required to trip the operating clutch, but before the clutch is tripped the spindle enters the crown fastener in the raceway as shown in Fig. 3. Having tripped the clutch, the operator immediately releases the treadle thereby permitting the spring 104 (Fig. 1) to raise the controlling rod 100 before the spindle 78 is again fully depressed by the fastener-inserting tool 52.

The first result of tripping the clutch is retraction of the delivery end of the raceway from the path of the inserting tool 52, the presented fastener being thus stripped from the raceway and remaining on the upper end of the spindle 78 as shown in Fig. 3. The inserting tool 52, now descending, inserts the barrel of the crown fastener into the article of work and clenches the lower end of the barrel against the annular clenching surface 76 of the lower tool. As the crown fastener is forced downwardly by the inserting tool 52 its crown portion 24 depresses the spindle 78 to the position shown in Fig. 4, whereupon the latch 86, now released by the tripping lever 96, is moved automatically to its latching position shown in that figure.

The inserting tool 52 now rises to its initial position represented in Figs. 1, 2 and 3, the delivery end of the raceway returns to its initial position shown in Fig. 3, and the wedge member 152, now riding on the controlling rod 100, disengages the clutch and arrests the rotation of the shaft 36.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A fastener-inserting machine comprising a spindle, a raceway arranged to present thereto the open end of a tubular fastener having a flange and a crown at its other end, mechanism for relatively moving said raceway and the spindle to place the fastener on the spindle, and mechanism arranged to insert and clench the fastener thus lodged on the spindle.

2. A fastener-inserting machine comprising an individually movable spindle, means arranged to present thereto the open end of a tubular fastener having a flange at its other end, manually operative means arranged to insert the spindle into a fastener

presented thereto by said presenting means, and mechanism arranged to insert and clench a fastener lodged on the spindle.

3. A fastener-inserting machine comprising an upstanding spindle, a raceway arranged to present to the upper end thereof a tubular fastener having a flange and a crown at its upper end, mechanism for relatively moving said raceway and the spindle to place the fastener on the spindle, and mechanism arranged to insert and clench the fastener lodged on the spindle.

4. A fastener-inserting machine comprising cooperative setting tools formed to operate on the ends of a tubular fastener having a flange at one end, a spindle telescopically arranged in the tool that operates on the unflanged end of the fastener, means arranged to present the unflanged end of a fastener to said spindle, mechanism for relatively moving said means and the spindle to place the fastener on the spindle, and mechanism by which said tools are relatively moved to insert and clench the fastener lodged on said spindle.

5. A fastener-inserting machine comprising a spindle, means arranged to present thereto the open end of a tubular fastener having a flange at its other end, manually operative means arranged to insert the spindle into the barrel of the fastener, and automatic mechanism controlled by said manually operative means for inserting and clenching the fastener thus lodged on the spindle.

6. A fastener-inserting machine comprising cooperative setting tools constructed and arranged to upset and clench the unflanged end of a tubular fastener having a flange at its other end, a spindle telescopically arranged in the one of said tools that engages the unflanged end of the fastener, means arranged to present the unflanged end of a fastener to said spindle, mechanism for relatively moving said means and the spindle to place a fastener on the spindle, and mechanism for operating the other one of said tools to insert and clench the fastener thus lodged on the spindle.

7. A fastener-inserting machine comprising a stationary upsetting tool provided with a spring-projected spindle and with an annular surface formed to upset and clench one end of the barrel of a tubular fastener having a flange at its other end, means arranged to supply a fastener to said spindle, a movable upsetting tool arranged to engage the flanged end of a fastener lodged on said spindle, and means for operating said movable tool to insert the fastener and clench it against said stationary tool.

8. A fastener-inserting machine comprising an upper tool and a lower tool formed and arranged to insert and clench a tubular fastener having a flange at its upper end, a spring-projected spindle telescopically arranged in said lower tool, means arranged to supply a fastener flange uppermost to said spindle, and means for relatively moving said tools to insert and clench a fastener lodged on said spindle.

9. A fastener-inserting machine comprising two cooperative setting tools one of which is provided with an annular clenching surface for operating on an unflanged end of a tubular fastener, a spindle telescopically arranged in said one of said tools, a raceway arranged to present the unflanged end of such a fastener to said spindle, mechanism for relatively moving said raceway and the spindle to place a fastener on the spindle, and mechanism for causing said tools to insert and clench the fastener thus lodged on the spindle.

10. A fastener-inserting machine comprising two cooperative setting tools one of which is provided with a spring-projected spindle, manually controlled means arranged to restrain and trip said spindle, means arranged to supply fasteners to said spindle, and automatic mechanism controlled by said tripping means for operating said fastener-supplying means and one of said setting tools.

11. A fastener-inserting machine comprising two cooperative setting tools one of which is provided with an annular clenching surface for operating on an unflanged end of a tubular fastener, a spindle telescopically arranged in said one of said tools, a raceway arranged to present the unflanged end of such a fastener to said spindle, manually operative means arranged to project said spindle into a fastener in said raceway, and mechanism for operating said raceway and one of said setting tools.

12. A fastener-inserting machine comprising cooperative setting tools one of which is provided with a spring-projected spindle, a latch by which said spindle is restrained in a retracted position, means arranged to present a tubular fastener to said spindle, manually operative means by which said latch is operated to trip said spindle, and automatic mechanism controlled by said manually operative means for operating said fastener-presenting means and for causing said tools to insert and clench the fastener lodged on said spindle.

13. A fastener-inserting machine comprising a stationary setting tool provided with a movable spindle and with an annular surface formed to clench an end of a tubular fastener, a movable fastener-inserting tool arranged to cooperate with said stationary tool, a movable raceway arranged to present to said spindle the unflanged end of a tubular fastener having a flange at its other end, manually controlled means arranged to project the spindle into the fastener so presented, and automatic mechanism under control of said

manually controlled means for operating said raceway and causing said movable tool to insert the fastener and clench it against said stationary tool.

14. A fastener-inserting machine comprising fastener-inserting mechanism provided with an individually movable spindle arranged to pick a tubular fastener to be inserted, means arranged to present a tubular fastener to said spindle, a clutch for operating said fastener-inserting mechanism and said fastener-presenting means, and manually operative means arranged to project said spindle into a presented fastener and thereafter cause driving engagement of said clutch.

15. A fastener-inserting machine comprising fastener-inserting mechanism provided with a spring-projected spindle for picking a tubular fastener to be inserted, a latch arranged to restrain said spindle in a retracted position, means arranged to present a fastener to said spindle, an automatic clutch for operating said fastener-presenting means and said fastener-inserting mechanism, and a manually operative means arranged to trip said spindle and said clutch.

16. A fastener-inserting machine comprising upper and lower setting tools formed and arranged to insert and clench a tubular fastener, a spring-projected spindle telescopically arranged in said lower tool, a latch arranged to restrain said spindle in a retracted position, means arranged to present a fastener to said spindle, an automatic clutch arranged to operate said fastener-presenting means and one of said setting tools, and a manually operative means arranged to trip said spindle and said clutch.

17. A fastener-inserting machine comprising mechanism for inserting and clenching a tubular fastener, said mechanism being provided with a spring-projected spindle for picking a fastener to be inserted, means arranged to present a fastener to said spindle, an automatic clutch by which said mechanism and said means are operated, manually operative means by which said clutch is tripped, a latch by which said spindle is restrained in a retracted position, and means by which clutch-tripping movement of said manually operative means is communicated to said latch to trip said spindle.

18. A fastener-inserting machine comprising upper and lower setting tools formed to operate respectively on the upper end and the lower end of a tubular fastener having a flange at its upper end, a spindle telescopically arranged in said lower tool, a raceway arranged to present such a fastener flange uppermost to said spindle, manually controlled means arranged to project the spindle into the fastener so presented, and automatic mechanism under control of said manually controlled means for operating said raceway and causing said tools to insert and clench the fastener lodged on said spindle.

19. A fastener-inserting machine comprising an automatic operating clutch, a manually movable member for controlling said clutch, fastener-inserting mechanism and fastener-supplying means both arranged to be operated by said clutch, a frame in which all the aforesaid elements are arranged in cooperative relation, and a unitary assemblage constructed and arranged to be attached to said frame and detached intact therefrom, said assemblage including a fastener-clenching tool, a spring-projected fastener-engaging spindle, a trip-latch for controlling said spindle, a member for operating said trip-latch, and a supporting member to which the aforesaid elements of said assemblage are connected, said operating member being arranged to receive operating movement from said manually movable clutch-controlling member when said assemblage is attached to said frame in cooperative relation to said fastener-inserting mechanism.

In testimony whereof I have signed my name to this specification.

MERTON D. PHELAN.