Sept. 9, 1924. 1,507,600

T. J. HALLAM

FASTENER INSERTING MACHINE

Filed July 31, 1920

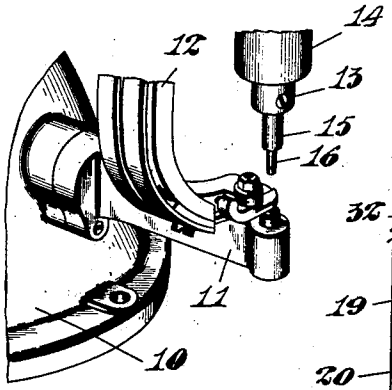


Fig.1.

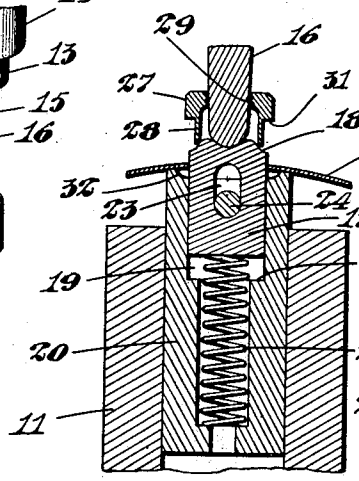


Fig.2.

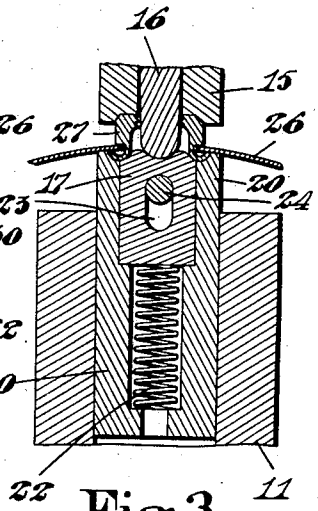


Fig.3.

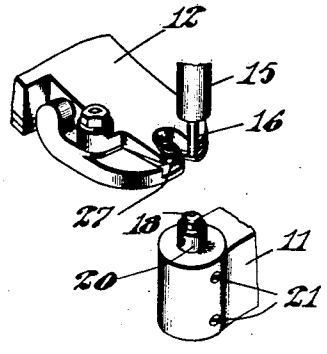


Fig.4.

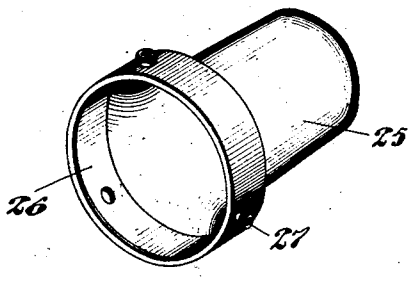


Fig.5.

INVENTOR.

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UNITED STATES PATENT OFFICE.

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FASTENER-INSERTING MACHINE.

Application filed July 31, 1920. Serial No. 400,477.

To all whom it may concern:

Be it known that I, THOMAS J. HALLAM, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain Improvements in Fastener-Inserting Machines, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to fastener-inserting machines and one of its objects is to provide improved fastener-setting mechanism by which an article of work having a previously punched fastener-receiving hole may be maintained in a position where the hole will lie in register with the fastener about to be inserted by a fastener-inserting device. Some kinds of work may be punched contemporaneously with the fastener-inserting operation but others, especially those made of metal and other hard materials, require a separate punching or other operation to provide the fastener-receiving holes. It is common practice, therefore, when the fastener-receiving article is made of metal or some other hard substance, to form the fastener-receiving holes before the article is presented to the fastener-setting machine. This practice, however, gives rise to the problem of positioning the article relatively to the fastener-setting mechanism so as to insure register of the hole with the fastener that is about to be inserted in it.

With the said problem in view an object of this invention is to provide improved means for registering an article of work relatively to fastener-setting mechanism so as to maintain the fastener-receiving hole in concentric relation to the fastener held by an inserting device. According to the illustrated development of the invention a feature of the latter consists in a fastener-inserting machine having a novel fastener-clenching tool the clenching shoulder of which is constructed and arranged to occupy the fastener-receiving hole in an article of work prior to and during the fastener-inserting operation, in combination with means for supporting the article of work during the period when the hole is occupied by the clenching shoulder. The invention consists further in so organizing the clenching tool and the work-support as to provide for movement of one relatively to the other during the inserting operation and thus to enable these two elements to assume another relation suitable for clenching the fastener in the hole initially occupied by the said clenching shoulder. From the foregoing it may be understood that the said clenching shoulder will fulfill two separate and distinct functions, first, to maintain the desired register of the fastener-receiving hole, and then to clench the fastener that is inserted in said hole.

Another object of the invention is to provide two telescopically related clenching tools of which the inner one may be initially utilized to exercise the aforesaid registering function and of which the outer one may be utilized to supplement the clenching action of the inner one so as to tighten the clenched part of the fastener that has passed beyond the clenching shoulder of the inner member. For this purpose the telescopically related tools are provided with cooperative clenching surfaces one of which is movable to and from flush relation with the other in consequence of relative telescopic movement of the two tools, and the organization further comprises means to limit such relative movement when the flush relation is reached, to cause the two tools then to present a complete clenching surface which, though structurally composite, is in effect unitary.

The two aforesaid phases of the invention may be conveniently combined by providing the work-support with a supplemental clenching surface or shoulder or, to state the matter in the reverse order, the outer or supplemental clenching member may be constructed and arranged to support the work. In speaking of supporting the work it is not to be understood that the work-supporting element would necessarily be below the article of work, although in many cases it would be convenient to have it so and it is so shown by the accompanying drawings. On the other hand the fastener-setting mechanism might, within the scope of the invention, be inverted so that the clenching tool would be above instead of below the work as it is in many machines of the type to which the invention relates. In that case the work-support would not support

the work against the force of gravity but would support it against upwardly directed force exercised manually or otherwise to maintain the work against it.

The type of fastener shown by the drawings is similar in some respects to an eyelet but in other respects it differs from an eyelet. For example, its internal diameter at its leading end is greater than at its other end, whereas the barrel of an eyelet is either of uniform diameter throughout its length or, if there is any variation in diameter, the smaller diameter is at its leading end. Accordingly an object of the invention is to provide fastener-setting mechanism adapted to insert and clench a tubular fastener having a greater internal diameter at its leading end than at its other end.

Another difference between the fastener shown and an eyelet is that the former is provided with an internal screw-thread at its smaller end. Without limiting the invention it may be stated that the particular fastener shown is a metallic bushing intended to be applied to a lighting fixture or any other article to be afterwards equipped with a screw arranged in the bushing. By way of example the drawing includes a metallic lighting fixture provided with three such bushings to receive three screws by which the fixtures may be coupled to some other element of lighting equipment. The presence of the internal screw-thread in the bushing presents the problem of inserting the bushing into the article of work so as not to injure the screw-thread, and accordingly an object of the invention is to provide inserting and clenching mechanism by which this may be done.

Other objects and features of the invention are hereinafter described and claimed and are shown by the accompanying drawing. Referring to the latter,

Fig. 1 represents a perspective view of a portion of a fastener-setting machine embodying the invention;

Fig. 2 is a vertical section on a larger scale through the operating tools, and includes an article of work in operative position and a fastener about to be inserted therein;

Fig. 3 is a view similar to Fig. 2, showing the operating tools in final position as having completed the clenching operation;

Fig. 4 is a perspective view including the operating tools and the delivery end of a raceway as they appear from a different point of view; and

Fig. 5 is a perspective view of an article of work in which fasteners of the type shown by Figs. 2 and 3 have been clenched.

The machine selected for purposes of illustration includes a main frame 10, a stationary horn 11, a movable raceway 12, a plunger 13, and a stationary guide or bearing 14 for controlling the path of movement of the plunger. A fastener-inserting tool 15 is carried by and fixed to the plunger and is provided with a central spindle 16 the function of which is to detach the leading fastener from the raceway and carry such fastener to the article of work. The spindle and the inserting tool are telescopically related in accordance with well-known construction and a light compression spring (not shown) is contained in a socket in the plunger 13 and is arranged behind the spindle so as normally to project the latter and thereafter to permit the spindle to recede into the inserting tool when the downward motion of the spindle is arrested by the clenching tool hereinafter described.

The main clenching tool is indicated at 17 and its clenching shoulder is indicated at 18. According to the construction shown this tool is arranged in a socket 19 formed in a member 20, and the latter is in turn arranged in a socket formed in the horn 11. Any suitable means such as set-screws 21 may be provided for fixing the member 20 relatively to the horn. The clenching tool 17 is movable lengthwise of its axis relatively to the member 20 and is preferably backed by a compression spring 22 so that its shoulder will protude initially beyond the upper end of the member 20. For the purpose of maintaining the members 17 and 20 in coupled relation the former is provided with a hole 23 extending transversely, while a retaining pin 24 extends therethrough and into the member 20. The hole 23 is elongated lengthwise of the axis of the tool so as to prevent relative telescopic movement of the members 17 and 20.

The article of work shown by Figs. 2, 3 and 5 is a bell-shaped metallic member 25 designed to form a part of a lighting fixture, although its particular shape and the particular purpose for which it is designed are not to be regarded as imposing any limitation on the present invention. The member 25 has a flange 26 in which any desired number of fastener-receiving holes may be provided before the article is presented to the fastener-setting machine. The fasteners shown comprise a relatively thick flange or body portion 27 and a barrel portion 28 projecting therefrom. In the present instance, since the fastener is designed to serve as a bushing to receive an attaching screw, it is provided with an internal screw-thread 29 at its body end, the internal diameter of the screw-thread portion being less than that of the barrel portion to provide clearance for the attaching screw after the bushing has been affixed to the flange 26.

The bushings or fasteners are supplied barrel downward by the raceway 12 as in eyeletting machines. Although the drawing does not include any mechanism for operat-

ing the raceway it is to be understood that initially the leading bushing in the latter will stand in the path of the spindle 16, and that when the plunger 13 has been depressed so far as to pass the spindle through the leading bushing the raceway will be retracted to clear the inserting tool 15.

Prior to setting the machine in operation the fastener-receiving article will be placed on the member 20, as shown by Fig. 2, the member 20 thus constituting a work-support. A fastener-receiving hole having previously been formed in the work, the rim of the hole will initially surround the clenching shoulder of the tool 17 as shown by Fig. 2 so that the clenching shoulder will exercise its preliminary function of registering the hole relatively to the approaching fastener while the member 20 sustains the work at the desired level. As the inserting tool descends the spindle 16 transfers a fastener from the raceway to the position shown by Fig. 2, in which position the barrel of the fastener rests on and is centered by the clenching shoulder 18. The inserting tool takes up the space between itself and the fastener and then forces the latter downwardly, the fastener in turn forcing the clenching tool 17 downwardly until such movement is arrested by any means provided for that purpose. According to the construction shown the tool 17 is arrested by a shoulder or abutment 30 formed in the socket 19. The inserting tool continues to descend after the downward movement of the clenching tool has been arrested and consequently the barrel 28 of the fastener is flared so that the work is locked between the clenched portion and a shoulder 31 formed on the body of the fastener.

For some purposes the clenching shoulder 18 would be sufficient to complete the clenching of the fastener but if it is desired to supplement such clenching action so as to curl the leading end of the barrel very tightly against the work, as shown by Fig. 3, the work-supporting member 20 may be utilized for this purpose by forming thereon a supplemental clenching surface 32. In that case the mechanism would comprise two cooperative telescopic clenching tools one of which would effect the first stages and the other of which would effect the final stages of clenching, both in conjunction with one inserting tool and both as contemporaneous phases of a single clenching operation. In this event the abutment 30 or any equivalent thereof would be arranged to insure a flush relation between the clenching surfaces of the members 17 and 20 when they are in clenching relation.

A machine constructed in accordance with the foregoing description and the accompanying drawing has proved in actual practice to be entirely satisfactory when operating upon fasteners and articles of work such as those shown, the clenching being so tightly effected as to hold the bushing against turning about its axis relatively to the article to which it is applied. This is an important requirement for this particular purpose since the bushing might otherwise turn with the attaching screw when the latter is being rotated and would thus defeat the purpose of the screw-threaded connection between the bushing and the attaching screw. Furthermore the illustrated mechanism accomplishes the desired results without any injury to the internal screw-thread 29, and in this respect the invention solves the problem of forming a tightly clenched relation between the bushing and the bushed article while preserving the internal screw-thread in perfect condition.

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

1. Fastener-setting mechanism comprising a clenching tool the clenching shoulder of which is formed and arranged to occupy initially the fastener-receiving hole in an article of work, a work-engaging abutment normally behind said shoulder, a movable tool constructed and arranged to force a fastener against the clenching tool, the latter being arranged to yield relatively to said abutment so as to carry the clenching shoulder to a position behind the article of work, and means for limiting such yielding movement of the clenching tool so as to cause the latter to exercise its clenching function after it has yielded as aforesaid.

2. Fastener-setting mechanism comprising a fastener-inserting tool, a clenching tool having a clenching shoulder, and means arranged to determine the operative position of an article of work so that a fastener-receiving hole therein may initially receive and be registered by the clenching shoulder of the clenching tool, the latter having a limited range of yielding movement relatively to said means so that the force applied by the inserting tool will transfer the clenching shoulder from said work-registering position to a predetermined clenching position.

3. Fastener-setting mechanism comprising a fastener-inserting tool, a clenching tool, and a work-rest adjacent to the latter, the clenching tool being arranged normally to project beyond the work-rest so that its periphery may initially occupy a fastener-receiving hole in an article of work on the work-rest and thereby register the work in fastener-receiving position, the clenching tool having a limited range of yielding movement relatively to the work-rest so that the force applied by the inserting tool will remove the clenching tool from such hole while inserting a fastener in the hole.

4. Fastener-setting mechanism comprising a fastener-inserting tool, a fastener-clenching tool arranged to cooperate therewith, and work-engaging means arranged to control the position of the work lengthwise of the axis of said tools, said means and the clenching tool being relatively movab'e lengthwise of said axis so that the clenching portion of the clenching tool may initially protrude through or into the fastener-receiving hole of the article of work and thereafter occupy a predetermined clenching position out of the hole.

5. Fastener-setting mechanism comprising a fastener-inserting tool, and two telescopically related members the inner one of which has a clenching shoulder initia'ly protruding from the outer member so as to occupy the fastener-receiving hole in an article of work, the outer telescopic member being arranged to control the position of the work surrounding the inner member, said members being relatively movable lengthwise of their axis during the fastener-inserting operation so that the fastener may pass through said hole before the inner telescopic member exercises its clenching function.

6. Fastener-setting mechanism comprising a work-support, a fastener-clenching tool the c'enching portion of which initially protrudes above the work-support so as to occupy the fastener-receiving hole in an article of work resting on the work-support, and a fastener-inserting tool arranged to cooperate with the clenching tool to clench a fastener in said hole, the clenching tool being depressible relatively to the work-support during the fastener-inserting operation so as to enable the fastener to pass through the hole before being clenched.

7. Fastener-setting mechanism comprising a work-support having a socket open at its top, a c'enching tool arranged in said socket so as to be movable up and down relatively to the work-support, said tool having a clenching shoulder, a spring arranged normally to raise the tool so that its clenching shoulder will be above the plane of the work-support, means arranged to arrest downward movement of the tool when the clenching shou'der is below said plane, and a fastener-inserting tool arranged to cooperate with the clenching tool to clench a fastener.

8. Fastener-setting mechanism comprising a fastener-inserting tool, two telescopically related tools for cooperating therewith, the latter said tools having clenching surfaces formed to engage and operate on the leading end of the inserted fastener, and means for controlling the relative telescopic movement of said two tools so that the inner one will initially protrude beyond the outer one and thereafter spread said end of the fastener into contact with the said clenching surface of the outer tool.

9. Fastener-setting mechanism comprising a fastener-inserting tool, two telescopically related clenching tools for cooperating therewith, said clenching tools having annular concentric clenching surfaces movable to and from flush relation, and means arranged to control relative telescopic movement of said clenching tools so that said clenching surfaces will occupy said flush relation while the leading end of a fastener is passing from one to the other.

10. Fastener-inserting mechanism comprising a fastener-inserting tool, two telescopically related clenching tools of which one has a surface to engage and spread the leading end of a tubular fastener and of which the other has a surface to engage and clench said end, and means to control said tools with respect to their relative telescopic movement.

11. Fastener-setting mechanism comprising a fastener-inserting tool, a work-supporting member, and a work-registering member telescopically related to said work-supporting member to be movable relatively thereto, said work-supporting member and said work-registering member having surfaces formed and arranged to engage the leading end of an inserted fastener to upset and clench it.

12. Fastener-setting mechanism comprising a fastener-inserting tool and two telescopically related members for cooperating therewith, said members having surfaces formed and arranged to function conjointly against the leading end of an inserted fastener to upset and clench said end and being relatively movable so that the inner member may register a previously punched article of work for the insertion of the fastener.

13. Fastener-setting mechanism comprising means formed and arranged to insert a tubular fastener, and relatively movable fastener-engaging tools constructed and arranged to engage successively the leading end of such fastener to spread it open and finally to act simultaneously to clench the fastener.

14. Fastener-setting mechanism comprising means formed and arranged to insert a tubular fastener, and two telescopically related tools constructed and arranged to engage successively the leading end of such fastener to spread it open and finally to act simultaneously to clench the fastener.

15. Fastener-setting mechanism comprising a work-supporting member and a work-registering member constructed and arranged respectively as the outer and inner members of a telescopic couple, a spring arranged normally to project the inner member beyond the outer member, and means arranged to limit the relative telescopic move-

ment of said members, the latter having cooperative clenching surfaces arranged to occupy flush relation when the members are at one limit of their telescopic movement.

16. Fastener-setting mechanism comprising a stationary work-supporting member having a bore and an annular clenching surface surrounding the latter, a work-registering member arranged to move endwise in said bore and having a clenching surface movable to and from flush relation with the first said clenching surface, a spring arranged in said bore to project the work-registering member initially beyond the work-supporting member, and means constructed and arranged to limit the endwise movement of the work-registering member.

17. A fastener-setting machine comprising a fastener-inserting device and a support relatively movable toward and from one another, said support having a socket in line with the inserting tool, and an assemblage adapted to be secured in and removed from said socket intact, said assemblage including a work-supporting member, a relatively movable work-registering member formed and arranged to occupy the fastener-receiving hole in an article of work, and a spring arranged to maintain the registering member initially in registering position but to permit it to recede from such position, one of said members having a clenching surface formed and arranged to cooperate with said inserting tool to clench the fastener.

18. A machine for setting tubular fasteners, comprising a fastener-inserting device, a work-support, and a depressible clenching tool telescopically related to the work-support and having a clenching portion arranged initially to protrude into or through the fastener-receiving hole in an article of work, said clenching portion being displaceable from said hole by the fastener, and means for causing the clenching tool to exercise its clenching function after it has been displaced from the hole as aforesaid.

19. Fastener-setting mechanism comprising two telescopically related members having cooperative clenching surfaces formed and arranged to provide, conjointly, an annular clenching surface of semi-circular cross-section, one of said members being movable relatively to the other so that the inner member may occupy the fastener-receiving hole in the work prior to insertion of the fastener.

20. Fastener-setting mechanism comprising a fastener-inserting tool, and two telescopically related members the inner one of which has an annular surface formed to engage and spread the leading end of the inserted fastener and the outer one of which has an annular surface formed and arranged to surround and confine said leading end to clench and tighten it against the work.

21. Fastener-setting mechanism comprising a movable fastener-inserting tool, a fixed clenching tool, and a movable clenching tool, said clenching tools being formed and arranged to engage and act simultaneously on the leading end of the inserted fastener to clench said end, one of said clenching tools being also formed and arranged to engage an edge of the work to register the latter for the insertion of the fastener.

22. Fastener-setting mechanism comprising means to insert a tubular fastener into an article of work, a tool having a surface to engage and clench the leading end of such fastener, and a tool having a surface to engage and spread said leading end and to guide it to said clenching surface, the second one of said tools being movable relatively to the first by the fastener.

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

THOMAS J. HALLAM.