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RIVETING TOOLS

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3 Claims

ABSTRACT OF THE DISCLOSURE

The disclosure is directed to a shears-type tool for setting blind hollow rivets each including a mandrel, which is pulled from the accessible side of the work to set the rivet on the blind side. The tool includes a body, a pulling device or chuck movable relative to the body, an actuating linkage and an adjustment between the linkage and the tool body to obtain the maximum mechanical advantage from the linkage at the time that the mandrel is broken after setting the rivet.

This invention is concerned with improvements in or relating to tools adapted for use in blind riveting.

The expression "blind riveting" is used herein to denote a procedure in which a hollow rivet, accommodated in a hole in the work, is set at one side of the work by application of a pull to a stem of a mandrel a head of which engages the rivet at that side of the work and the stem of which projects from a head of the rivet at the other side of the work. A rivet and a mandrel assembled together ready for use in blind riveting is what is meant by the expression "a blind riveting assembly" where used hereinafter. Blind-riveting assemblies of various types, one with the mandrel head exposed and arranged to abut the tail end of the rivet (which has a hole right through it), another with the mandrel head concealed within the barrel of a rivet which is closed at the tail end, are commercially available.

In blind riveting, it is customary to use a tool of a type comprising a body portion which includes a nosepiece adapted to abut the head of the rivet of a blind-riveting assembly, mandrel-gripping means in the form of a plurality of jaws, a pulling device arranged to move within the body portion towards and away from the nosepiece, and a leverage mechanism interconnecting the body portion and pulling device and affording a mechanical advantage whereby a force applied to the leverage mechanism can cause a substantially greater force to be exerted by the pulling device, the mechanical advantages increasing as the pulling device moves further from the nosepiece, the tool being so constructed and arranged that (a) rearward movement of the pulling device away from the nosepiece in the operation of the tool first causes the jaws to grip the mandrel stem and thereafter to pull it relative to the head of the rivet abutted by the nosepiece, and that (b) the mandrel stem is released upon forward movement of the pulling device relative to the jaws. A tool of this type is what is meant by the phrase "a blind-riveting tool of the type referred to" where used hereinafter.

There is hereinafter described in detail to illustrate the invention by way of example a blind-riveting tool of the type referred to which is arranged to be operated manually by an operator moving a pair of symmetrically disposed arms which form part of the leverage mechanism of the tool. The pair of arms of the leverage mechanism of this illustrative tool are pivoted upon the body portion of the tool, and connected by two links to a common bridgepiece to which the pulling device is adjustably coupled. The pulling device of the illustrative tool comprises a sleeve and the jaws of the mandrel-gripping means have

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external faces inclined to the axis of the sleeve and engageable with complementary inclined internal faces of the sleeve. The jaws are urged forwardly within the sleeve by spring means and their foremost positions in the body portion are determined by their engagement with a rear face of the nosepiece, which is detachable for replacement by one of another size for use with a different sized blind-riveting assembly.

The sleeve of the pulling device of the illustrative tool has a collar at its rearward end which provides a flange arranged to abut a rearward end face of the body portion of the tool to determine the foremost position of the pulling device. The sleeve is rotatable about its axis, and the periphery of the collar is knurled to facilitate turning of the sleeve by the operator. The sleeve is threaded on to a threaded stud which projects forwardly from the bridgepiece. Turning of the sleeve thus adjusts the relative dispositions of the sleeve and bridgepiece, which results, for example if the sleeve is turned while in its foremost position, in adjustment of the disposition of the leverage mechanism.

Using the illustrative tool in blind riveting, the stem of a mandrel of a blind-riveting assembly may be inserted through the nosepiece and between the jaws of the mandrel-gripping means, the two arms of the leverage mechanism being spread apart so that the jaws and the pulling device are in their foremost positions. The barrel of the rivet can then be inserted in the work and the rivet head pushed against the work by the nosepiece. Closing of the arms effects retraction of the pulling device to cause the jaws first to grip and then to pull the mandrel stem. Should a second stroke of the pulling device be necessary to complete the rivet-setting operation (which may include breaking of the mandrel stem), the arms are spread apart to allow the mandrel stem to be released and the nosepiece to be pushed up the mandrel stem into abutment again with the rivet head (forward movement of the pulling device within the body portion of the tool before release of the mandrel stem having resulted in the nosepiece moving away from the rivet head); release of the mandrel stem is ensured when the jaws have reached their foremost positions in the body portion and the pulling device has moved further forward to its foremost position. A second stroke can now be imparted to the pulling device by again closing the arms of the leverage mechanism. If necessary, yet a third stroke can be made.

In the illustrative tool, the mechanical advantage obtained from the leverage mechanism in applying a substantially greater force to the pulling device than is applied by the operator to the end portions of the arms remote from their pivotal connections to the body portion, increases as the arms are closed. The load on the pulling device also increases as the mandrel head is drawn, relative to the rivet, reaching, in the case of a blind-riveting assembly of the kind in which the mandrel stem is arranged to break, a maximum when the mandrel stem is about to break. Whether rivet-setting with one or more strokes, it is possible by turning the sleeve of the pulling device so to vary the disposition of the leverage mechanism that the said arms are nearly closed, and the mechanical advantage of the leverage mechanism at its greatest, when the rivet-setting load is at its maximum. The provision for such adjustment is especially useful where an operator is setting a large number of similar rivets under uniform conditions (e.g. uniform work thickness) so that once carefully adjusted, the tool can be used repeatedly to best advantage. Such conditions may be found for example, on building sites where the operator may be suspended in a cradle by the wall of a building; in such an instance, the illustrative tool not only enables rivets to be set with minimum fa-

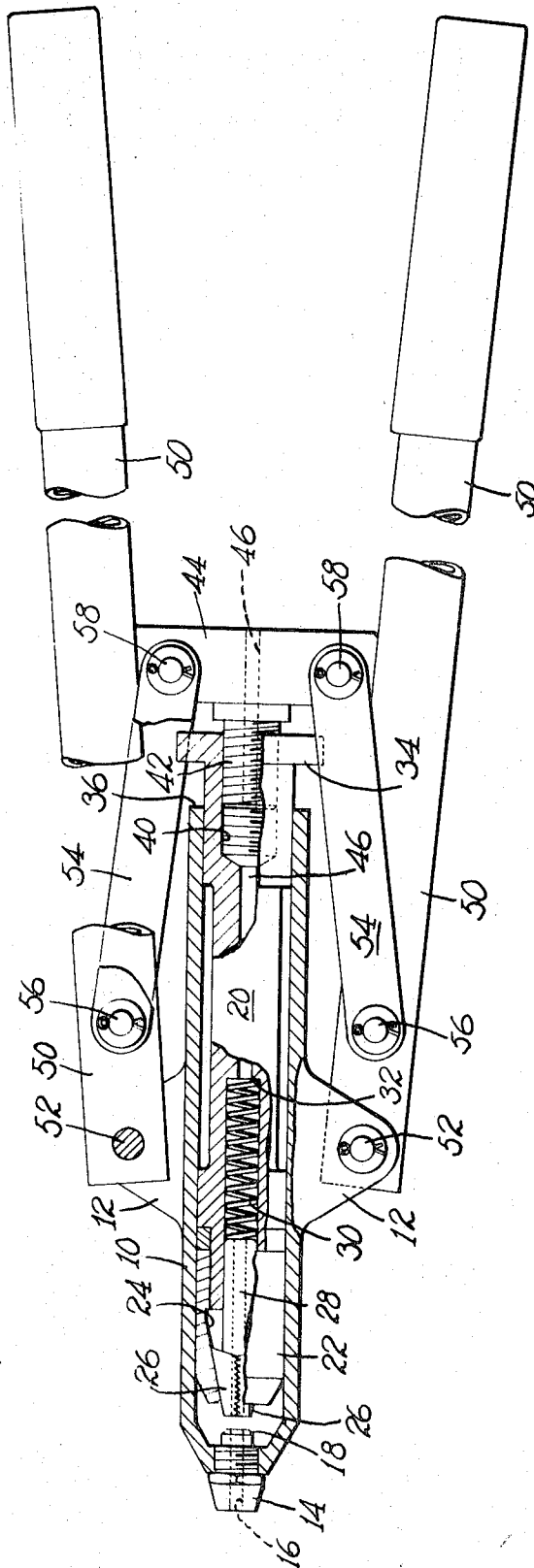
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the mandrel of a blind-riveting assembly through the nose-piece 14 and between the jaws and inserts the barrel of the rivet into the work. He then closes the arm 50 and in the one, or two, or perhaps three, strokes for which the tool is set completes the rivet-setting operation.

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

1. A blind riveting tool having a body and a pulling device movable relative to the body and including jaws, the foremost positions of the jaws and the pulling device being determined by abutment of the jaws and the pulling device with a portion of the body of the tool, the jaws being adapted to be opened in their foremost position to permit release or insertion of a mandrel stem therebetween, in combination with a leverage mechanism for actuating the pulling device and means operative between the leverage mechanism and the pulling device for adjusting the disposition of the leverage mechanism relative to the body independent of any given position of the pulling device relative to the body.

2. A tool according to claim 1 in which the pulling device has a collar having a flange for abutting a rearward end face of the body portion of the tool to determine the foremost position of the pulling device in the body.

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3. A tool according to claim 1 in which the leverage mechanism comprises two arms operatively connected to the body portion of the tool and to a common bridge piece and in which the pulling device has a rotatable sleeve in threaded engagement with a stud projecting from the bridge piece for adjusting the position of the pulling device relative to the bridge piece.

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