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RIVETING APPARATUS

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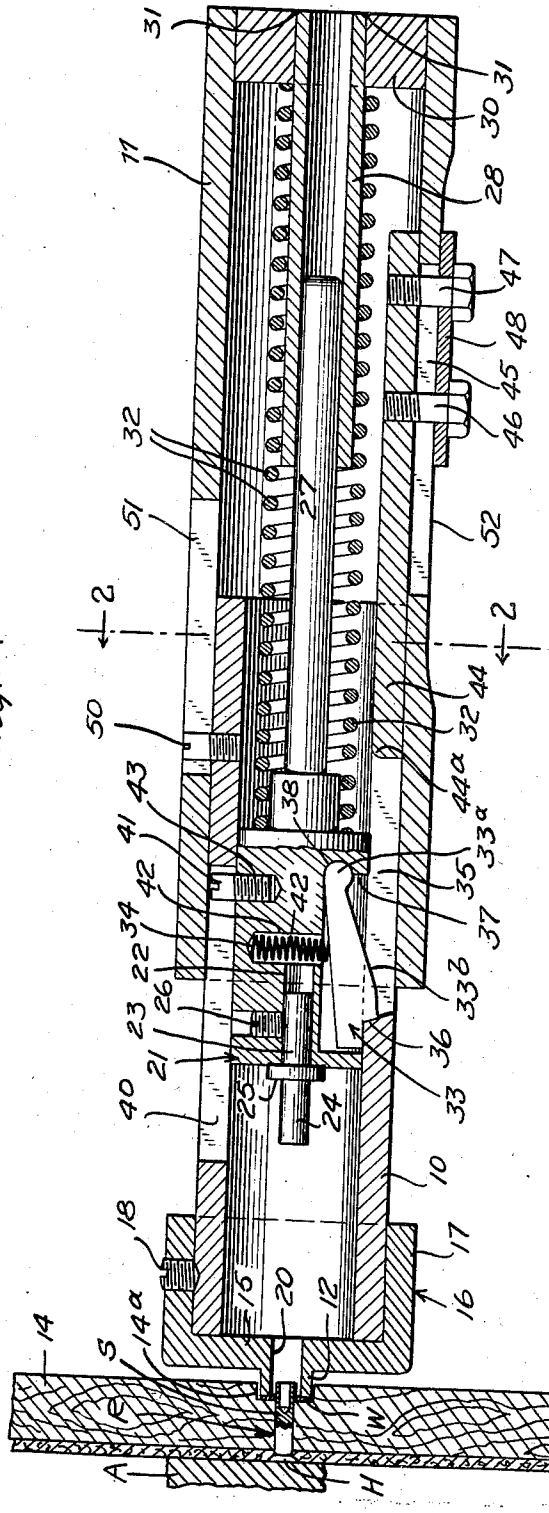


Fig. 1.

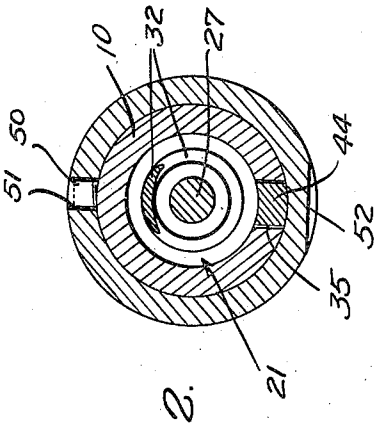


Fig. 2.

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RIVETING APPARATUS

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4 Claims. (Cl. 218—19)

This invention relates to apparatus for riveting.

One of the objects of this invention is to provide a simple, practical and inexpensive device for heading over rivets or the like. Another object is to provide a riveting apparatus of the above-mentioned character that will be simple to handle or manipulate, that will be of good and reliable action, and that will effect efficient and improved setting up and completion of the riveted joint or junction.

Another object is to provide a simple, practical and efficient apparatus for facilitating the achievement of better and proper relationship between the rivet and a rivet washer or the like and the part or parts to which the rivet is to be secured by heading it over. Another object is to provide an apparatus of the above-mentioned character in which preparatory compression or compressing against the head of the rivet, of the part or parts to be secured may be achieved in a simple, dependable and efficient manner; another object is to carry out this last-mentioned object by way of apparatus that will be of compact construction and reliable action and capable of achieving substantial uniformity of action in successive operations. Another object is to provide an apparatus of the above-mentioned character by which in general to facilitate riveting operations and to improve the character and strength of the resultant fastening, particularly where one or more of the parts to be secured is relatively yieldable. Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing in which is shown by way of illustration a preferred embodiment of the mechanical features of my invention,

Figure 1 is a central longitudinal sectional view of the riveting apparatus shown in relation to a part or parts to which a rivet is to be secured, and

Figure 2 is a transverse sectional view as seen along the line 2—2 of Figure 1.

Similar reference characters refer to similar parts throughout the several views of the drawing.

In the preferred form of construction the apparatus preferably comprises two relatively slideable and preferably telescopically arranged casing-like members 10 and 11 preferably cylindrical with the inside diameter of member 11 large enough to receive slideably therein the other member 10 and thus to provide for each other good large-area bearing surfaces for guiding each other during relative sliding movement therebetween. At the outer end of the inner member 10, is provided a part 12, preferably and conveniently annular in cross-section, to take over or about the shank end of the rivet and to present an end annular face of appropriate area to press against the part or parts to which the rivet is to be secured or which the rivet is to secure or fasten.

To better illustrate certain features of construction and action, let it be assumed that one or more of the parts which are to be clamped or fastened by the rivet is of a material that is relatively yieldable as compared to metal, and in Figure 1 I have assumed, for purposes of illustration of a practical application or functioning of my apparatus that a conveyor type of belt or the like made up of a suitable flexible material 13, such as rubberized canvas belting, is to have secured to it at suitable intervals transverse slats of, for example, wood, and of which one is shown in Figure 1 at 14. Thus a rivet R is shown in Figure 1 passed through a suitable hole punched at the appropriate point in the element 13, with its head H overlying a substantial area of the material 13 and with its shank S passed through a suitable hole drilled through the member 14 and preferably countersunk as at 14^a to a suitable depth and to a diameter to accommodate therein and about the projecting portion of the shank S a washer W over and against the right hand face of which the excess portion of the shank S is to be hammered or headed or spread. This end portion of the shank S may be given any desired or suitable configuration and in the illustrative application of my apparatus the shank end may be counter-bored or hollowed out to facilitate lateral spreading and heading over, though it will be understood that any other suitable shape or configuration, including a solid shank end, may be utilized if desired.

The above-mentioned presser element 12 is shown in Figure 1 as taking over and about the free end of the shank, the head and related assembled parts being backed up in any suitable way as by an anvil or other suitable support A, and by exerting pressure in a direction toward the left upon the apparatus, the presser element correspondingly compresses the parts 13, 14 and W between itself and the head H of the rivet R, and such action I am enabled to achieve in my apparatus as preparatory to the actual striking of the exposed shank end to head it over.

The presser element 12 is preferably formed on the end wall 15 of a cylindrical cap-like member 16 whose cylindrical wall 17 snugly receives therein the left-hand end of the casing member 10 whose end annular face preferably abuts against the inner face of the end wall 15, thus to insure better transmission of the compressing force that is to be applied, to the presser element 12, and the mounting of the end cap member 16 is preferably detachable, as by a set screw 18, whereby the part 16 may be readily removed and replaced by another whose presser element 12 is of a different size or shape or by one whose bore 20 is of different dimension, according to such factors as the size of rivet to be operated upon, the size of washer, the size or character of other parts to be clamped by the rivet, etc., etc.

The bore 20 is coaxial with the cylindrical wall 17 of the cap member 16 and as the latter and the casing member 10 are telescopically fitted together upon assembly and locked in place by the set screw 18, the bore 20 thus becomes positioned coaxially with the coinciding axes of the telescopically arranged casing members 10 and 11, and in casing member 10 is slideably contained and guided a cylindrical carrier or head 21 having in its forward or left-hand end a recess, such as a cylindrical hole 22 preferably coincident with its axis, for removeably receiving the shank 23 of the rivet-hammer or plunger 24 which is preferably provided with a heavy shoulder 25 to rest against the left-hand or front face of the cylindrical head 21. The rivet plunger 24 may be removeably held assembled to the head 21 in any suitable way as, for example, by a set screw 26 threaded into a radially extending hole in the head 21.

The plunger 24 is of a diameter to freely enter the bore 20 of the presser head member 16 and, by the above-described mounting, it is held coaxial with that bore; it is of a length somewhat in excess of the length of the bore 20, substantially as indicated in Figure 1.

The rear or right-hand end of the head 21 has integrally formed with it or suitably secured thereto a guide rod 27 that is coaxial with the head 21 and whose right-hand or free end is slideably received in a hollow cylindrical tubular guide element 28 rigidly supported coaxially with the outer casing member 11 in any suitable way, as, for example, by a heavy collar 30 which is received into the outer end of the casing member 11 and into a suitable bore in which the hollow cylindrical guide 28 is tightly fitted, the three parts being rigidly held together in any suitable manner as by welding as indicated at 31.

Parts 27 and 28 will thus be seen to be slideably and telescopically related to each other and about them extends a helical compression spring 32 of appropriate or substantial strength or power, and in its uncompressed state and with the above-described parts and others later to be described in the position as shown in Figure 1, it has a length such that its ends just about abut respectively against the end collar or wall 30 of the outer casing member 11 and against the right-hand end of the head 21.

In just about these relative positions of the various parts, a latch 33, preferably spring-biased as by spring 34 and carried by and with the head 21 becomes free to swing into a longitudinally extending slot 35 in the casing member 10 so that one wall of its notch 36 abuts against the left-hand end wall of the slot 35, thus to limit movement of the head 21 toward the left relative to the casing member 10, while the other wall of the notch 36 rests against the inner wall of the casing member 10 to limit the extent of this counterclockwise movement of the latch 33 under the bias of the spring 34.

The latch 33 is relatively heavy and substantial in structure and with the spring 34 is mounted in the head 21 in any suitable way. But for purposes of greater ease of assembly and greater durability and strength of mounting, the latch 33 is simply set into a substantially rectangular recess 37 formed in any suitable way in the head 21 and provided with a suitably curved or cylindrical end wall portion 38 into which the arcuate end portion 33^a of the latch 33 is received, and serving also as a pivotal support for that end of the latch.

The recess 37 is of a width substantially the same as the width of the slot 35 in the casing member 10 and the respective side walls of the recess 37 and of the slot 35 are held in respective alignment with each other and against relative rotary displacement by a longitudinally extending slot 40 in the casing element 10 and a screw 41 threaded into the head 21, the cylindrical head of the screw 41 and the slot 40 neatly interfitting so as to prevent material relative rotary displacement during relative sliding movement between the parts 10 and 21.

The latch 33 is of a thickness slightly less than the width of the recess 37 and width of the slot 35 and is of greater length than the recess 37 so that, after the spring 34 has been inserted into the radially extending hole 42 in the head 21 and opening into the recess 37, the arcuate end 33^a of the latch 33 is first slipped into the undercut arcuate seat 38, and thence is swung in clockwise direction to compress the spring 34 and to enter the left-hand end of the latch into the recess 37, just clearing the left-hand end wall of the latter. When so assembled, the head 21 with the latch 33 may be slid into the casing member 10 the walls of which close off the recess 37 upon such assembly, whence the guide screw 41 may be put in position by threading it into the hole 43 in the head 21, through the slot 40.

The slot 40 is of a length to permit movement of the head 21 toward the right-hand end of casing member 10 sufficiently to permit the latch 33 to become operative as a stop element by letting its latching portion enter the slot 35, and to permit sufficient movement of the head 21 toward the left to permit the rivet plunger 24 to completely enter the bore 20.

The underface 33^b of the latch 33 as seen in Figure 1 is shaped to provide what is in effect a cam of easy slope when entered into the slot 35 of the inner casing member 10, and upon the outer casing member 11 I provide an element 44 for engaging the cam portion 33^b and for actuating the cam 33 in clockwise direction, thus to trip it out of stopping or holding position, at the desired point in the stroke of movement toward the right of casing member 11 relative to the casing member 10, and conveniently member 44 comprises a bar cross-sectioned to fall relatively snugly within the cross-sectional shape or dimensions of the slot 35 in the casing member 10, so that it may slide along that slot and with its left-hand portion 44^a, preferably curved or rounded off for smoother coaction with the cam 33^b, engage the latter to actuate the latch.

Preferably latch-actuating member 44 is ad-

justably secured to the casing member 10 and this is preferably achieved by a slot 45 extending longitudinally in the cylindrical wall of the casing member 11 having extending therethrough, and threaded into the member 44, two longitudinally spaced screws 46 and 47 whose heads externally overlie the slot 45 but preferably with a clamping plate 48 interposed between the heads and the outer face of the casing member 11 which is preferably milled off flat as at 52 on each side of the slot 45 to provide flat faces against which the clamping plate 48 may rest.

The longitudinal spacing of the screws 46—47, whose shanks snugly fit the slot 45, insures longitudinal alignment of the latch-actuating member 44 with the slot 35 in the other casing member, the width of the member 44 being therefore greater than the width of the slot 45 to overlie and engage the inner surfaces of the casing member 11 to each side of the slot 45. Accordingly, a secure clamping action may be effected to hold the member 44 assembled to the casing member 11 and in the selected position thereof lengthwise of the slot 45.

With the head 21 and related parts assembled to the casing member 10 as above described and with the spring 32 slipped over the guide rod 27 of the head 21, the outer casing member 11 may be telescoped onto the right-hand end of the casing member 10, the latch control member 44 being entered into the slot 35; thereupon a screw 50 is threaded into a hole near the right-hand end of casing member 10, the screw being passed through a longitudinally extending slot 51 in the casing member 11, with the screw head diametered for sliding fit with the walls of the slot 51, whereupon the screw head and slot 51 and also the latch control member 44 and the slot 35 may thereafter coact to guide the two telescopic casing members 10 and 11 during their relative sliding movements and to hold them against material relative rotary displacement. Preferably, in this latter connection, I provide more play or leeway in the fit of the latch control member 44 in the slot 35 than in the fit of the head of the screw 50 in the slot 51, thus to reduce friction during operation and to avoid having to provide too precise alignment of the latch control member 44 relative to the slot 35.

The length of the slot 51 is such that it permits outer casing member 11 to move toward the right relative to inner casing member 10, with the head 21 withdrawn and the latch 33 in stopping position as shown, to accommodate the spring 33 between its abutments 21 and 30 freely and in uncompressed condition, and to permit movement of the casing member 11 to the left relative to casing member 10 to an extent sufficient to bring the cam portion 44a of the member 44 into coaction with the latch-cam portion 33b and sufficiently so to swing the latch 33 in clockwise direction completely out of engagement with the end wall of the slot 35.

Having assembled the rivet and the parts such as the members 13, 14 and W, and having suitably backed up the head end of the rivet R as by the anvil A, the apparatus, with the parts positioned as shown, is by the operator put into position with the presser element 12 of the head end resting against the outermost of the parts, such as the washer W, which are to be clamped between the head of the rivet and the shank end thereof to be headed over. The operator, using the casing member 11 as a handle, presses toward the left and has to exert sufficient force to compress the spring 32 and to continue to compress it until the cam-actuating member 44 trips the latch 33. During this interim, all of the force necessary to achieve such compression of the spring 32 is made effective to compress the elements 13 and 14 between the head H of the rivet R and the washer W and thereby also the washer W becomes seated well down upon the shank of the rivet R and, moreover, it is also thereby possible to maintain it neatly in coaxial relationship with the rivet shank S. That force thus makes certain that the part or parts to be clamped by the rivet are well seated against the head H of the rivet and thus guards against the premature commencement of a heading-over operation upon the rivet shank. During that interim of time, the compression of the spring 32 results in the storage of energy in the latter and when the latch 33 is disengaged at substantially the end of the compression stroke, that energy is suddenly released, and the head 21 carrying the hammer-like plunger 24 is projected at high velocity to the rivet, enters the bore 20 and strikes the projecting end of the rivet shank S a substantial blow. Depending upon such factors as the material operated upon, the particular metal employed in the rivet R, its shape or conformation, the tightness of clamping desired, and the like, the operation may or may not be repeated and if repeated any desired number of successive operations like that above described may be effected. But each time, it will be noted, the reaction to the forces applied to compress the spring 32 is effective to act upon the part or parts being clamped by the rivet in the manner above described, though it will be appreciated that it is at the outset of the riveting operation that these preliminary or preparatory actions of the apparatus have their greatest effectiveness.

Upon the conclusion of each blow administered by the released hammer plunger 24, the apparatus is restored to the relative positions of the parts substantially as shown in the drawing, and this is easily and quickly achieved in this apparatus for all that the operator need do is to take hold of the apparatus by the left-hand end of the casing member 10, as by grasping the head end 16, and let the apparatus swing downwardly with this left-hand end of the casing member 10 as a pivot or axis; the weight of the outer casing member 11 causes it to slide axially in a direction away from the inner casing member 10 until the left-hand end of slot 51 and the screw 50 engage each other, and the head 21 with related parts, including the spring 32, partake of movement in similar directions, movement of the head 21 toward the right as viewed in Figure 1 relative to the casing member 10 being limited by the engagement of the right-hand end of slot 40 and the screw 41, latch 33 dropping under the bias of spring 34 into engagement with the left-hand end wall of slot 35 of casing member 10, thus conditioning the apparatus for repetition of the cycle of operation above described.

In Figure 1 the parts are shown in the positions they occupy subsequent to such restoration of the various parts but after taking up such looseness or play as is desirable to effect the above-described coactions for restoration purposes; thus it will be noted that casing member 11 is still free to move toward the right by the small amount of space between the screw 50 and the left-hand end of slot 51 and head 21 could still move slightly toward the right rela-

tive to the inner casing member 10 by the amount of the small space between the screw 41 and the right hand end wall of slot 40, and it is these relatively small amounts of play that insure that, without having to compress spring 32, the latch 33 can be bodily moved to the right beyond the position shown in Figure 1 to a slight extent to insure that it freely drops into stopping or engaging position, the play however being insufficient to ride the horizontal wall portion of the notch 36 out of engagement with the inner wall of the casing member 10.

If it is desired to change the power of the blow exerted by the riveting plunger 24, the cam control member 44 is shifted so that its cam portion 44a actuates the latch cam 33b at a different point in the stroke that is exerted to compress the spring 32, and this is readily achieved by the adjustable clamp mounting of the member 44 in the form of the clamping plate 48 and the screws 46—47. Also the pressure element head 16 and the riveting head 24 may be easily and quickly replaced by corresponding parts of different sizes or dimensions, and thus the apparatus will be seen to have a wide adaptability in practical use. But in all such cases, it will also be seen, I am enabled to achieve quickly and dependably proper pre-compression of the part or parts to be engaged between the head of the rivet and the headed-over shank end and more particularly I am enabled to avoid the shortcomings, deficiencies and weaknesses and lack of uniformity of holding action that result, according to prior practices, from inability or failure properly to position and hold the washer before the first blow is struck. That first blow has the effect of expanding the shank into tight engagement with the washer and if the latter is not properly positioned at the outset, inefficient, defective and undesirable riveting junctures result. With my apparatus, however, such deficiencies can be avoided and nicety and uniformity of proper riveting action achieved.

As many possible embodiments may be made of the mechanical features of the above invention and as the art herein described might be varied in various parts, all without departing from the scope of the invention, it is to be understood that all matter hereinabove set forth, or shown in the accompanying drawing, is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. Two tubular telescopic casing members the inner of which has at its forward end apertured presser means and has a slot in its wall extending from its rear end to an intermediate point, a striker head slidably supported for axial movement in said inner member and having a striker aligned with said apertured presser means and having a latch to coact with the end of said slot at said intermediate point in said inner member, said outer member having a part for slidable engagement within said slot to engage and actuate said latch upon movement of the outer member toward said presser means, and spring means interposed between the rear of said outer member and said striker head to become stressed prior to actuation of said latch by said part.

2. A construction as claimed in claim 1, in which said striker head is provided with a recess in a side thereof, said latch being accommodated in said recess, with means biasing said latch outwardly of said recess.

3. A construction as claimed in claim 1, in which said latch-actuating part comprises an elongated member positioned internally of said outer casing member and having means accessible from the exterior of said outer member for adjustably securing it in position lengthwise of said outer member to thereby set the point at which it is to actuate said latch.

4. Two tubular telescopic casing members the inner of which has at its forward end apertured presser means, a striker head slidably supported for axial movement in said inner member and having a striker aligned with said apertured presser means, said striker head being substantially cylindrical and having in a face thereof exposed to the wall of said inner casing member recess means, a latch member accommodated in said recess means together with spring means for biasing said latch outwardly of said recess means and toward the wall of said inner casing member, said wall having means forming a shoulder for coaction with said latch and positioned at a point in the path of movement of said latch as the latter is carried along with said striker head, whereby the latter is held by the latch and shoulder in a position spaced rearwardly from said presser means, spring means interposed between the rear end of said outer casing member and said striker head to become stressed upon telescopic movement of said outer member in a direction toward said presser means, and means actuated upon the completion of a certain amount of said last-mentioned movement to disengage said latch member from said shoulder and thereby release energy stored in said spring to impel said striker head toward said presser means for entry of said striker into said apertured presser means.

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