Jan. 29, 1946. A. J. HEINTZ 2,393,771

APPARATUS FOR RIVETING

Filed April 8, 1943

FIG. 1.

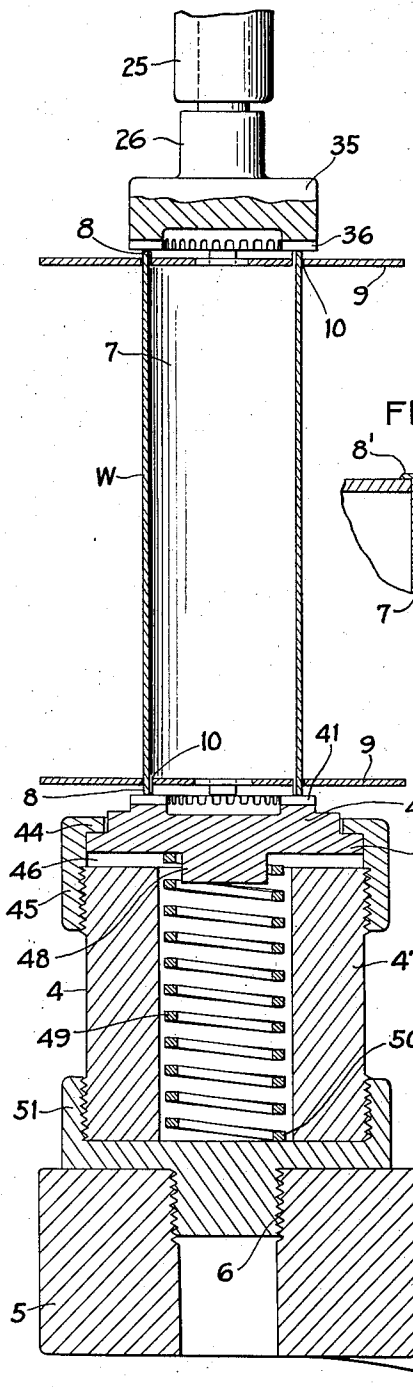


FIG. 3.

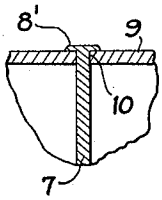


FIG. 2.

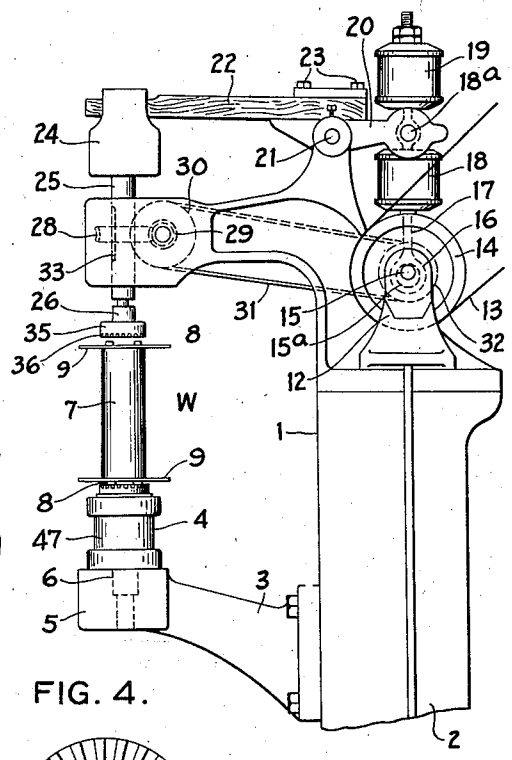


FIG. 4.

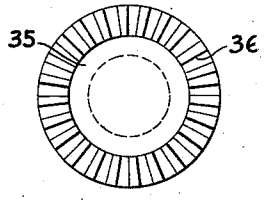


FIG. 5.

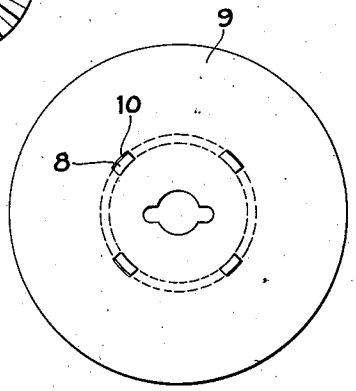
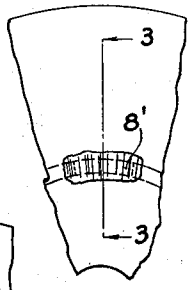


FIG. 6.



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APPARATUS FOR RIVETING

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3 Claims. (Cl. 78—49)

This invention relates to apparatus for rapidly riveting two spaced portions of work. One of the objects of my invention is to provide a machine which can be used for simultaneously fastening flanges on opposite ends of a spool core. Another object of my invention is to provide an anvil which is so constructed that it may return a blow delivered through the work to the anvil in such a manner that this blow may be utilized for riveting. Another object of my invention is to provide a machine which will simultaneously rivet both flanges of a spool onto the spol core which will work at a high speed and which will produce uniform results. Still another object of my invention is to provide a method of riveting which will reduce the normal cost of such a riveting operation very materially. Other objects will appear from the following specification, the novel features being particularly pointed out in the claims at the end thereof.

Coming now to the drawing wherein like reference characters denote like parts throughout:

Fig. 1 is an enlarged sectional view through a riveting machine utilizing an anvil constructed in accordance with and embodying a preferred form of my invention;

Fig. 2 is a fragmentary view on a somewhat reduced scale of the anvil shown in Fig. 1 arranged to operate in conjunction with a high speed riveting hammer;

Fig. 3 is a fragmentary sectional view taken on line 3—3 of Fig. 6 of a typical riveted joint which can be made with my improved form of riveting mechanism;

Fig. 4 is a bottom plan view of a preferred type of riveting tool which may be used on either the riveting hammer or the anvil or both;

Fig. 5 is a top plan view of a spool before riveting; and

Fig. 6 is a fragmentary view on an enlarged scale showing a top plan view of one of the rivet heads.

It has been customary heretofore in manufacturing certain types of spools to provide lugs on the core which would project through closely fitting apertures in the spool flanges and then to rivet over these lugs or rivets to hold the flanges in place. The forming or riveting operation has usually been performed on a high speed hammer type of machine and it has been customary for one flange to be riveted in place after which the spool is turned over and the second flange is riveted into place. In accordance with my present invention both ends of the spool may be riveted at once and I have been able to accomplish this without any change in the structure of the riveting hammer used.

While obviously I do not wish to be limited to any specific type of riveting hammer, I have found that the machines made by the High Speed Hammer Company, Inc., of Rochester, New York, can be used with my improved form of anvil to accomplish the double riveting operation. Such machines have proven very satisfactory in use.

Referring to Fig. 2, I have illustrated a high speed hammer 1 which consists broadly of an upright post 2 carrying a bracket 3 for supporting an anvil 4 on a table 5. The anvil may have a threaded connection at 6 with the table 5 to hold it in position.

In this instance the workpiece designated broadly as W may be a spool in which a core 7 provided on the ends with lugs 8 is used to support flanges 9. The flanges 9, as shown in Fig. 5, have openings 10 closely fitting the lugs 8 and the lugs extend slightly through the flange 9 as indicated in Figs. 1 and 2.

The post 2 supports a power drive in unit 12 which may be operated by a belt 13 running over a pulley 14 on a shaft 15. The shaft 15 carries an eccentric or cam 15a seated in a strap 16 on the lower end of a rod 17. This rod carries resilient buffers 18 and 19 that serve to cushion the rapid oscillations of the rod 17 and to transmit these oscillations by means of a transverse pin 18a between the buffers, this pin being seated in arms 20 pivoted at 21 in the frame.

The arm 20 carries a wooden lever 22 as by being bolted at 23 thereto and the wooden arm is preferably made of some strong resilient wood such as hickory. On the outer end of this arm there is a strap 24 to which a shaft 25 is attached. This shaft will, therefore, move axially as the arm 22 moves so that the hammer 26 will deliver a series of sharp, rapid blows, the length of a stroke of which is determined by the cam 15a selected for the particular job.

Not only does the shaft 25 move axially, but it is turned through a worm gear 28, worm 29, pulley 30 and belt 31 which engages a pulley 32 in the power driven unit. The worm gear 28 is held in mesh with the worm 29 and the shaft 25 may slide through the worm gear on a suitable spline 33.

The high speed hammer described above may be of any known type but is preferably one made by the High Speed Hammer Company, Inc., above referred to except for the shape of the hammer tool 26.

This hammer tool 26 is preferably provided with a circular-shaped head 35 having teeth 36 as shown in Fig. 4. The position of these teeth is such that one or more teeth will always contact with the lugs 8 of the spool core when the work W is positioned for the riveting operation. Moreover, as the hammering tool moves at very high speed axially and as it is slowly turned as it hammers, it provides a series of light, firm strokes which flatten out the lugs 8 from the condition shown in Fig. 5 to the condition shown in Fig. 6 wherein the lugs have been flattened over as indicated at 8'. This operation takes place very rapidly and with my improved form of anvil 4, which will now be described, a similar riveting operation simultaneously takes place on the opposite end of the workpiece W.

As indicated in Fig. 1 the lower spool flange 9 is provided with the openings 10 through which the lugs 8 pass. In other words, this end of the spool is exactly the same as the first-described end. My improved anvil 4 includes a riveting tool 40 which, like the riveting hammer 26, is provided with a series of serrations or teeth 41 arranged in annular form, but this riveting tool differs from the hammer 35 in that it is provided with an annular flange 43 adapted to engage an overhanging flange 44 of the annular cap 45 in such a manner that the tool 40 may slide relative to its support through a distance not greater than the width of the slot 46 between the riveting tool and the tubular support 47. The riveting tool has a central and downwardly projecting post 48 encircled by one end of a substantial spring 49, the other end of which, 50, rests on the threaded cap 51 holding the base of the tubular support 47 to the shelf or rest 5 by means of a threaded connection at 6 with the end of the bracket 3.

My improved anvil 4 not only supports the work W in position for the upper end of the work to be riveted, but it likewise supports and rivets the lower end of the work at the same time. This action takes place since the anvil returns the blow struck against the work by the hammer 35 and this rebound causes the riveting teeth 41 to rivet the lugs 8 in the same manner that the riveting teeth 36 of the hammer 35 rivets the opposite end of the work. Each time the hammer 35 strikes the tubular core 7 by contacting with the upper lugs 8, the lower lugs are driven down against the riveting tool 40 and the spring 49 is compressed and as soon as the hammer 35 rises, the riveting tool 40 rises and the blows thus struck simultaneously rivet both ends of the work at once. The operation takes place with a high degree of rapidity and by controlling the operation of the machine the degree of riveting or the degree of deforming which can be applied to the lugs 8 can be very readily controlled. It is possible to make these lugs only slightly longer than the thickness of the flanges and to deform them very slightly, or it is possible to deform the lugs as indicated in Fig. 6 to a much larger degree and to form them over quite a substantial portion of the flanges 9 should this be desired.

By my improved method I utilize the blows struck by the riveting hamer to not only rivet the upper lugs, but to cause the rebound of the anvil to perform a similar riveting operation of the lower set of lugs. This method not only cuts down the usual time of riveting such work by half, since it does the two operations at once, but in addition it insures that both of the riveting operations will be carried to a like extent in completing the work. It is of course possible to obtain differential results riveting more at the top than at the bottom or vice versa, should this become necessary. This can be done in a number of ways, one of the simplest of which is to vary the space 46 and consequently the amount which the riveting tool 40 may move. Another way is to unscrew the collar 45 and insert a spring 49 of different power from the spring previously used as by making the spring more or less powerful the degree of riveting can be varied.

It is quite obvious that different types of mechanisms may be employed for operating the riveting hammer as any desired mechanism whether working at a high speed or not could be used for this part of the operation. However, as above explained, a preferred type of machine may include known types of high speed riveting hammers. With a machine of the type above described, the duo riveting operation can not only be carried out with a high degree of uniformity, but the riveting can occur very rapidly and the machine can readily be so set that, as soon as the riveting is carried on to the desired extent, further operation of the machine will not affect the riveted joint already made.

I claim:

1. In a riveting machine of the type including a riveting hammer, power means for rapidly reciprocating the riveting hammer and means for turning the hammer as it is reciprocated, the combination with said hammer, of an anvil spaced from and in alignment with said hammer, the anvil being positioned for supporting work to be riveted at both ends, and comprising a support, a spring inside of the support, a riveting tool mounted on the support for limited movement relative thereto, means for limiting movement of the riveting tool relative to said support, the spring bearing against and holding the riveting tool against said means for limiting movement of the riveting tool and towards the riveting hammer, whereby both said riveting hammer and said riveting tool may strike their respective ends of work placed therebetween, the hammer striking direct blows upon the work causing the work to store up and release energy in the spring thereby causing the riveting tool of the anvil to strike blows on the end of the work spaced from the riveting hammer.

2. A machine for simultaneously riveting spaced ends of work comprising a high-speed hammer, a riveting tool having spaced teeth carried by the hammer, an anvil mounted beneath the hammer, a movably mounted riveting tool carried by the anvil and having spaced teeth, said riveting tool being spaced from the first mentioned riveting tool and being in axial alignment therewith to receive work therebetween, a mount for said last mentioned riveting tool in which the riveting tool may move a limited distance, a spring tending to hold the last mentioned riveting tool toward the first mentioned riveting tool, whereby the blows struck by the hammer upon the first mentioned riveting tool may cause the spring to move the second mentioned riveting tool so that both ends of the work between the hammer and anvil may be riveted by the action of the two axially alined riveting tools upon the work.

3. An anvil for high speed riveting hammers of the type including a power driven hammer, a first riveting tool carried thereby and oscillatable by the hammer to deliver a plurality of

rapid blows upon work, said anvil including a second riveting tool shaped like the first and positioned to support work beneath the hammer and the first riveting tool, said first and second riveting tools normally having a fixed relationship, a carrier on which the second riveting tool is slidably mounted, flanges on the second riveting tool and carrier, a spring normally holding said flanges in engagement, said hammer and first riveting tool being adapted to strike work carried on the anvil beneath the hammer and cause the flanges to separate, said spring returning the flanges to their normal contacting position, and means for adjusting the movement of the second riveting hammer relative to the first riveting hammer comprising a threaded connection between one flange and the carrier for limiting the stroke of the second riveting hammer carried by the anvil.

ALBERT J. HEINTZ.