

Sept. 17, 1940.

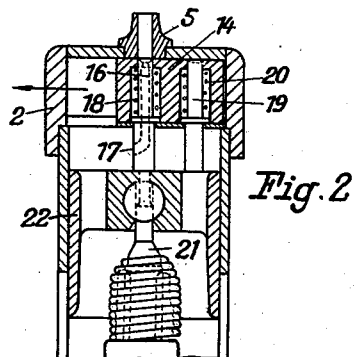
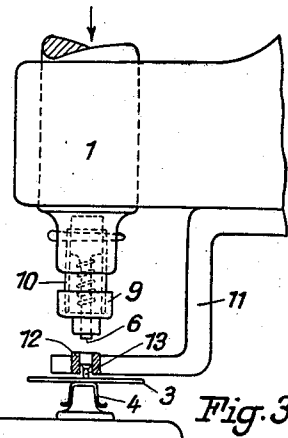
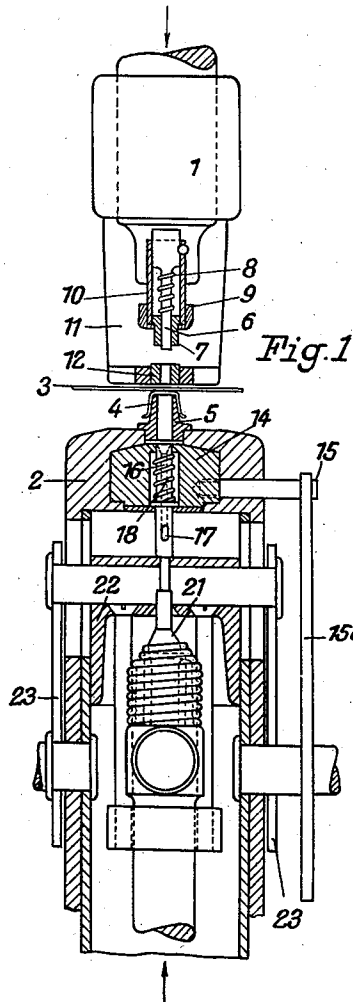
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2,215,388

RIVETING MACHINE

Filed Oct. 14, 1938

3 Sheets-Sheet 1



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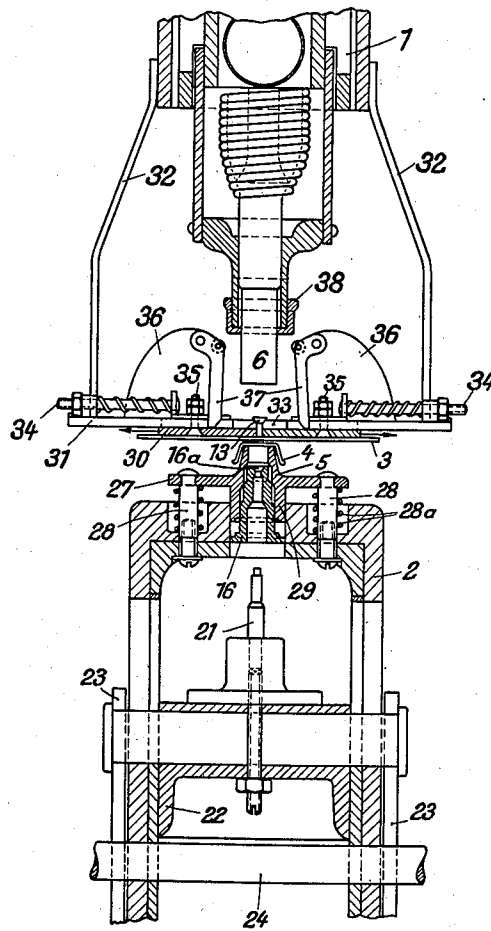
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RIVETING MACHINE

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3 Sheets-Sheet 2

Fig. 4



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3 Sheets-Sheet 3

Fig. 5

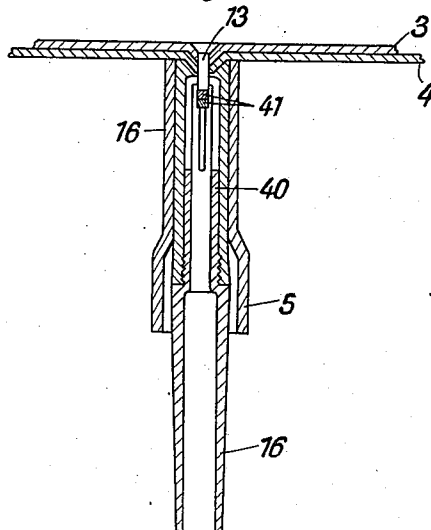


Fig. 6

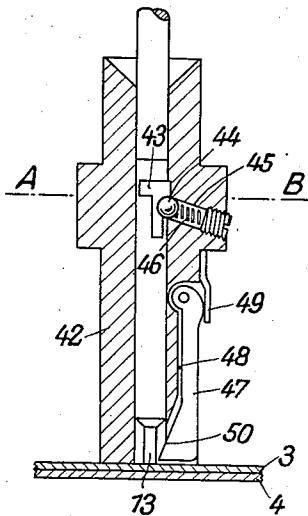
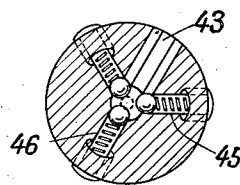


Fig. 7



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UNITED STATES PATENT OFFICE

2,215,388

RIVETING MACHINE

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In Germany November 4, 1936

9 Claims. (Cl. 78—48)

The present invention relates to a machine for riveting together sheets of metal or other material, for instance profile irons, and it relates in particular but not necessarily exclusively to a machine for riveting together thin imperforate sheets which are to be perforated by the shanks of the rivets.

It is an object of the invention to provide a riveting machine comprising a reciprocable stamp and means for alternately bring a holder-up and a snap head die in operative relation to said stamp.

It is another object of the invention to provide an improved holder-up having means for effecting or permitting the removal of punchings from the shank of a rivet struck through sheets of work material.

It is a further object of the invention to provide novel means for supporting and/or holding a rivet in position in readiness to be struck through sheets of work material.

It is yet another object of the invention to provide improved work supporting and holding means.

It is a still further object of the invention to provide a machine for riveting together imperforate sheets by means of countersunk rivets and incorporating for this purpose a countersunk holder-up.

It is a still further object of the invention to provide a machine by means of which imperforate sheets may be riveted together with a speed and ease comparable to the sewing together of fabrics by means of a sewing-machine.

Other objects and advantages of the invention will become apparent from the following description with reference to the accompanying drawings which illustrate some embodiments of the invention by way of example only. In the drawings,

Figure 1 is a sectional elevation of a machine constructed in accordance with one embodiment of the invention,

Figure 2 is a sectional elevation of part of the machine, taken at right angles to Figure 1,

Figure 3 is a side elevation at right angles to Figure 1,

Figure 4 is a sectional elevation of a machine constructed in accordance with another embodiment of the invention.

Figure 5 is a sectional view, on an enlarged scale, of a modified construction of holder-up,

Figure 6 is a sectional view of a sleeve incorporating a centering device, and

Figure 7 is a cross-sectional view taken on line A—B of the sleeve shown in Figure 6.

Referring first to Figures 1, 2 and 3 the riveting machine comprises an upper part 1 and a lower part 2 between which the imperforate workpieces 3 and 4 are placed on the hollow rest 5 of

the lower part 2, the rest being formed to suit the shape of the workpieces to be riveted. Arranged in the upper part 1 is a stamp 6 reciprocable vertically by any suitable means and partly surrounded by a slidable sleeve 7 co-operating with a coil spring 8 which tends to move the sleeve against a cap nut 9 screwed to a pipe 10 which surrounds the stamp 6. To the upper part 1 of the machine is fastened an arm 11 carrying an interchangeable ring 12 for the reception of the rivets to be fed by hand or automatically. The ring 12 is arranged in such a way as to allow of a slight downward movement when the stamp during its downward stroke presses the sleeve 7 on to the ring 12 which, therefore, is pressed on to the workpiece 3 before the stamp 6 reaches the rivet 13 to be struck through the workpieces 3 and 4. In the working head of the lower part 2 of the machine there is arranged a slide 14 carrying two different tools and reciprocable through the intermediary of a lever 15 driven by a crank guide drive 15a. One tool comprises a holder-up 16 having a countersunk surface 16a and provided with a boring 17 for the removal of the parts punched out from the workpieces. A spring 18 tends to hold the holder-up 16 in a position in which it does not project above the upper surface of the slide 14. Close to the holder-up 16 a snap-head die 19 is mounted in the slide 14 and is subject to the action of a spring 20 which tends to hold the die in such a position as not to project above the surface of the slide 14. The tools 16 and 19 respectively are brought into the working position by means of a spring-pressed spindle 21 connected to a piston 22 movable up and down in the head of the lower part 2 of the machine by means of an eccentric 23 driven in any suitable manner, for instance by a shaft 24 driven by a gear wheel 25 meshing with a gear wheel 26 driven in any suitable manner.

The movements of the slide 14 and the piston 22 respectively, are so timed that the piston is lifted as soon as the axis of one of the two tools 16, 19 of the slide 14 reaches the vertical axis of the hollow rest 5 and of the stamp 6. The lifted spindle 21 strikes the lower surface of the tool to lift the latter until it reaches the shank of the rivet 13 struck through the workpieces by the stamp 6.

To prevent shocks from the stamp 6 from being transmitted to the drive and the bolts of the eccentric 23 the latter is arranged in such a way as to reach its upper dead centre position not before the stamp has already struck the rivet.

The operation is as follows:

The workpieces 2 and 3 to be riveted are put on the rest 5, and a countersunk rivet 13 is fed to the movable ring 12. The slide 14 is moved into the position in which the holder-up 16 and the hollow rest 5 are vertically aligned. The pis-

ton 22 is lifted so that the spindle 21 strikes the lower surface of the tool 16, lifting same against the action of the spring 18 until the upper surface with the countersink 16a reaches the workpiece. In the meantime the stamp 6 has started its downward stroke so that the sliding sleeve 7 presses down the ring 12 to press the workpieces to the holder-up 16 and to the rest 5. In continuing its stroke the stamp 6 strikes the head of the rivet 13 in the ring 12 and strikes the shank of the rivet through the workpieces, pressing the edges of the rivet hole into the countersink of the hollow holder-up 16 through the central opening of which the parts stamped out are removed. The spindle 21 is then lowered to allow the holder-up 16 to be withdrawn under the action of the spring 18 and the slide 14 is then moved into its other working position in which position the plunger 21 is again raised to lift the snap-head die 19 to set the closure head. The plunger 21 is then lowered so that the die is withdrawn by means of its spring 20 in order to allow the slide 14 to be shifted into its first working position in which the holder-up and the stamp are vertically aligned.

From the foregoing it will be clear that for setting a rivet the stamp 6 is reciprocated once. At the same time the slide 14 is shifted into its two working positions, in one of which the holder-up 16 acts to allow striking the shank of the rivet through the workpieces and in the other position the snap-head die forms the closure head of the rivet. The sheets to be riveted can be held and placed in position ready for striking by hand or by any suitable mechanism, the latter not forming part of the invention.

In the embodiment illustrated in Figure 4, the slide 14 is dispensed with, and the tool 16 is rigidly mounted on the head of the lower part 2 of the machine. The rest 5 for the sheets to be riveted is integral with a bridge 27 guided by means of bolts 28 on the head of the lower part 2, and subject to the action of springs 28a tending to hold the bridge in the position shown in Figure 4. A bush 29 integral with the bridge 27 fits over the tool 16 with the countersink 16a and centres the bridge 27. The spindle 21 of the piston 22 moved up and down by means of the eccentric 23 is constructed to enter the hollow tool 16 so that its upper surface is flush with the countersink 16a and forms a snap-head die for the shank of the rivet 13 struck through the sheets 3 and 4. To hold the rivet in suitable position when the stamp during its downward stroke strikes the head of the rivet to strike its shank through the sheets, a holding device is arranged on the upper part 1 of the machine. Said device comprises two slides 30 mounted on the lower side of a plate 31, fastened to the upper part 1 by means of two brackets 32 and provided with an opening 33 for the stamp 6 to pass through. The slides 30 are connected by means of screws 35 to spring-pressed bolts 34 adjustably mounted on the plate 31 and tending to close the jaws of the slides 30 around the shank of the rivet 13 which is in the suitable position for being struck by the stamp. The plate 31 is provided with lateral bearings 36 for the suspension of toggle levers 37, the free ends of which co-operate with the spring pressed bolts 34 to open the jaws of the slides 30 when a sleeve 38 arranged on the stamp 6 strikes the toggle levers 37.

If the parts of the machine are in the positions shown in Figure 4, a rivet 13 having been put by hand or by any suitable feeding mechanism

into the opening 33 of the plate 31, it is held by the jaws of the slides 30 in the suitable position for being struck by the stamp 6 through the sheets to be riveted which have been placed on the bridge 27. Just before the stamp 6 strikes the head of the rivet 13 the sleeve 38 strikes the toggle levers 37 to push back the slides 30. As soon as the rivet has been freed from the jaws the stamp touches the head of the rivet and presses it downwards together with the sheets 3 and 4 as the bridge 27 is yieldingly mounted. The bridge 27 follows the downward movement until it rests on the surface of the head of the lower part 2 of the machine. In this position the hollow tool 16 is engaged by the lower workpiece 4 so that the stamp in its further stroke strikes the rivet through the workpieces at the same time pressing the thin sheets into the countersink of the tool. The parts of the workpieces stamped out fall through the hollow tool 16 on to the piston 22 which is provided with an opening substantially as shown in Fig. 2 to allow the parts stamped out to be carried off. Now, the piston with the spindle 21 is lifted by means of the eccentric 23 so as to enter the hollow centre of the tool. The stamp stops its downward stroke and is allowed to lift by about the amount by which the bridge 27 was previously lowered. The tool 16 together with the top of the spindle 21 now forms a snap-head die to set the closing head if the stamp now continues its downward stroke. The stamp and the spindle then return to their initial positions in order to enable the machine to set a second rivet in the manner described.

As it has been found that with the machine as shown in Figures 1 and 2 the parts stamped out of the sheets 3 and 4 may stick to the shank of the rivet and not fall out through the hollow tool 16, a device has been provided (Figure 5) for automatically removing said parts. This device comprises a slotted expansible chuck 40 inserted into the tool 16. In a modification the head of the tool 16 may be slotted to allow of expansion. When the parts 41 have been stamped out they will be driven into the expanding opening of the tool 16 or of the chuck 40 inserted therein so that the parts 41 will be carried away if the tool and the chuck therein are taken away to allow the holder-up 19 to be brought into working position. As the tool 16 is hollow as well as the chuck 40 the parts 41 stamped out are forwarded by the next parts stamped out and pressed further into the hollow tool until they reach the lower end of the tool 16 where they fall out and are removed from the machine in any suitable manner.

If the internal diameter of the chuck can be made greater than the diameter of the shank of the rivet it will be sufficient if the expanding opening of the chuck is adapted to loosen the parts sticking to the shank of the rivet so as to make same fall out of the chuck.

In Figures 6 and 7 a centering chuck is shown for the rivets fed by an automatically feeding apparatus which is not shown as it does not form part of the invention. In this case the stamp 6 moves in a sleeve 42 having a lateral opening 43 for the entrance of the rivets being fed. To hold the rivet in the upright position it is fed between three balls 44 disposed in three radial borings 45 in the sleeve 42 and protruding into the hollow central part of the sleeve 42 under the influence of springs 46 arranged in the said borings 45. Advantageously the borings 45 are arranged obliquely to the stamp 6 to facilitate the balls 71

44 being pushed back when struck by the stamp. The rivet held in position by the centering balls 44 is freed from same when the stamp during its downward stroke pushes it to feed the rivet into the jaws of three radially movable centering levers 47 pivotally mounted in slots 48 in the sleeve 42. The levers 47 are pressed by springs 49 to close their jaws around the shank of the rivet, but when the stamp during its downward stroke strikes the rivet into the sheets to be riveted the levers 47 are pushed back by the countersunk head of the rivet so that the head can pass freely between the three levers 47. After the rivet has been set the stamp is restored to its initial position to allow a further rivet to be fed between the centering balls 44. The procedure described is then repeated.

The spring pressed ball chuck may be dispensed with if the levers 47 are constructed to centre the shank of the rivet automatically. This can be done by providing sloping enlargements 50 on the lower ends of the levers 47 in such a way that the shank of the rivet falling down the hollow sleeve 42 is guided by the sloping surfaces 50 of the levers 47 so to be centered in the desired central position.

I claim:

1. A machine for riveting imperforate work pieces comprising, in combination, a reciprocable stamp operative to strike a rivet through the work pieces, means for supporting a rivet in suitable position to be struck by said stamp, means for supporting the work pieces to be riveted, holder-up means operative through said work supporting means for holding up the work pieces while the rivet is being struck through the same, and means also operative through said work supporting means for forming a closure head on said rivet while the latter is engaged by the stamp.

2. A machine as defined in claim 1, wherein the means for supporting the work pieces is provided with an aperture in alignment with the stamp, and wherein the holder-up means and the means for forming a closure head on the rivet are operative through said opening.

3. A machine as defined in claim 1, wherein the holder-up means is provided with a through-bore for the removal of the material punched out from the work pieces by said rivet.

4. In a riveting machine, in combination, a reciprocable stamp operative to strike a rivet through the work to be riveted, means for supporting a rivet in position to be struck by said stamp, means for supporting the work to be riveted, a slide reciprocable with reference to the work supporting means, a holder-up and a snap head die both operative through said work supporting means and carried by said slide, and means for reciprocating said slide whereby to bring said holder-up and snap head die alternately into alignment with said stamp.

5. In a riveting machine, in combination, a reciprocable stamp operative to strike a rivet through the work to be riveted, means for supporting a rivet in position to be struck by said stamp, means for supporting the work to be riveted, a slide reciprocable with reference to the work supporting means, a holder-up and a snap head die both operative through said work supporting means and carried by said slide, means for reciprocating said slide whereby to bring said holder-up and snap head die alternately into

alignment with said stamp, and means for operating said holder-up and die alternately through said work support when the latter are in alignment with said stamp.

6. In a riveting machine, in combination, a reciprocable stamp operative to strike a rivet through the work to be riveted, means for supporting a rivet in position to be struck by said stamp, means for supporting the work to be riveted, a slide reciprocable with reference to the work supporting means, a holder-up and a snap head die both operative through said work supporting means and carried by said slide, means for reciprocating said slide whereby to bring said holder-up and snap head die alternately into alignment with said stamp, means for operating said holder-up and die alternately through said work support when the latter are in alignment with said stamp, and means for reciprocating said stamp in timed relation to the operations of said holder-up and die.

7. In a riveting machine, in combination, a reciprocable stamp operative to strike a rivet through the work to be riveted, an apertured work support, a slide reciprocable with reference to said work support, a holder-up and a snap head die both alternately movable into the aperture of the work support and carried by said slide, means for reciprocating said slide to bring said holder-up and die alternately into alignment with the aperture of said work support, means normally maintaining said holder-up and die in retracted position, and means for advancing said holder-up and die into the aperture of said work support when one or the other is in alignment therewith.

8. In a riveting machine, in combination, a reciprocable stamp operative to strike a rivet through the work to be riveted, an apertured work support, a slide reciprocable with reference to said work support, a holder-up and a snap head die both alternately movable into the aperture of the work support and carried by said slide, means for reciprocating said slide to bring said holder-up and die alternately into alignment with the aperture of said work support, means resiliently urging said holder-up and die away from said work support, means for advancing said holder-up and die into the aperture of said work support when one or the other is in alignment therewith, and means for reciprocating said stamp in timed relation to the advance movements of said holder-up and die.

9. A riveting machine comprising, in combination, a reciprocable stamp operative to strike a rivet through work to be riveted, an apertured work support, an apertured rivet support, a slide reciprocable with reference to the work support, a holder-up and a snap head die carried by said slide, said holder-up and die being adapted for alternate alignment with the aperture of said work support, a spindle in alignment with the aperture of said work support, means for reciprocating said slide whereby to bring said holder-up and die alternately in alignment with the aperture of said work support, means normally maintaining said holder-up and die in retracted position, means for reciprocating said spindle whereby to advance said holder-up and snap head die alternately into said work support, and means for reciprocating said stamp in timed relation to the advance movements of said holder-up and die.

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