April 25, 1933. A. A. NORIN 1,905,047

ROLLER WEDGE RIVETER

Filed June 21, 1930

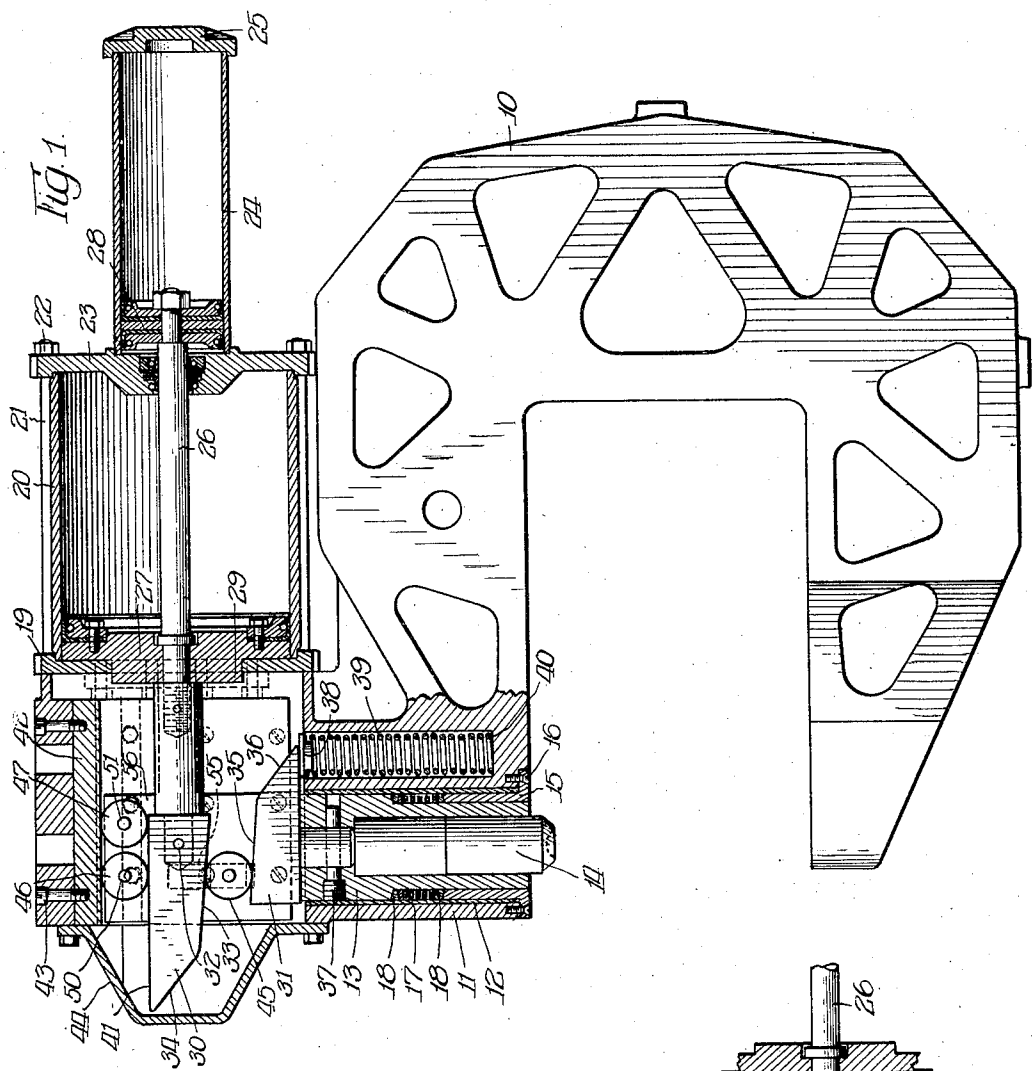


Fig. 1.

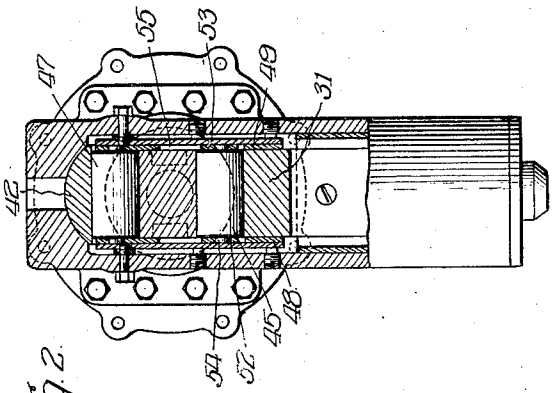


Fig. 2.

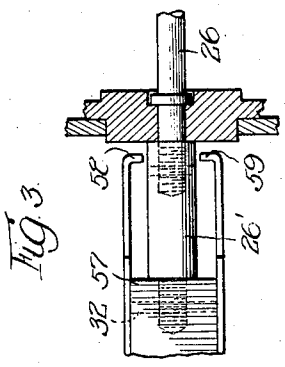


Fig. 3.

Inventor:
Allan A. Norin,
By Wilkinson Huxley Byron & Knight
Attys.

Patented Apr. 25, 1933 1,905,047

UNITED STATES PATENT OFFICE

ALLAN A. NORIN, OF CHICAGO, ILLINOIS, ASSIGNOR TO HANNA ENGINEERING WORKS, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

ROLLER WEDGE RIVETER

Application filed June 21, 1930. Serial No. 462,735.

This invention relates to improvements in roller wedge mechanism primarily used in connection with riveting machines or machines for performing like operations, such as pressing or punching, wherein a power actuated member is movable in such a manner as to transmit pressure and movement through the roller wedge mechanism to a plunger or working member movable in a direction transverse to the movement of the pressure-actuated member.

In the co-pending application of Hanna, Serial No. 351,007, filed March 29, 1929, where is disclosed a riveting machine in which a horizontally movable member is actuated by fluid pressure, compressed air or other force and includes a wedge member which has a cam surface corresponding to a similar wedge member secured to the upper end of a vertically movable working plunger. An intermediate roller is mounted between the cam surfaces in order to transmit the pressure and movement of the pressure actuated wedge without friction to the movable plunger. The pressure-actuated wedge is guided for frictionless movement by a roller mounted between flat surfaces of the wedge and the riveter frame. It is obvious that in such an arrangement the rollers are maintained in contact at diametrically opposite points with the relatively movable surfaces and there is no component of force developed tending to displace the rollers. The upper roller will have a movement in a horizontal path which is one-half of the total movement of the wedge while the lower roller will have a similar horizontal movement as well as a vertical movement equal to the stroke of the plunger. The rollers are liable to be displaced by sudden jars or if the working plunger is not returned at the same rate as the pressure-actuated wedge. In order, therefore, to prevent such displacement of the rollers, which is liable to throw the upper and lower rollers out of vertical alignment and out of correct relationship with respect to the wedge members, the Hanna application discloses the use of gear teeth associated with the rollers and meshing with gear teeth having pitch line contours corresponding to the cam surfaces and the flat guiding surfaces.

It is an object of the present invention to provide a simpler form of mechanism for preventing the displacement of the rollers in such a construction since the provision of gear teeth is relatively expensive and requires accurate manufacture.

It is a specific object of the present invention to provide plate members which serve as supports for the pivots of the upper rollers and provided with slots in which are supported blocks carrying the pivots of the lower roller so that the lower roller is guided for vertical movement with respect to the upper roller.

Further objects and advantages of the present invention will be more readily apparent from the detail description taken in connection with the attached drawing, in which—

Figure 1 is a complete vertical elevation of a riveting machine embodying the present invention, partly in section;

Figure 2 is an end view of the mechanism partly in section taken on the plane indicated by 2—2 in Figure 1, and.

Figure 3 is a detail view of the construction by which the plates carrying the rollers are brought to the correct position at the end of the return stroke.

In the drawing, there is shown a U-shaped riveter frame 10 of ordinary design having an upper head 11, which is bored to receive a bushing 12. The bushing 12 serves as a guide for a plunger 13 which may carry at its lower end a removable die 14. The plunger 13 is reduced in diameter at its lower end and is further guided by an inserted bushing 15 secured by screws 16 to the riveter frame. A compression spring 17 is mounted between the enlarged end of the plunger and the upper end of the bushing 15 and assists, due to its compression, in returning the plunger after its working stroke. In addition there may be provided means (not shown) for admitting compressed air to the annular space in which is mounted the compression spring 17 in order

to further assist in returning the plunger and gaskets 18 or provided for sealing the space in which the compression spring 17 is mounted against the escape of compressed air. The riveter head 11 has secured to one side a cylinder head 19 to which is attached a main cylinder 20 by rods 21 and nuts 22 which engage a supplemental cylinder head 23. A secondary cylinder 24 is provided closed by a head 25. A horizontally movable piston rod 26 has secured thereto a main piston head 27 and a secondary piston 28. Connections may be provided in any suitable manner to the main and secondary cylinders in order to admit compressed air or the working fluid to the right-hand ends of both the cylinders to produce movement of the piston rod to the left for its actuating stroke, while for the return stroke it is only necessary to admit the working fluid to the left-hand end of the secondary cylinder. A piston head 27 has a projection 29 which fits into an opening in the cylinder head 19 at the end of the working stroke of the piston in order to cushion the movement by substantially closing the left-hand end of the main cylinder near the end of the stroke.

In order to transmit a horizontal movement of the piston rod into vertical movement of the plunger, a pair of wedge members 30 and 31 are employed. The wedge member 30 is attached by pin 32 to an extension 26′ which is threaded into the wedge member and is also secured by a pin and thread connection to the piston rod 26. The lower surface of the wedge 30 is formed with a slight incline, as at 33, and a relatively sharp incline as at 34. The inclines correspond to the upper surfaces 35 and 36 of wedge 31, which is attached by the pin 37 to the plunger 13. The right-hand end of the lower wedge 31 engages an abutment member 38 which receives the pressure of a spring 39 bearing against the lower end of the surface opening 40 formed in the riveter frame. The spring 39, therefore, assists in producing the return movement of the plunger.

The upper surface of the wedge 30 is flat, as at 41, parallel to the lower surface of a guide plate 42, suitably secured, as by bolts 43, to the riveter head 11. A cover member 44 is attached to the riveter head and encloses the protruding end of the wedge 30. A roller 45 is supported between the inclined surfaces of the wedge members 30 and 31 in order to transmit the pressure and movement of the upper wedge member without friction to the lower wedge member 31. It will be obvious that the inclines of the wedge members are so designed that the initial travel of the piston rod 26 and upper wedge 30 will produce a substantially rapid movement of the vertical movable plunger, while the latter portion of the stroke will transmit a decreased movement to the plunger with a correspondingly increased pressure. The wedge 30 is guided on its upper side by a pair of rollers 46 and 47 which travel along the stationary guide plate 42 and the flat surface 41 of the wedge member 30.

It will be readily apparent that the rollers 45, 46 and 47 will all partake of a horizontal movement equal to one-half of the total horizontal movement of the wedge 30 and the lower roller will have in addition a short vertical movement corresponding to the travel of the working plunger. The rollers 45 and 46 are initially in vertical alignment and it is desirable to maintain the rollers in such relative position as to prevent displacement between the rollers and the wedge members by relative sliding of the contacting surfaces.

As previously described, the pending application of Hanna discloses the use of gear teeth for preventing such displacement, whereas, according to the present invention, a simple arrangement is employed. A pair of plates 48 and 49 are vertically mounted at the ends of the rollers and sides of the wedges and serve as a support for the rollers, receiving the pivot pins 50 and 51 of the upper rollers 46 and 47 and serving as guides for sliding blocks 52 and 53, carrying the pivot pin 54 of the lower roller 45. The blocks 52 and 53 are guided for vertical movement in slots formed in the plates 48 and 49, as indicated at 55 in Figure 1. The plates 48 and 49, therefore, tend to maintain the three rollers in correct relationship and only permit the vertical movement of the axis of the lower roller relative to the axis of the upper rollers.

In order to insure that the rollers are in correct position with respect to the wedges at the beginning of the working stroke, the plates are so designed that the rearward edges 56 will abut against the cylinder head 19 at the end of the return stroke of the actuating wedge and therefore, if the roller carrying plates have been displaced towards the right, the engagement between the rearward ends 56 and the cylinder head 19 will serve to return the plates to their correct positions. Should the roller carrying plates be displaced in the opposite direction, they will be returned by the engagement between the rearward end 57 of the actuating wedge and inturned fingers 58 and 59, which are formed integral with the plates 48 and 49 and extend as projections from the rearward extensions 56. Therefore, in either case, the return stroke of the actuating wedge will bring the roller carrying plates to their correct positions for the start of a working stroke.

The parts as illustrated in Figure 1 are shown at the end of a working stroke. In operation, the working fluid will be ad-

mitted to the left-hand end of the auxiliary cylinder 24 and produces movement of the piston rod 26, carrying the wedge 30 towards the right. The plunger 13 will be moved upwardly by the force of the springs 17 and 39 as well as by the force of compressed air, which may be admitted to the annular space in which the spring 17 is supported. Therefore, the pressure should be sufficient to hold the roller 45 in rolling contact with the inclined surfaces of the wedges 30 and 31 and prevent any displacement of the roller carrying plates, but if the plunger should not return as fast as it should, the roller carrying plates may remain in stationary position and will not be moved until the rearward end 57 of the wedge 30 engages the fingers 58 and 59, thereby serving to return the roller bearing plates and the rollers to their initial position. The working stroke of the wedge produces pressure acting through the lower roller to cause movement of the working plunger while the upper roller guides the movement of the wedge. The rolling of the rollers causes movement of the rollers and plates equal to one-half the movement of the wedge.

Various modifications may be resorted to without departing from the spirit of the invention as expressed in the appended claim.

I claim:

In a machine of the character described, a longitudinally movable wedge, means for producing movement of said wedge in opposite directions, a transversely movable plunger actuated in one direction by the working stroke of said wedge, resilient means for returning said plunger during the return stroke of said wedge, a wedge-shaped block carried by said plunger, said wedge and said wedge-shaped block each having a double inclined working surface for producing initial rapid movement of said plunger and final slow movement of said plunger with respect to the movement of said wedge, a movable roller in rolling contact with the working surface of said wedge and said wedge-shaped block, means guided for movement in the direction of travel of said wedge supporting the axis of said roller for movement in the direction of movement of said plunger with respect to the movement of said wedge and means actuated by the return movement of said wedge for moving said last-named means and said roller into a predetermined initial position with respect to the working surfaces of said wedge and said wedge-shaped block.

Signed at Chicago, Illinois, this 16th day of June, 1930.

ALLAN A. NORIN.