Dec. 28, 1943. P. E. FLOWERS 2,337,984

NUT AND BOLT DEVICE

Original Filed April 29, 1940

FIG. 1

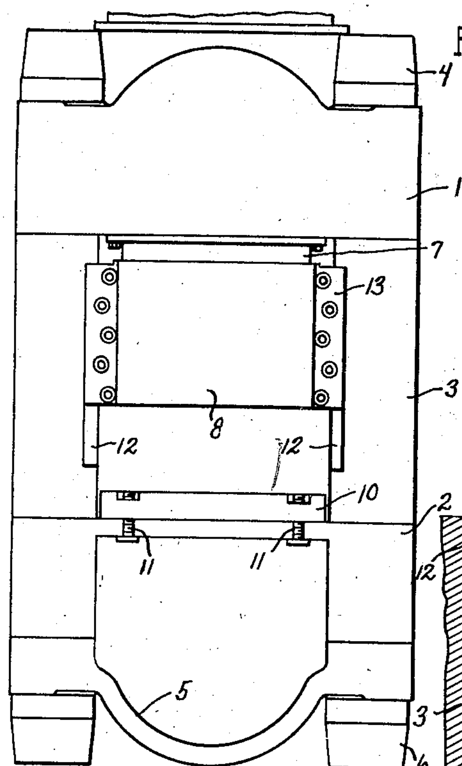


FIG. 2

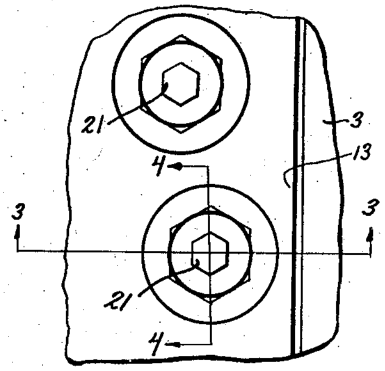


FIG. 3

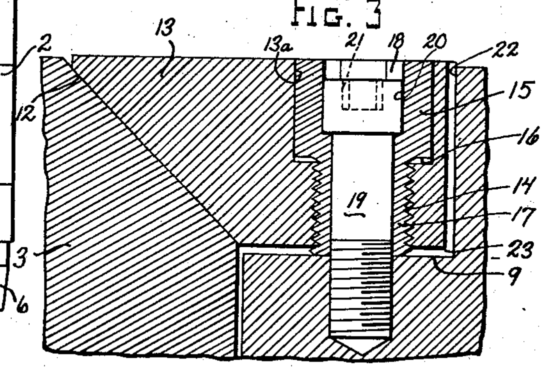
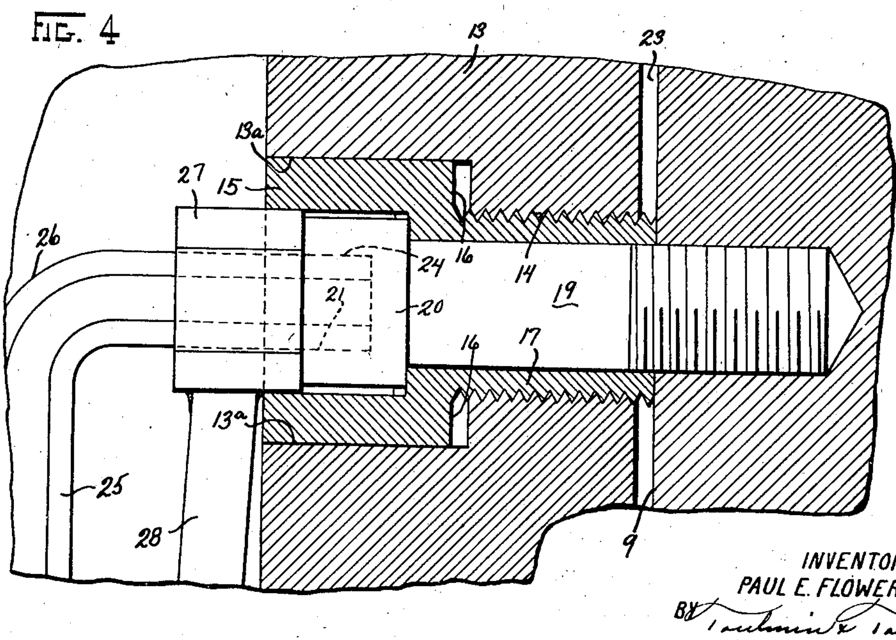


FIG. 4



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NUT AND BOLT DEVICE

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3 Claims. (Cl. 85—1)

This is a division of my copending application, Serial No. 332,178, filed April 29, 1940.

The present invention relates to hydraulic presses and more particularly to mechanism for guiding the platen during its excursions between the head and the bed of the press.

Hydraulic presses are usually provided with a heavy framework which carries the actuating unit of the press at the top, and mechanical power is transmitted from this unit to the platen through a plunger. The platen is guided in its upward and downward movements by means of gibs secured respectively to the corners of the platen and bearing against the compression members of the press.

In order to provide a large bearing surface, the working corner of each gib and the adjacent edge of the compression member are chamfered, usually at 45 degrees so that the diagonally cut surface of the gib is adapted to slide over the abutting diagonal surface of the adjacent compression member.

The gibs are usually bolted to each side of the platen and therefore form a U shaped recess along two opposite edges of the platen which embrace the projecting U shaped portions of the compression members.

The platen and the gibs secured thereto reciprocate continuously during the operation of the press and the wear between the working surface of each gib and the adjacent compression member is usually taken up by removing shims from under each gib, depending on the amount of wear. However, it will be apparent that the adjustment obtained in this manner is crude since the adjustment is not obtained gradually and continuously, but rather abruptly as determined by the thickness of the shims. For example, if one shim were to be removed from under each gib the platen may still be too loose within its guideways, but if two shims were removed the platen would be too tight and would bind. When the necessary amount of adjustment is in terms of a few thousandths of an inch rather than the whole thickness of a shim an adjustment obtained by removing shims is not altogether satisfactory.

The primary object of the present invention is to provide an improved structure by which an accurate adjustment of the gibs can be made with respect to the compression members of the press, and in particular to provide an improved structure by which the tightness with which the platen slides over the compression members can be adjusted without the use of shims. A still further object is to provide an improved means for adjustably spacing the gib and the press from the platen and for locking the gib in the adjusted position in order accurately to control and to maintain the control of the sliding fit with which the platen is guided along the compression members.

In the prior art it has been customary to bolt the gibs to the platen and to arrange these bolts in a single vertical line down through the middle of each gib in order to secure the gib to the platen. In the event that the gib is fairly wide, it is apparent that a single line of bolts does not give the proper amount of adjustment over the entire width of the gib. In accordance with another feature of my invention, I arrange the improved spacing and locking means in a staggered relation over the entire width, as well as length of the gib so that proper adjustment may be obtained not only in a vertical direction over each gib, but also in a horizontal direction thereby providing the proper snugness of fit over the entire bearing surface between the gib and the adjacent compression member.

The above objectives are carried out in brief by discarding the shims referred to hereinbefore and, instead, employing a screw member for spacing the gib from the compression member and maintaining this spacing effect by employing a locking screw contained within the screw member. The arrangement is such that before any adjustment can be made, the locking screw must first be loosened and then the spacing adjustment made, after which the locking screw is tightened so as to make the adjustment permanent. By staggering the spacing and locking screws throughout the entire area of the gib, not only is it possible to obtain a uniform spacing throughout the opposed surfaces of the gib and the adjacent compression member, but also a non-uniform spacing, if desired, which provides increased adjustments of the gib with respect to the compression member.

Other objectives and features will be apparent as the specification is perused in connection with the accompanying drawing.

In the drawing:

Figure 1 represents an elevational view of a hydraulic press provided with the improved gib-securing means.

Figure 2 is an enlarged fragmentary elevational view of a pair of adjacent gib-spacing and gib-locking screws.

Figure 3 is a cross sectional view taken along line 3—3 in Figure 2 but somewhat enlarged to show the details of the improved spacing and locking screw and the manner in which it operates to give a snug sliding fit between the gib and the compression member.

Figure 4 is a sectional view taken along line 4—4 in Figure 2 and considerably enlarged to show the operation of the wrenches employed in connection with the improved spacing and locking screw.

Referring to the drawing, numeral 1 designates a heavy block of metal which constitutes the head of the hydraulic press. This head is supported on the bed 2 of the press by means of two or more compression members 3 of angular configuration, and which usually surround and conceal a number of heavy strain rods. These rods pass up through the head and terminate in nuts 4. At the lower ends, the rods pass through the bed 2 and through the end portions of a bottom truss 5, finally terminating in nuts 6.

The head 1 carries any suitable form of hydraulic cylinder (not shown) containing a piston which is actuated by a pump of any suitable and well-known character (not shown), for example, a variable delivery rotary pump operated by an electric motor and in which the delivery is controlled by an ordinary shift ring (not shown). The plunger of the cylinder is designated 7 and the lower end thereof carries a platen 8. The platen is provided with a rabbeted portion 9 at each of its vertical corners. The platen is adapted to slide upwardly and downwardly between the compression members 3 and, on its downward or working stroke contacts with a die 10, which is secured to the bed of the press by means of bolts 11.

During operation, a sheet of metal is placed on the die member 10 and subjected to pressure by the platen 8 which either forms or cuts the metal to any desired shape, depending on the configuration of the lower surface of the platen. The downward and upward excursions are controlled by the shift ring of the pump either automatically or by an operator. In order accurately to control the points of contact between the lower surface of the platen and the metal workpiece positioned on the die 10, it is necessary to control the manner in which the platen approaches the workpiece. For this reason the platen is guided during its working and also during its upward stroke by the compression members.

The inner corner of the outside surface and compression members are beveled or chamfered at approximately 45° as indicated by the reference character 12 (Figure 3). A gib 13 is also bolted to the platen 8. These gibs extend along each vertical edge of the platen and are positioned in the rabbet groove as shown in Figure 3. The gibs are usually made of case-hardened steel and of rectangular configuration, with a length greater than the width so as to extend the entire length of the platen. The edge of each gib adjacent the beveled edge of the compression member is chamfered or beveled to an angle complementary of the angle of the compression member. As the compression member is beveled at 45° the gib has a similar bevel.

The bolts by which the gib is secured to the platen member are shown more clearly in Figures 3 and 4. Each gib is provided with a large countersunk opening 13*a* which terminates in a threaded portion of smaller diameter, indicated at 14. This opening receives a large screw member 15 having a round head, a shoulder 16, and terminates in a threaded portion 17 which rests against the lower flat surface of the rabbeted portion 9. The head of the screw is provided with a hexagonal opening 18.

Directly under the last mentioned opening there is a threaded opening in the platen which receives the shank 19 of a screw, the head 20 of which is of slightly smaller diameter than the distance between the opposite flat surfaces of the hexagonal opening 18. The head 20 of the smaller screw 19 is also preferably provided with a countersunk opening 21 of hexagonal configuration.

It will be noted from Figure 3 that the axes of the screws 15 and 19 coincide, and the position of this axis with respect to the gib and the platen and the distance between the axis and the inner edge of the platen are such as to leave a small space indicated at 22 between the gib and the side of the rabbeted portion which is shown vertical in Figure 3. It will be further noted that the screw 15 has been tightened and therefore bears against that portion of the rabbeted surface 9 which is shown horizontal in Figure 3, leaving a space between the lower surface of the gib and the platen as indicated at 23.

The manner in which the spacing 23 is accurately controlled and maintained will be clear from a consideration of Figure 4. The hexagonal opening 21 of the bolt 19 is adapted to receive the hexagonal end portion indicated at 24 of the wrench 25. This wrench may be fabricated of hexagonal stock having the proper size snugly to fit the opening 21 and bent as indicated at 26 to form a handle. A special wrench 27, also formed of a piece of hexagonal stock, is adapted to be received by the hexagonal opening 18 of the screw 15. The wrench 27 has a round opening which is sufficiently large to permit the wrench 25 to be inserted and rotated therein. A handle 28 is secured to the wrench 27 as indicated in Figure 4.

In making the proper adjustment of the gib with respect of the platen, the lock screw 19 is first unloosened by turning the wrench 25 counter-clockwise (Figure 4), after which the wrench 27 is turned in such a direction as to give the required spacing 23 between the gib and the platen. This is usually determined by the amount of friction exercised at the beveled surface 12, and indicated by the load on the pump. When the proper spacing has been obtained to provide the required snugness of the sliding fit between the gib and the platen the wrench 25 is turned clockwise to lock the screw 19 rigidly in the adjusted position, which in turn locks screw 15.

An analysis of the compressional forces exercised between screws 15 and 19 will show that until the lock screw 19 has been loosened so as to remove its head 20 from the shoulder, it is impossible to rotate the screw 15 in either direction. Consequently, assuming that the proper fit has been obtained at the beveled surface 12, or in other words, the proper amount of spacing 23, this adjustment is rigidly maintained by the screw 15 as long as the locking screw 19 is tight.

From the foregoing, it is evident that I have separated the operation of obtaining the proper fit at the bevel 12 into two functions, namely, the adjustment function which is exercised solely by the screw 15 and the maintenance of this adjustment by the locking screw 19. It is further apparent that the screws 15 and 19 may have different coarseness or fineness of thread to perform their individual function in the optimum degree.

While the combined adjusting and locking screw structure may be arranged as units in a single vertical line extending down the middle of each gib **13**, I prefer to stagger these structures over the entire width as well as the entire length of each gib. Due to the fact that the screw **15** serves as a spacing member and bears against the platen, any one of these screws can also constitute a fulcrum about which the gib can be swung depending on the relative positions of the remaining screws **15**. Consequently, the beveled edge of the gib is adapted to be swung outwardly and inwardly due to the fulcrum effects of any line of bolts in order to introduce still further variations of adjustment and greater accuracy in the sliding fit between the gib and the compression member.

It will also be evident from Figure 4 that the spacing adjustment at **23** may be had simultaneously with the locking adjustment due to the manner in which the wrenches **25**, **28** can be manipulated. There is no necessity for shims between the gib and the platen and, furthermore, the spacing **23** can be controlled as accurately as may be desired depending on the fineness of the threads **14** and the angular movement through which the wrench handle **28** is turned.

This fineness and gradualness of adjustment is so pronounced that the same pressure may be brought to bear throughout the entire beveled surfaces which contact, so that the guiding effect of the gib is exercised not only equally by all of the compression members, but also equally throughout each beveled surface of each compression member.

It will be understood that I desire to comprehend within my invention such modifications as come within the scope of the claims and the invention.

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

1. An article of manufacture comprising a cylindrical member having a shouldered threaded portion and an enlarged cylindrical head portion adapted to be received within a recess of a machine part and provided with a shouldered bore in said head adapted to receive a screw having a head at one end which bears against the shoulder on the bore and is threaded on the shank portion.

2. An article of manufacture comprising a cylindrical member having a shouldered threaded portion and an enlarged cylindrical head portion adapted to be received within a recess of a machine part and provided with a shouldered bore in said head adapted to receive a screw having a head at one end which bears against the shoulder on the bore and is threaded on the shank portion, said shouldered bore having an hexagonal configuration.

3. An article of manufacture comprising a member having a head provided with juxtaposed inner and outer non-threaded portions, the outer portion of which is cylindrical and the inner portion of which is multi-sided for the reception of a wrench, said member having a hollow shank provided with reduced interior and exterior surfaces as compared to the inner and outer portions respectively of said head to thereby form interior and exterior shoulders, said exterior surface being threaded and said interior surface being unthreaded, the inner portion of said head and shank being adapted to receive a screw having a head at one end which bears against the interior shoulder of said member, and a threaded portion which extends beyond the threaded portion of said member.

PAUL E. FLOWERS.