May 18, 1943

D. GUP

2,319,677

HYDRAULIC CIRCULAR PRESS

Filed Jan. 17, 1942

2 Sheets-Sheet 1

Fig. 1

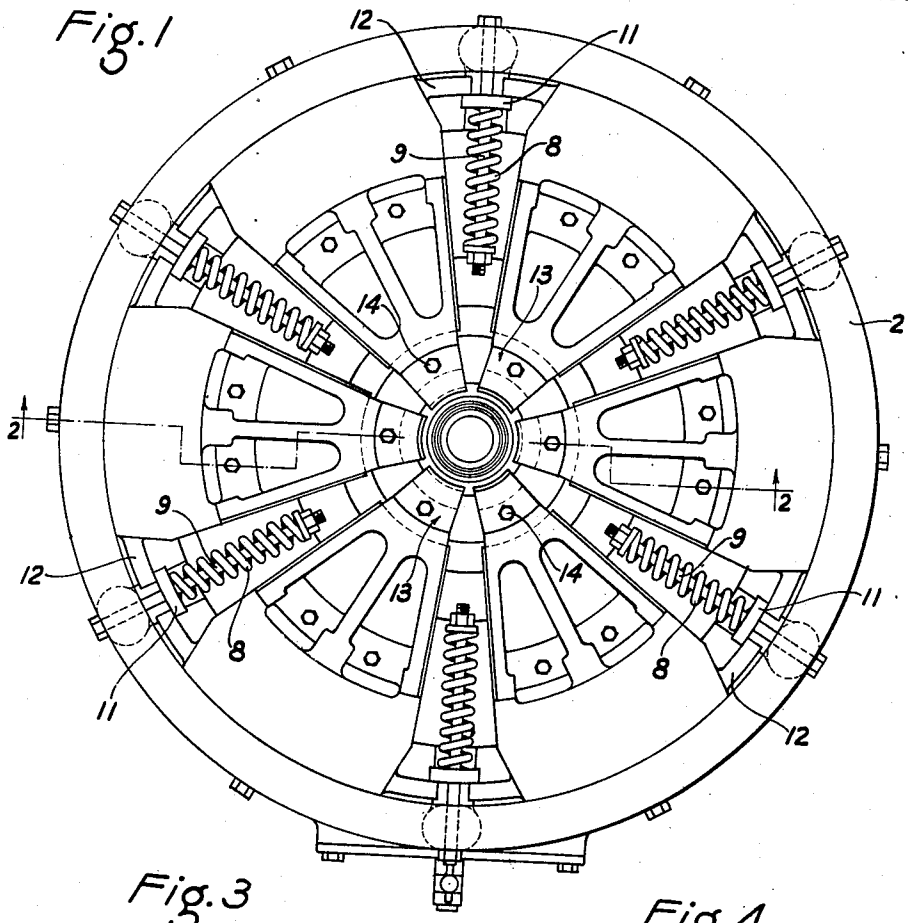


Fig. 3

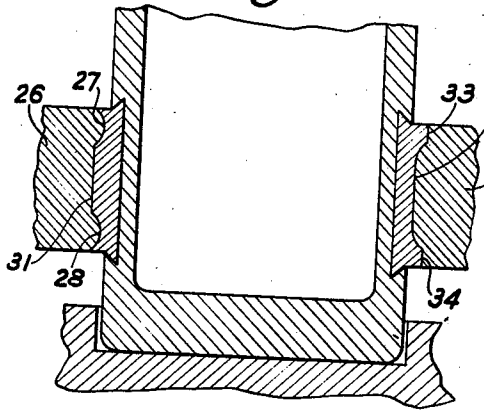
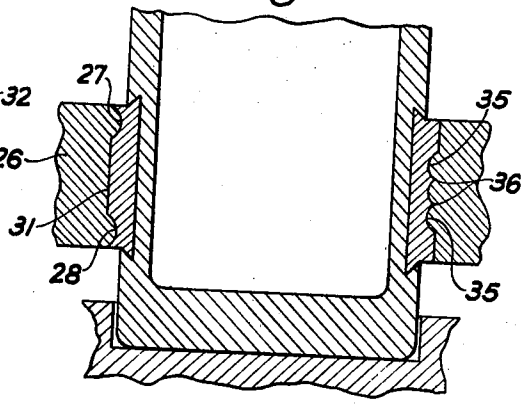


Fig. 4



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2 Sheets-Sheet 2

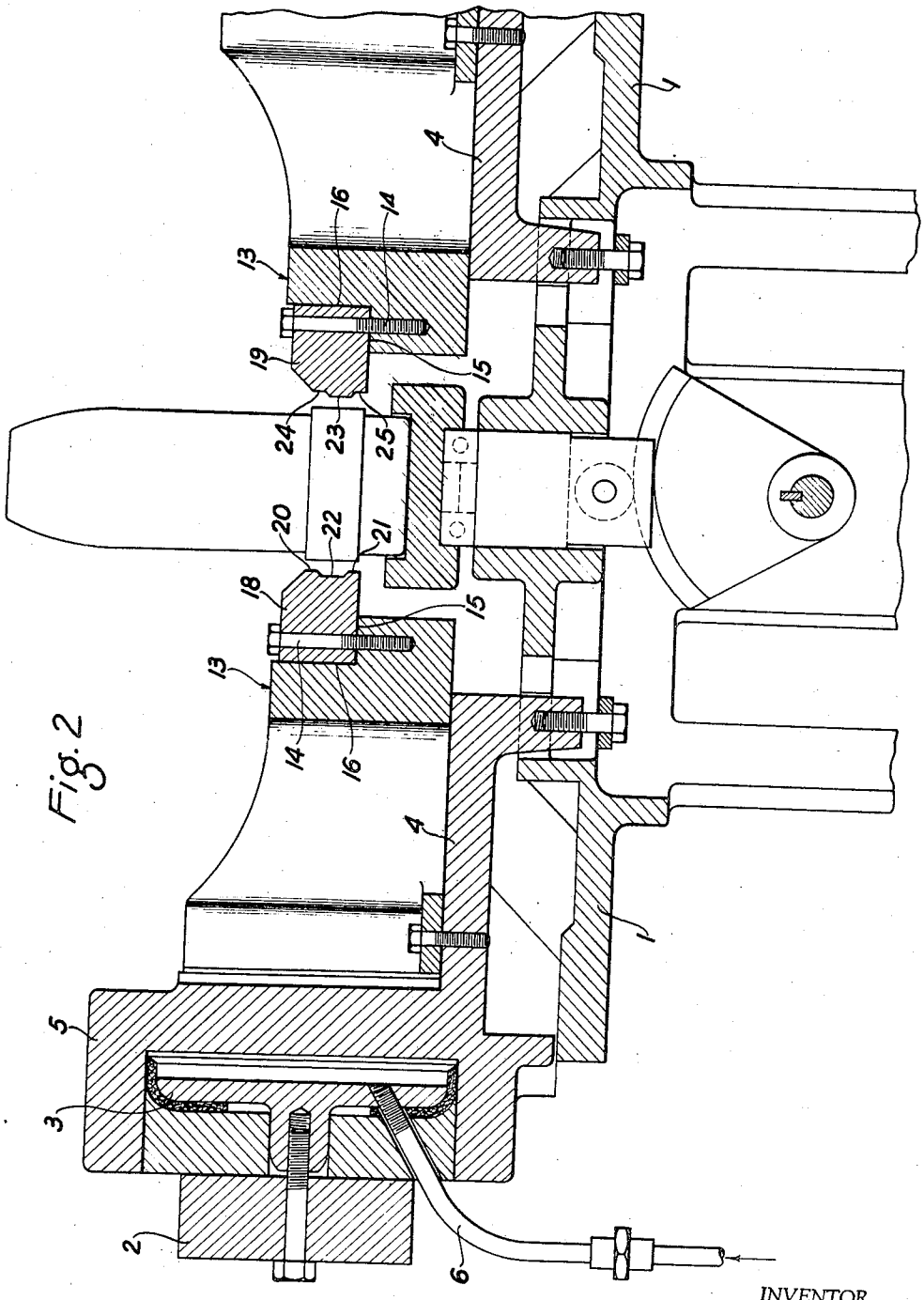


Fig. 2

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UNITED STATES PATENT OFFICE

2,319,677

HYDRAULIC CIRCULAR PRESS

David Gup, Rochester, N. Y., assignor to The West Tire Setter Company, Rochester, N. Y., a corporation of New York

Application January 17, 1942, Serial No. 427,147

7 Claims. (Cl. 78—15)

This invention relates to a hydraulic circular press of the general type employed for compressing bands on shells or projectiles in which a series of die carriers or rams are moved radially inwardly under considerable fluid pressure, and it has for its object to afford a mechanism that will effectually prevent distortion or change in the body of the shell or projectile to which the band is attached, while at the same time insuring rigid attachment of the band.

More particularly, the invention has for its purpose to afford a circular press with dies so constructed as to make it possible to fasten a band securely with lower pressures than required with the dies heretofore employed, and without danger of distorting the projectile or cylindrical part to which the band is secured.

A further purpose of the invention is to enable operating a series of dies radially against a band on a given shell or projectile under lower pressure than has been necessary with prior types of dies, in which cases the higher pressure required caused distortion of the band, the lower pressures of the present invention preventing distortion or serious changes in the interior of the shell or projectile which would otherwise render it unsuitable for service, and at the same time effectually spreading the band and fastening it securely to the shell.

Another object of the invention is to provide a machine of the character mentioned including a series of radially movable dies, the operative face of each of which has one or more portions that contact the band to compress the same and one or more outwardly offset portions that are spaced a slightly greater distance away from the band, so that during any given operation with the work in one position, the band is engaged only over portions of its surface with the maximum available pressure instead of over its entire surface as in prior machines.

An additional purpose of the invention is to provide a hydraulic circular press with radially movable dies having operative faces with radially offset portions, the band-engaging and offset portions of the operative faces of opposite dies and also of adjacent dies being reversely arranged so that by turning the work a proper distance between two successive operations, the band will be engaged and compressed over its entire surface and thus rigidly attached to the shell or projectile, but without distorting or otherwise affecting the interior contour of the shell or projectile.

To these and other ends, the invention consists in the construction and arrangement of parts that will appear clearly from the following description when read in conjunction with the accompanying drawings, the novel features being pointed out in the claims following the specification.

In the drawings:

Fig. 1 is a plan view of a hydraulic circular press embodying a preferred arrangement of the invention;

Fig. 2 is a vertical sectional view on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged detail sectional view showing a modified form of die in engagement with a band on a projectile, where the band is to be secured in an undercut or dovetail recess, and

Fig. 4 is a similar view showing a pair of complementary dies, embodying a further modified form.

The present invention is in the nature of an improvement on the structure forming the subject matter of Patent No. 2,252,740, dated September 23, 1941, in which the operative face of each die is in substantially uniform contact with the band from the top to the bottom of the latter and throughout the width of the die. With such arrangement, in some instances the amount of pressure possible is limited due to the danger of distortion of the shell or projectile upon which the band is compressed, and it is therefore not possible sometimes to attach the band tightly enough. To overcome this, the present invention has been designed to permit of forcing the dies against the work under lower pressures while the dies act effectually to spread and secure the band without distorting or affecting the interior surface of the wall of the shell or projectile.

Referring more particularly to the drawings in which like reference numerals refer to the same parts throughout the several views, 1 designates a table forming a part of the stationary frame which also includes a ring member 2 to which are bolted a series of fixed pistons 3, while 4 designate the radially movable carriers or rams that travel inwardly and outwardly on the table 1, each of said carriers including a cylinder 5 that cooperates with one of the fixed pistons 3, while 6 designates a fluid conductor leading through each piston 3, whereby the carrier or ram 4 is moved radially inwardly when fluid pressure is admitted to the cylinder 5 through the conductor 6.

The carriers are returned to their initial or inactive positions when pressure is released by

means of the coil springs 8, each of which is supported on a rod 9, and arranged thereon between a plate 10 held on the inner end of the rod 9 and a plate 11 which is loosely mounted on the rod and abuts the lugs 12 on adjacent carriers. The outer end of the rod 9 is attached to the ring member 2 and held against inward movement thereon in suitable fashion. Each carrier 4 has attached thereto a die indicated generally at 13 and secured to the carrier by means of bolts 14, the die including a horizontal flat surface 15 and a vertical curved surface 16 that is concentric with the operative face of the die point. The parts thus far described are similar to my earlier patent referred to above and the structure of the die point and the manner in which it differs from said prior structure and cooperates with the work and the previously described elements will now be described.

Referring to Figs. 1 and 2, in the machine disclosed there are six carriers, with a die and die point for each carrier, for a purpose that will appear presently, although the construction is not limited to this precise number of carriers and dies. Each die point is provided with an operative face having portions which are offset radially from each other so that some portion or portions of the operative face engage the work in advance of other portions while such other portions may remain slightly spaced from the work when the die point reaches the limit of its inward movement.

In order to attain the required results, it is desirable that the die points which are opposite to each other be provided with reversely arranged band-engaging and offset portions or of male and female relationship, and also in the machine disclosed that the die points which are adjacent to each other be provided with reversely arranged band-engaging and offset portions or of male and female relationship. With such a construction, the entire surface of the band to be attached to the shell is engaged and compressed effectively in two successive operations by turning the work through one-sixth of a complete turn so that when two operations are completed, any one-sixth portion of the band shall have been engaged and compressed successively by two dies having reversely arranged band-engaging and offset portions and thus the entire surface of the band will have been subjected to the required pressure. To accomplish this result, the die points are formed in the manner shown in Figs. 2, 3 and 4, depending upon the character of the blank and the particular requirements of any selected piece of work.

Referring to Fig. 2, 18 and 19 designate two oppositely arranged male and female die points which may be attached to their respective carriers or supports in the manner shown and described in my earlier patent above mentioned, or in any suitable fashion. The operative or pressure face of the female die point 18 is provided with vertically straight top and bottom band-engaging portions 20 and 21 which are symmetrically arranged with relation to the center line of movement of carrier 4 and are separated by an intermediate outwardly offset vertically straight portion 22 which is preferably offset from the top and bottom portions a few thousandths of an inch so as not to engage the work or band, or to contact the same after engagement by the top and bottom portions 20 and 21 and consequently impose less pressure on the shell or projectile on which the band is compressed. The operative face of the die point is arcuate endwise so as to conform to the circular work or band, and when pressure is applied to the die point 18 by moving it inwardly, upper and lower parts of the band are engaged corresponding to the upper and lower portions 20 and 21 while a central area of the band between such upper and lower portions is free from contact with the die point or is engaged with considerably less pressure than that imposed by said upper and lower portions of the die point.

The male die point 19 which is located opposite to the female die point 18, and engages an opposite portion of the band, is provided with an operative face including a vertically straight central band-engaging portion 23 that is opposite to the outwardly offset portion 22 of the die point 18, while 24 and 25 are upper and lower vertically straight outwardly offset portions on the die point 19 which remain out of engagement with the band or engage the latter after and with considerably less pressure than the central portion 23, and are opposite to the upper and lower band-engaging portions 20 and 21 respectively of the die point 18, the band-engaging and offset portions on opposite die points being thus reversely arranged. In addition to having the band-engaging and offset portions on opposite die points reversely arranged as described above, it is also preferable to have the band-engaging and offset portions on adjacent die points reversely arranged and constructed as shown in Fig. 2.

Thus in a machine employing six equally spaced die points, each of which has an operative face with band-engaging and offset portions reversely arranged to those on the adjacent die points and also to the band-engaging and offset portions on the opposite die point, it is possible to effect compression of an entire band in two successive operations, the work being turned through one-sixth of a complete turn between such operations. Die points such as just described and shown in Fig. 2 are preferably employed where a band is to be compressed into a groove of rectangular cross-section, and where the band is to be compressed into an undercut groove as shown in Fig. 3, it is necessary to cause the metal of the band to flow somewhat under the overhanging portion of the groove.

To accomplish this, dies with reversely arranged band-engaging and offset portions are employed such as shown in Fig. 3, in which the top and bottom band-engaging portions of the die point 26 are rounded, as shown at 27 and 28, instead of being formed on a straight line vertically as in Fig. 2, the rounded portions 27 and 28 of the operative face being located above and below the outwardly offset portion 31 and engaging the band in such a fashion as to force or flow the metal into the undercut portion of the groove beneath the overlying portion of the shell. With this type of die point, the opposite die may be formed with a vertically straight band-engaging surface 32 between the top and bottom outwardly offset portions 33 and 34, as shown in Fig. 3, or in some instances it may be desirable to construct the die as shown in Fig. 4, in which its operative face has a central portion consisting of a series of vertically curved areas 35 affording grooves 36 therebetween so as to effect a greater lateral flow of the metal of the band throughout its entire area.

It will be understood that with all of these forms, each die point has an operative face with

band-engaging and offset portions that are arranged reversely to the band-engaging and offset portions on the opposite die point and preferably also to the band-engaging and offset portions on the adjacent die point, so that only portions of the band are subjected to the maximum pressure during any given operation. The band may be completely affixed by two successive pressure operations between which the work-holding band is turned sufficiently to bring the areas previously compressed by the band-engaging portion of the die points into position where they are in the path of the outwardly offset portions of the die points, thus effecting the necessary pressure over the entire surface of the band but without applying the maximum pressure over the entire surface of the band at one operation.

While the invention has been described with reference to the particular embodiments herein disclosed, it is not confined to the details herein set forth, and this application is intended to cover such other departures or modifications as may come within the purposes of the invention or the scope of the following claims.

I claim:

1. In a circular press for compressing a band on a cylindrical body including a series of pairs of oppositely arranged radially movable carriers and fluid means for actuating said carriers inwardly, a die mounted on each carrier having its pressure or operative face including band-engaging and radially offset portions whereby one of said portions engages the band in advance of the other, the band-engaging and offset portions on opposite dies being reversely arranged whereby the band is compressed only at spaced intervals in any given horizontal plane at each operation and two operations are required with the work in different positions to compress all portions of the band.

2. In a circular press for compressing a band on a cylindrical body including a series of pairs of oppositely arranged radially movable carriers and fluid means for actuating said carriers inwardly, a die mounted on each carrier having its pressure or operative face including band-engaging and radially offset portions whereby one of said portions engages the band in advance of the other, the band-engaging and offset portions on adjacent dies being reversely arranged whereby the band is compressed only at spaced intervals in any given horizontal plane at each operation and two operations are required with the work in different positions to compress all portions of the band.

3. In a circular press for compressing a band on a cylindrical body including a series of pairs of oppositely arranged radially movable carriers and fluid means for actuating said carriers inwardly, a die mounted on each carrier having its pressure or operative face including band-engaging and radially offset portions whereby one of said portions engages the band in advance of the other, the band-engaging and offset portions on both opposite and adjacent dies being reversely arranged whereby the band is compressed only at spaced intervals in any given horizontal plane at each operation and two operations are required with the work in different positions to compress all portions of the band.

4. In a circular press for compressing a band on a cylindrical body including a series of pairs of oppositely arranged radially movable carriers and fluid means for actuating said carriers inwardly, a die mounted on each carrier having its pressure or operative face including band-engaging and radially offset portions whereby one of said portions engages the band in advance of the other, the band-engaging and offset portions on some of the dies being arranged reversely to the band-engaging and offset portions on other of the dies whereby the band is compressed only at spaced intervals in any given horizontal plane at each operation and two operations are required with the work in different positions to compress all portions of the band.

5. In a circular press for compressing a band on a cylindrical body including a series of pairs of oppositely arranged radially movable carriers and fluid means for actuating said carriers inwardly, a die mounted on a carrier having band-engaging portions at the top and bottom of its pressure or operative face separated by a central outwardly offset portion and a die mounted on the opposite carrier having a central band-engaging portion and outwardly offset portions at the top and bottom of its pressure or operative face above and below said central band-engaging portion, said band-engaging and offset portions being reversely arranged on the opposite dies and the band-engaging portions being symmetrical in relation to the center line of movement of the carriers.

6. In a circular press for compressing a band on a cylindrical body including a series of pairs of oppositely arranged radially movable carriers and fluid means for actuating said carriers inwardly, a die mounted on a carrier having band-engaging portions at the top and bottom of its pressure or operative face separated by a central outwardly offset portion and a die mounted on the adjacent carrier having a central band-engaging portion and outwardly offset portions at the top and bottom of its pressure or operative face above and below said central band-engaging portion, the band-engaging and offset portions on the adjacent dies being reversely arranged and the band-engaging portions being symmetrical in relation to the center line of movement of the carriers.

7. In a circular press for compressing a band on the cylindrical body including a series of pairs of oppositely arranged radially movable carriers and fluid means for actuating said carriers inwardly, a die mounted on a carrier having band-engaging portions at the top and bottom of its pressure or operative face separated by a central outwardly offset portion and a die mounted on each of the opposite and adjacent carriers having a central band-engaging portion and outwardly offset portions at the top and bottom of its pressure or operative face above and below said central band-engaging portion, the band-engaging and offset portions on the first mentioned die being arranged reversely to the band-engaging and offset portions on the opposite and adjacent dies, and the band-engaging portions being symmetrical to the center line of movement of the carriers.

DAVID GUP.