June 25, 1940. T. F. KOHL 2,205,532

PRESS

Filed April 24, 1939

FIG. 1.

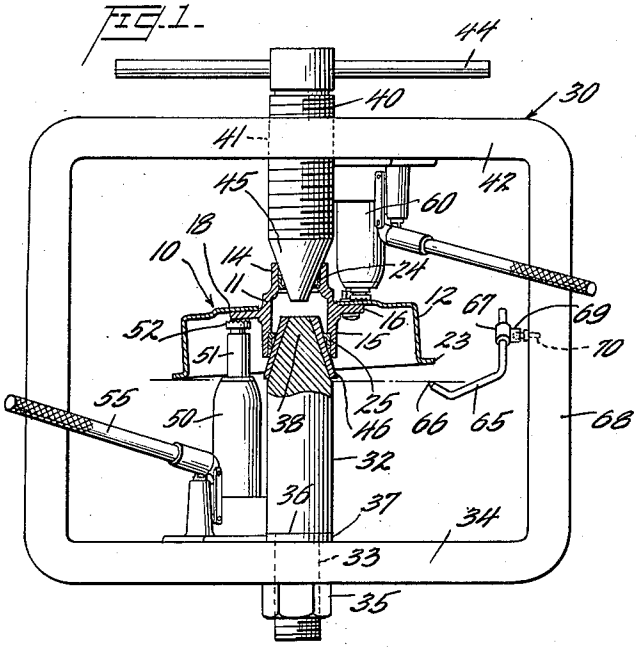


FIG. 3.

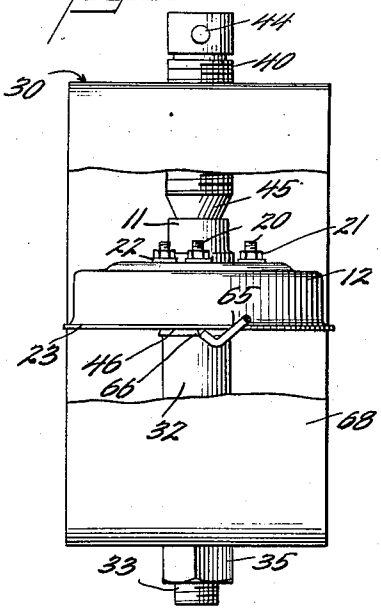


FIG. 2.

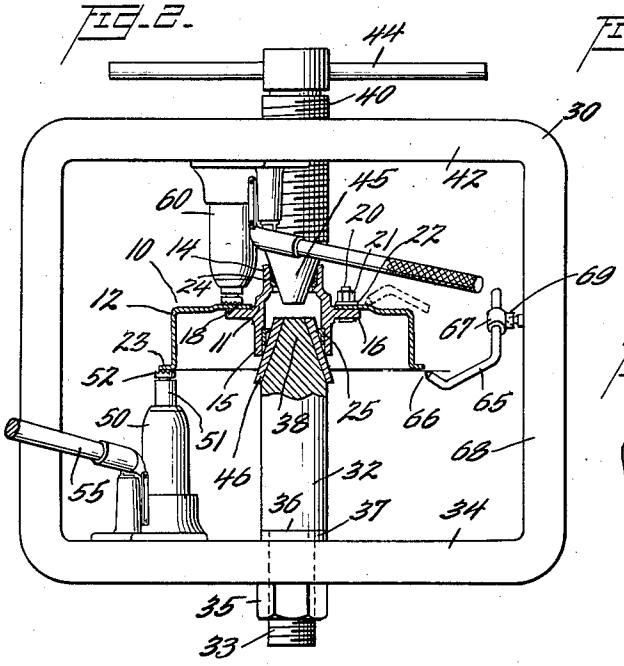


FIG. 4.

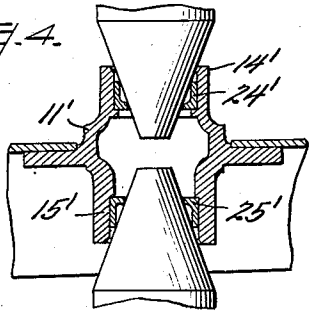
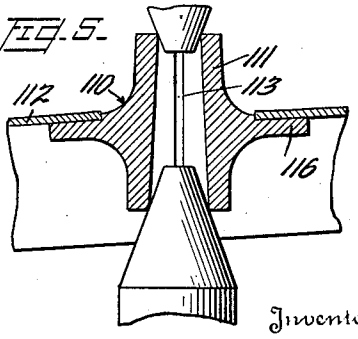


FIG. 5.



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PRESS

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Application April 24, 1939, Serial No. 269,713

2 Claims. (Cl. 153—32)

This invention relates to processes and apparatus for bending metal articles, and in particular to such devices and methods as are applicable to the straightening or realigning of warped or bent wheel hubs, brake drums, or similar members.

The general object of the invention is to provide novel and improved methods and apparatus for straightening and re-forming of articles of the class described, by means of which substantial savings in time, effort, and expense may be effected, and which find particular utility in automobile repair shops in restoring hubs and brake drums which have been bent or distorted through collisions or other accidents.

The novel process involves the gauging and pressing of the combined hub and drum elements back to their original shape and symmetry while rigidly secured together and is preferably accomplished in successive stages, whereby the hub is straightened first, then the brake drum is trued up while secured to the former element.

Machines for effecting somewhat similar truing operations have been proposed in the past, but these have been bulky and elaborate relatively permanent installations, designed rather for factory requirements, and lacking the flexibility and portability which is necessary in devices adapted for use in the general repair shop.

The invention, therefore, contemplates also the provision of improved apparatus for carrying out the process described, and in its preferred embodiment this apparatus comprises a rigid, substantially rectangular frame constructed of metal and provided at two opposite sides with threaded shafts having tapered or conical inwardly directed ends and adjustable toward and from each other, whereby the hub and drum assembly within the confines of the frame is straightened. The actual cramping or bending of the members is effected by means of small jacks which may be seated against various portions of the inner sides of the frame at different distances from the axis of the opposed clamping and centering shafts.

As a further feature of the apparatus, adapters are provided for application to either or both of the conical shaft ends for use in connection with hubs with wider bearing apertures.

Another novel provision is a gauging element which is universally adjustably secured to the frame and adapted to indicate the low and high points of the member to be straightened. By suitable modification the gauge element may take the form of a crayon or stylus, by which the article may be marked to indicate the portions to which the jacks are to be applied.

Other objects and features of novelty will be apparent from the following specification, when read in connection with the accompanying drawing, in which one embodiment of my invention is illustrated by way of example.

In the drawing:

Figure 1 is a view in side elevation of a press embodying the principles of the invention; a portion of the device and of the article to be straightened being shown in vertical section, to better illustrate the operation of the press;

Figure 2 is a similar view showing the relation of the parts at a subsequent stage in the straightening process;

Figure 3 is a view in end elevation of the press, a part of the frame being broken away; and

Figures 4 and 5 are fragmentary elevational views on an enlarged scale showing additional examples of the types of articles adapted to be treated in the press.

Although the present invention may be applied to the bending and shaping of various articles and machine elements, it is particularly adapted to the straightening of wheel hub and brake drum assemblies, as already pointed out; and in order to present a complete disclosure of the device and its operation, it may be well to describe certain examples of these automotive elements before entering upon a detailed description of the present invention itself.

In Figures 1 and 2 of the drawing the reference numeral 10 is employed to designate a hub and drum assembly of a familiar type, the hub being indicated by the numeral 11 and the brake drum by the numeral 12. In this example the hub 11 is provided with an end portion 14 of smaller diameter than the opposite end 15. Intermediate the ends of the hub element, the circular flange 16 is provided, to which the radial flange 18 of the brake drum 12 is normally secured by means of rivets. In the disclosure in the present drawing, however, these members are shown as being secured together by means of the bolt 20 to which the nut 21 and washer 22 are applied. The purpose of this connection will be explained in connection with the description of the method, which is to follow. The drum 12 is provided with the usual flared flange 23 at its free edge.

The interior of the hub 11 is occupied, when the wheel is completely assembled, by anti-friction bearings of the ball or roller type, but for the purpose of straightening the hub and drum assembly these bearings have been dismantled

and only the outer races at each end of the hub are allowed to remain. The smaller race in the upper portion of the assembly, as shown in the drawing, is indicated by the numeral 24, and the larger lower race by the numeral 25.

In Figure 4 of the drawing there is shown a front wheel hub and drum assembly in which the lower portion 15' of the hub 11' is of substantially the same diameter as the upper portion 14'. The bearing races 24' and 25' are consequently of similar diameters.

In Figure 5 of the drawing, a rear wheel hub and drum assembly 110 is shown, a portion of the brake drum being indicated at 112 and the hub at 111. The hub is tapered slightly and provided with an internal key-way 113, whereby it is rigidly secured to the axle shaft to revolve therewith. The hub member 111 is provided with an intermediate radial flange 116 to which the drum 112 is secured.

The novel press which comprises one phase of the present invention consists of a substantially rectangular rigid frame 30 which is preferably of substantial width as indicated in the end view shown in Figure 3, and is of sufficient thickness to withstand distortion during the clamping and bending operations. A relatively stationary spindle element 32 is provided with an attenuated shank 33 which passes through a central opening in the lower wall 34 of the frame 30. The shank 33 is threaded and the spindle is secured rigidly upon the frame element 34 by means of the nut 35. In order to make possible a rough vertical adjustment of the spindle with respect to the frame, washers or sleeves 37 may be interposed between the shoulder 36 and the upper surface of the frame elements 34. The upper end of the spindle 32 is tapered to provide a conical point 38 for centering the article to be straightened.

An upper threaded spindle 40 passes through a threaded opening 41 in the top wall 42 of the frame 30 and is provided with a manually operable crossbar or handle 44 by which it may be rotated and adjusted vertically with relation to the lower spindle 32 in order to clamp the work. The upper spindle 40 is provided with a conical lower end 45 which is preferably of the same shape as the upper end 38 of the lower spindle. The two spindles are of course disposed on a common axis and the tapered end portions are adapted to enter the tubular hub portion 11 of the hub and drum assembly, the conical surfaces of the spindles being adapted to contact with the inner walls of the hub element or with the bearing races as indicated in Figures 1 and 4. In the case of the hub of the smaller size shown in Figure 4, the bare spindles may be employed to center the work; but in the case of the larger hub shown in Figure 1, an adapter element 46 is applied to the lower spindle end in order to contact with the inner portions of the larger end of the hub. It will be noted that the adapter 46 may be applied to either spindle member, depending upon the nature of the work being handled.

In Figure 5, the two tapered spindle ends contact with the ends of the inner walls of the hub 111 and thus center the rear wheel hub which is not provided with bearing races.

In Figures 1 and 2 of the drawing, there is shown a pair of jacks by means of which the article is straightened. These jacks may be of any suitable kind, but it is preferred that they be of a comparatively small size and of the hydraulic type. One of the jacks is adapted to be seated upon the lower frame element 34 and to exert an upward force upon portions of the article being treated. This jack is indicated at 50 and is provided with the vertically reciprocating portion 51 having a head 52 adapted to contact with the work. The operation of the jack is effected by oscillating the handle 55 in the usual way. Another jack 60 is seated against the undersurface of the upper frame member 42 and is indicated as being an exact counterpart of the jack 50, just described.

In order to gauge the amount of distortion of the article and to determine the points to which pressure is to be applied to restore it to its original configuration, a gauge pointer 65 is provided which is preferably of the angular shape shown in the drawing and is provided with a sharp point 66 adapted to be applied to various portions of the work. The shank of the pointer is adapted to be adjustably received within the sleeve 67, which is universally mounted with respect to the side wall 68 of the frame 30 by means of the ball and socket joint 69, one member of which is rigidly secured to the frame as by means of the threaded connection indicated at 70. It will thus be seen that the pointer 65 may be readily brought against substantially any point on the work. For certain purposes the point 66 may be replaced by a crayon or marking device of any sort, as will be pointed out in connection with the description of the method of operation.

The method of straightening the hub and drum assemblies by means of the apparatus which has just been described will now be explained in considerable detail. It will be understood that suitable modifications of the method to adapt it to work of slightly differing nature may be made without departing from the scope of the invention as set forth in the subjoined claims.

In order to secure the hub 11 and the brake drum 12 rigidly together during the straightening process, they are securely bolted together by means of the bolts 20 and nuts 21. The upper spindle 40 is retracted sufficiently to allow the hub to be applied to the lower spindle 33 which has previously been rigidly positioned upon the lower element 34 of the frame 30. The damaged hub and drum assembly 10 is placed upon the cone portion 38 of the lower spindle, or upon the adapter 46, as indicated in Figures 1, 4, or 5. The upper spindle 40 is then screwed down until the coned end 45 enters the upper portion of the hub and the assembly 10 is clamped lightly between the two spindles, so as to permit rotation of the assembly with a slight drag or resistance.

The hub and drum assembly is slowly rotated, and by means of the gauge 65 the lowest point of the drum is determined by the contact of the point 66 of the gauge with the low point of the flange 23 of the drum. This extreme lowest portion is then marked with a crayon in order to indicate the point at which upward pressure should be applied to restore it to its original shape. Then the gauge 65 is applied to the upper side of the hub and drum assembly, as indicated in dotted lines in Figure 2, in order to determine the low point of the hub flange portion 16. This portion is then marked and it will be found that the low portions of the hub flange and of the brake drum correspond fairly closely.

In cases of very great distortion of the hub and drum assembly, the high point of the hub flange portion is also marked, and the straightening is

effected by the use of two jacks instead of merely one.

After the various portions of the assembly are marked, the assembly is rotated until the marked portions are disposed in convenient positions above the broad bottom member 34 of the frame and the jack 50 is seated upon this member and the head 52 applied beneath the low point of the hub flange. The spindle 40 is then screwed down in order to clamp the work tightly, and the jack 50 is elevated until the hub flange 16 is straightened. If necessary, the second jack 60 may be applied to the high point of the flange portion of the hub as shown in Figure 1, and pressure exerted downwardly at the same time the low portion is moved upwardly by means of the jack 50. In most cases the above procedure of gauging and pressing will have to be repeated several times until the hub flange revolves true in the press, as indicated by the gauge 65.

After the hub flange 16 is straightened, the drum 12 may still be somewhat out of true, as indicated in Figure 2 of the drawing. In order to straighten the drum alone, the flanges 23 (and if necessary the inner flange 18) are gauged and marked in order to determine the points at which pressure is to be applied. The spindle 40 of course is again loosened in order to rotate the assembly for proper gauging and marking. The low point of the drum flange 23 is then disposed above a convenient portion of the lower member 34 of the frame, and the jack 50 is applied thereto. The spindles are then tightened and the jack 60 applied in reverse position on top of the hub flange 16 which has already been straightened, at a point adjacent the lower jack 50. This is in order to hold the flange 16 in a firm and rigid position while pressure is applied to straighten the drum. The two jacks during this procedure are of course upon the same side of the press as shown in Figure 2. This operation may also have to be repeated several times until the drum is perfectly true.

It is obvious that similar procedures will be followed in treating the wheel and drum assemblies shown in Figures 4 and 5 of the drawing, and also in straightening and truing similar articles.

It is also understood that various changes and modifications may be made in the embodiments illustrated and described herein, without departing from the scope of the invention as defined by the following claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A portable tool for use in straightening wheel hub and brake drum assemblies or similar circular or annular articles of considerable radial extent, comprising, in combination, a relatively heavy, rigid, rectangular frame consisting of an endless metal band, a pair of cooperating centering and supporting spindles extending inwardly from opposite sides of said frame and provided with tapering conical points adapted to enter alined openings in the article to be treated in order to center and clamp the article between them, one of said spindles being normally rigidly secured to its side of the frame but having means for attaining longitudinal bodily adjustment with respect to the frame by comparatively large increments, the other of said spindles being threaded through an opening in the opposite side wall of the frame, means for rotating said last named spindle for attaining a fine adjustment of the spacing of the points to center the work or to grip it firmly, the inside surfaces of the side walls of the frame from which said spindles project being plane and extending a distance radially of said spindles to encompass the vertical projection of said brake drum upon said side walls for the seating of pressure exerting means on said surfaces, for operating upon radially extending portions of the article at various successive distances from the center thereof.

2. A portable tool for use in straightening wheel hub and brake drum assemblies or similar circular or annular articles of considerable radial extent, comprising, in combination, a relatively heavy, rigid, rectangular frame consisting of an endless metal band, a pair of cooperating centering and supporting spindles extending inwardly from opposite sides of said frame and provided with tapering conical points adapted to enter alined openings in the article to be treated in order to center and clamp the article between them, one of said spindles being adjustably secured to its side of the frame, the other of said spindles being threaded through an opening in the opposite side wall of the frame, means for rotating said last named spindle for attaining a fine adjustment of the spacing of the points to center the work or to grip it firmly, the inside surfaces of the side walls of the frame from which said spindles project being plane and extending a distance radially of said spindles to encompass the vertical projection of said brake drum upon said side walls for the seating of pressure exerting means on said surfaces, for operating upon radially extending portions of the article at various successive distances from the center thereof, a hollow generally conical adaptor cap applied to at least one of said points for enlarging it to fit enlarged openings in certain kinds of work, the inner surface of said cap being of the same conical configuration as the outer surface of the point to which it is applied.

THOMAS F. KOHL.