

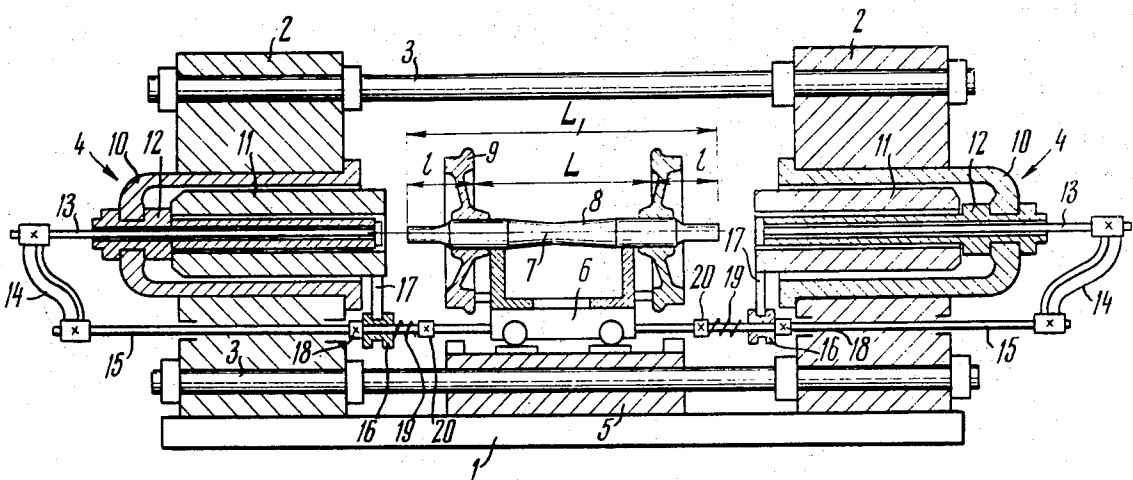
- [54] **DOUBLE-ACTION HYDRAULIC FORCING PRESS**
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- [51] Int. Cl. **B23p 19/04**
- [58] Field of Search..... **29/208 C, 252, 208 R, 208 D**

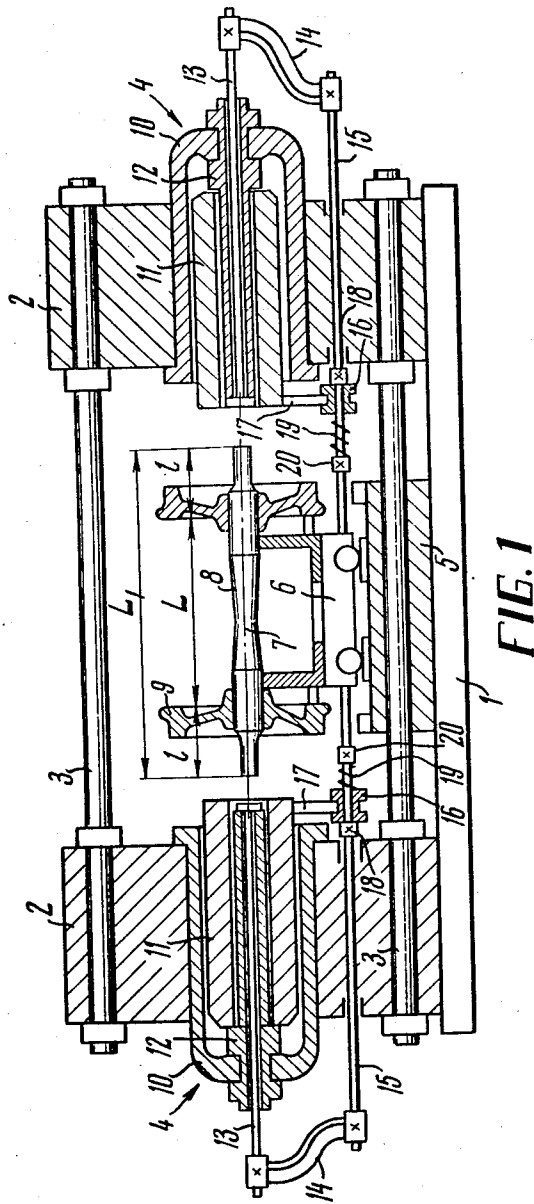
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Primary Examiner—Thomas H. Eager
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[57] **ABSTRACT**
 Fixed inside each of the hydraulic cylinders is a thrust sleeve having an axial bore which accommodates a feeler rod axially movable in said bore. The feeler rod is mechanically interlinked with the plunger of a respective hydraulic cylinder and is adapted to interact with the axle of the item being assembled that is positioned in between the hydraulic cylinders and onto which its members are to be forced, and with the corrector device which, while interacting with one of said members, determines the effective length of stroke of the plunger depending upon the length of the item being assembled.

6 Claims, 4 Drawing Figures





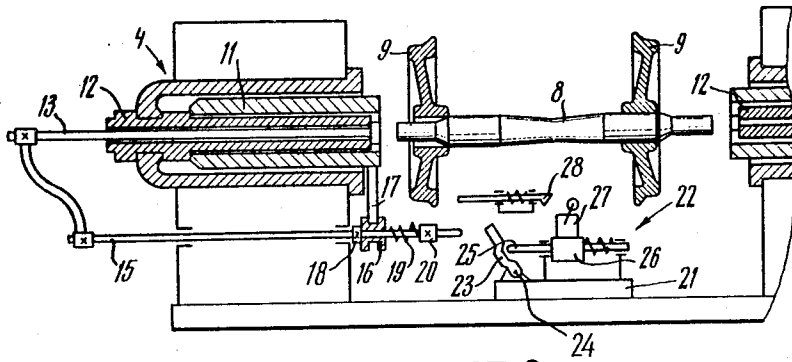


FIG. 2

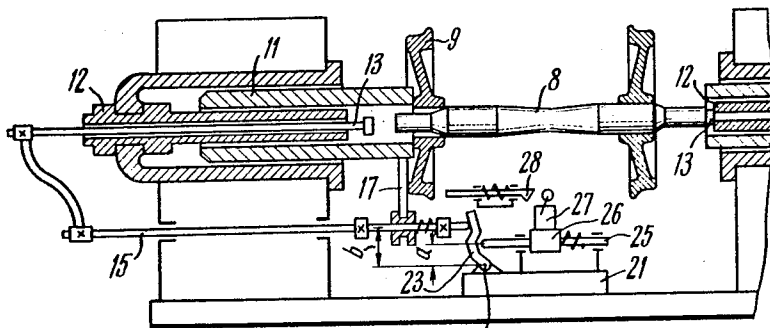


FIG. 3

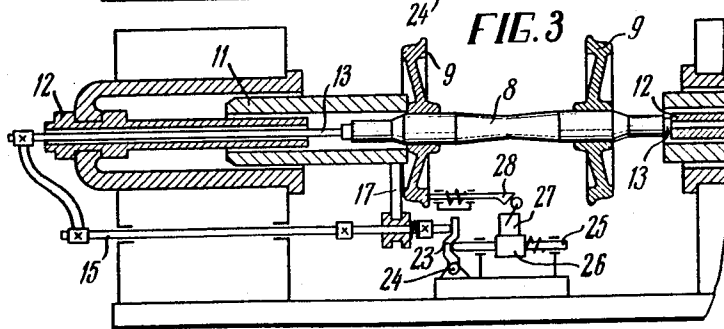


FIG. 4

DOUBLE-ACTION HYDRAULIC FORCING PRESS

This invention relates generally to pressing machinery of the through-going type and, more specifically, to a double-action hydraulic forcing press intended for forcing onto an axle the parts arranged symmetrically to the midpoint thereof e.g., for forcing bearings, bushes and some other items.

The invention can find most preferential application when used either independently or in an automatic transfer line for assembly of wheel pairs of railway cars, Diesel locomotives, electric locomotives and of some other transportation facilities.

Known in the present state of the art is a double-action hydraulic forcing press for assembling wheel pairs, comprising a bed carrying two stands interlinked with braces; each of said stands accommodates a horizontal hydraulic plunger case or cylinder, both of them being coaxially mounted.

A carriage is mounted in between the stands so as to travel along the axis of the hydraulic cylinders on a rail track, said carriage being intended for positioning the wheel pair being assembled (i.e., axle and wheels to forced thereonto) within the working space of the press, viz., between the hydraulic cylinders.

Wheels are forced onto the axle in the heretofore used presses by virtue of working stroke of the plungers of the hydraulic cylinders, operating alternatively.

The quality of an assembled wheel pair depends upon the accuracy to which the predetermined distance between the inner wheel faces has been maintained, as well as upon the deviations from the specified distance between the wheel inner faces to the axle butt end on both sides of the wheel pair.

However, as it is commonly known, axles onto which wheels are mounted to form a wheel pair, feature but different lengths within the size tolerance for their production; that is why prior to assembling each wheel pair its axle should be marked out individually by dividing the axle lengthwise into two halves and applying a witness mark.

Besides, some gauges are used during wheel forcing procedure to indicate the position of the wheel on the axle with respect to the witness mark. As soon as the wheel has reached the position at the predetermined distance from the witness mark the press is thrown out of operation.

The operations of marking out the axle, setting the gauge and disengagement of the press are carried out manually. These manual operations make it impossible to introduce automation into the wheel pair assembly process which results in low efficiency of the hitherto used forcing presses.

It is an essential object of the present invention to provide a double-action hydraulic forcing press, wherein when assembling items featuring their component members arranged symmetrically along the center line thereof, the required distance between the inner faces of the members being forced onto the axle would be maintained automatically and the distances from said inner faces to the butt ends of the axle on both sides of the item being assembled be single-valued irrespective of the axle length.

Said and other objects are attained due to the fact that, according to the invention, provision is made inside each hydraulic cylinder for a thrust sleeve whose

axial bore accommodates a movable feeler rod mechanically interlinked with the working member of the respective hydraulic cylinder and adapted to interact with the axle of the item being assembled and with a corrector device mounted on the press bed, said corrector device while simultaneously interacting with the member being forced onto the axle, determines the effective length of stroke of the hydraulic cylinder working member to suit the axle length of the item being assembled, said length being fixed by the feeler rod.

Such a design principle underlying the essence of the present invention enables an exact correction of the mutual position of the members being forced onto the axle due to the interaction of one of the feeler rods through the axle of the item with the thrust sleeve of the opposite hydraulic cylinder.

It is expedient that each feeler rod be mechanically interlinked with the working member of the respective hydraulic cylinder by way of a pushrod arranged in parallel with said feeler rod so that its one end be locked-in with the latter and the other end be interconnected with the hydraulic cylinder working member through a spring-loaded sleeve mounted on said pushrod and a bracket.

In a specific and preferred embodiment of the press it is likewise expedient that the corrector device have a lever to interact with the pushrod and with a slide block travelling in parallel with the axis of the hydraulic cylinder and that said slide block carry a position sensor of the member being forced onto the item axle.

The lever of the corrector device is expedient to be so positioned that the lines of its interaction with the pushrod and with the slide block be coplanar with the plane of rotation of said arm.

This will result in a reduced error in correcting the position of the member being forced lengthwise the axle of the item.

It is likewise favorable that the distance between the pivot spindle of the slide block and that of the arm be at a ratio of 1:2 with the distance between the pivot spindle of the pushrod and that of the lever.

It is not less expedient that the sensor of the corrector device interact with the member being forced through a spring-loaded stop located on the press bed at the level of said member.

This will protect the sensor against occasional damage in the course of interaction with the member being forced.

Such a design of the double-action hydraulic forcing press, according to the invention, makes it possible to automatically set and maintain a desired distance between the inner faces of the members being forced and obtain equal distances between said inner faces and the butt ends of the axle on both sides of the item being assembled irrespective of the length of said axle. Besides, an individual marking out of every axle and the use of a gauge to determine the position of the member being forced are dispensed with.

Given below is a detailed description of an embodiment of the present invention to be read in conjunction with the accompanying drawings, wherein:

FIG. 1 is a diagrammatic longitudinal-section view of a double-action hydraulic forcing press for assembly of wheel pairs;

FIG. 2 illustrates the press of FIG. 1 showing the initial position of its mechanisms prior to forcing the L.H. wheel;

FIG. 3 illustrates the press of FIG. 1 showing the intermediate position of its mechanisms when forcing the L.H. wheel; and

FIG. 4 illustrates the press of FIG. 1 showing the terminal position of its mechanisms when forcing the L.H. wheel.

Now referring to the Drawings, the double-action hydraulic forcing press comprises a bed 1 (FIG. 1), carrying two stands 2 interlinked with horizontal braces 3 to form a closed rigid structure which takes up pressing force.

Each of the stands 2 accommodates a horizontal cylinder 4 of the plunger type. Both hydraulic cylinders 4 are coaxially mounted.

A movable appliance is arranged between the stands 2 on a support 5 which is fixed on the press bed 1, said appliance being essentially a carriage 6 adapted to reciprocate along an axis 7 of the hydraulic cylinders 4.

The wheel pair being assembled (i.e., an axle 8 and two wheels 9) is placed on the carriage 6 within the press working space lengthwise the axis 7 of the hydraulic cylinders 4.

Each of the hydraulic cylinders 4 incorporates a cylinder barrel 10 and a working member made as a hollow plunger 11, wherein a thrust sleeve 12 is loosely mounted lengthwise the axis 7 of the hydraulic cylinder 4, said sleeve with its one end being fixed in the end face of the barrel 10.

Each of the thrust sleeves 12 has an axial bore along which a feeler rod 13 is free to pass lengthwise the axis 7 of the hydraulic cylinders 4, said feeler rod with its one end facing the wheel pair being assembled, whereas its other end carries a pushrod 15 arranged parallel to the feeler rod 13 and mounted on a bracket 14.

The vacant end of the pushrod 15 is fitted with a sleeve 16 interconnected with the plunger 11 through a bracket 17. The travel of said sleeve 16 along the pushrod 15 is restricted at one end by a stop 18 and at the other end, with a spring 19 and another stop 20. Both stops 18 and 20 are made fast on the pushrod 15.

Two corrector devices 22 are arranged inside the support 5 on a plate 21 (FIGS. 2-4) to determine the effective length of stroke of each of the plungers 11 depending upon the length of the axle 8 in each wheel pair being assembled.

Each of the corrector devices 22 comprises a lever 23, whose pivot spindle 24 is fixed on the plate 21 and whose vacant end is located at the level of the pushrod 15.

A spring-loaded slide block 26 is mounted in a horizontal pivot spindle 25 on the same plate 21 at the level of the midpoint of the lever 23, said slide block carrying a position sensor 27 of the wheel 9 on the axle 8. The sensor 27 interacts with the rim of the wheel 9 of the wheel pair being assembled through a spring-loaded stop 28 mounted on the plate 21 at the level of the rim of the wheel 9.

The distance a between the pivot spindle 25 of the slide block 26 and the pivot spindle 24 of the lever 23 is at a ratio of 1:2 with the distance b between the pivot

axis of the pushrod 15 and the pivot spindle 24 of the lever 23.

The above ratio between the arms a and b of the lever 23 is selected on the following assumption. Since the total length L_1 of the axle 8 set in the press ranges within its tolerance margin, viz., $L_1 + L_1 \pm \Delta L_1$, so with the distance L between the inner faces of the wheels 9 being constant, the value of the distance 1 between the inner faces of the wheels 9 to the butt ends of the axle 8 on both sides of the wheel pair likewise ranges within the limits of $1 + 1 \pm \Delta 1$.

The best qualities will be featured by such a wheel pair, wherein $1 = (L_1 - L/2)$, and $\Delta 1 = \frac{1}{2}\Delta L_1$.

Thus, the purpose of the corrector device 22 consists in that when the total length L of the axle 8 varies by the value L_1 , the corrector device causes the position sensor 27 which disengages the press, to shift by the length value $\Delta 1 = \frac{1}{2}\Delta L_1$.

The double-action hydraulic forcing press of the invention operates as follows.

The wheel pair being assembled, with the wheels 9 preliminarily fitted onto the guide cones of the axle 8, is fed by the feed mechanism (not shown in the drawings) onto the carriage 6 of the press which positions the axle 8 within the press working space lengthwise the axis 7 of the hydraulic cylinders 4.

The wheels 9 are forced onto the axle 8 in succession.

FIG. 2 represents the initial position of the press mechanisms when forcing the L.H. (in the drawings) wheel 9.

The L.H. hydraulic cylinder having been put into operation, its plunger 11 while travelling rightward till the contact with the end face of the L.H. wheel, centers the latter on the guide cone of the axle 8 of the wheel pair, whereupon the plunger causes the wheel pair together with the carriage 6 to shift rightward unit 1 the R.H. butt end of the axle 8 rests against the butt end of the thrust sleeve 12 of the R.H. hydraulic cylinder 4.

At the same time the bracket 17 interconnected with the plunger 11 of the L.H. hydraulic cylinder 4 causes the sleeve 16 to travel along the pushrod 15, said sleeve acting upon the stop 20 via the spring 19 and causing the pushrod 15 and the feeler rod 13 connected thereto, to move rightward.

While further moving rightward the pushrod 15 exerts upon the lever 23 of the corrector device 22, said lever while rotating round its pivot spindle 24, shifts to the right the pivot spindle 25 of the slide block 26 together with sensor 27.

This motion continues until the butt end of the L.H. feeler rod 13 rests against the L.H. butt end of the axle 8 of the wheel pair being assembled. At that instant the sensor 27 stops in such a position that ensures the equivalent distance l from the inner faces of the wheels 9 to the butt ends of the axle 8 on both sides of the wheel pair depending upon the length L_1 of the axle 8.

Further motion of the sensor 27 ceases, and forcing of the L.H. wheel 9 will be kept until the inner face of the wheel 9 rim gets in contact with the stop 28 which while travelling rightward, exerts upon the sensor 27 which throws the L.H. hydraulic cylinder out of operation.

The forcing procedure of R.H. wheel 9 is similar to that of the L.H. wheel, being actuated from the R.H. hydraulic cylinder 4.

What is claimed is:

1. A double-action hydraulic forcing press, comprising: stands mounted on a bed and interlinked with braces; two coaxial hydraulic cylinders, each mounted in one of said stands; a contrivance located in between said hydraulic cylinders with a possibility of travelling along their axis and adapted to carry the axle of the item being assembled and the members being forced thereonto; a thrust sleeve fixed inside each of said hydraulic cylinders concentrically therewith and having an axial bore; a feeler rod accommodated in each of said axial bores and made axially movable; each of said feeler rods being mechanically interlinked with the working member of the said respective hydraulic cylinder and adapted to interact with the axle of the item being assembled; a corrector device mounted on said bed of the press and adapted to interact with the respective of said feeler rods and simultaneously with one of the members being forced onto the axle, said corrector device determining the effective length of stroke of the working member of the said respective hydraulic cylinder to suit the length of said axle of the item being assembled, said length being fixed by the respective of said feeler rods.

2. A press as claimed in claim 1, wherein each of the aforesaid feeler rods is mechanically interlinked with said working member of the respective hydraulic

cylinder by way of a pushrod arranged in parallel with said feeler rod, one of the ends of said pushrod being locked-in with said feeler rod and the other end being interconnected through a spring-loaded sleeve mounted on said pushrod and a bracker, with the working member of the respective of the aforesaid hydraulic cylinders.

3. A press as claimed in claim 1, wherein each of the aforesaid corrector devices has a lever adapted to interact with the respective of the aforesaid pushrods and with the slide block travelling in parallel with the axis of said hydraulic cylinders and carrying the sensor of the position of the member being forced on the axle of the item being assembled.

4. A press as claimed in claim 3, wherein said lever is so positioned that the lines of its interaction with said pushrod and said slide block are coplanar with the plane of rotation of said lever.

5. A press as claimed in claim 4, wherein the distance between the pivot spindle of said slide block and that of said lever is at a ration of 1:2 with the distance between the pivot spindle of said pushrod and that of said lever.

6. A press as claimed in claim 3, wherein said sensor interacts with said member being forced, through a spring-loaded stop mounted on said bed of the press at the level of said member being forced.

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