

Oct. 25, 1938.

C. C. BENNETT

2,134,501

AXLE PRESS

Filed Oct. 18, 1935

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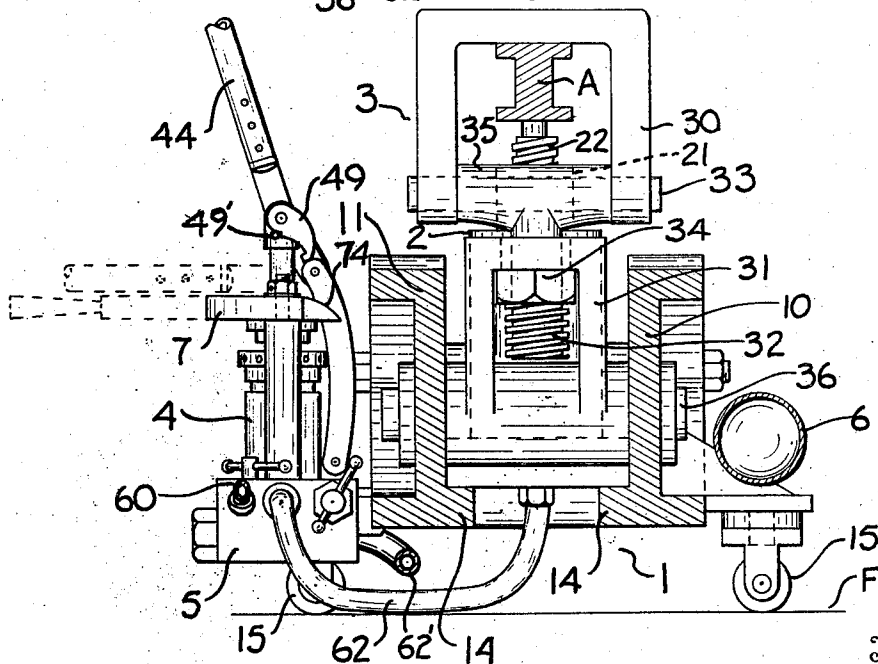
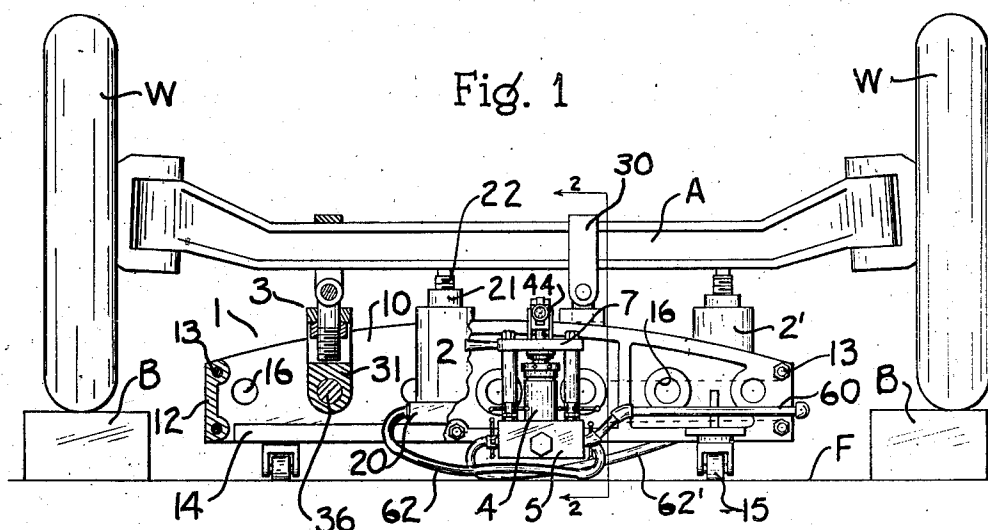


Fig. 2

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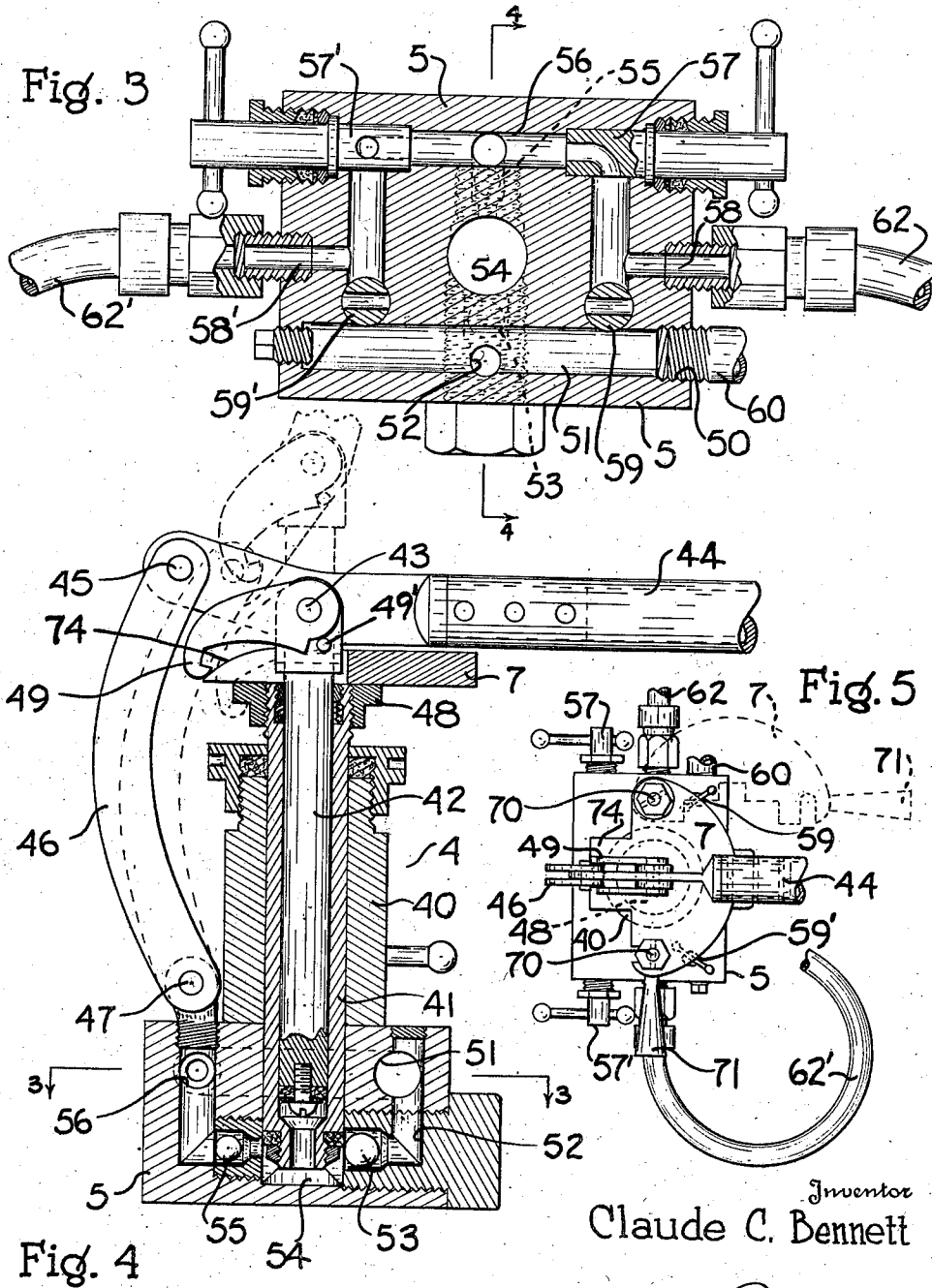
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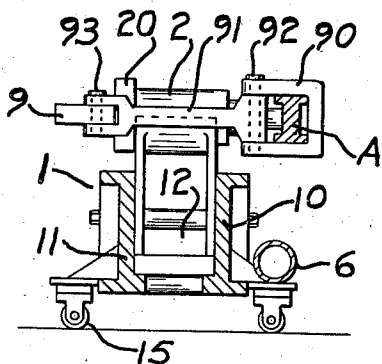
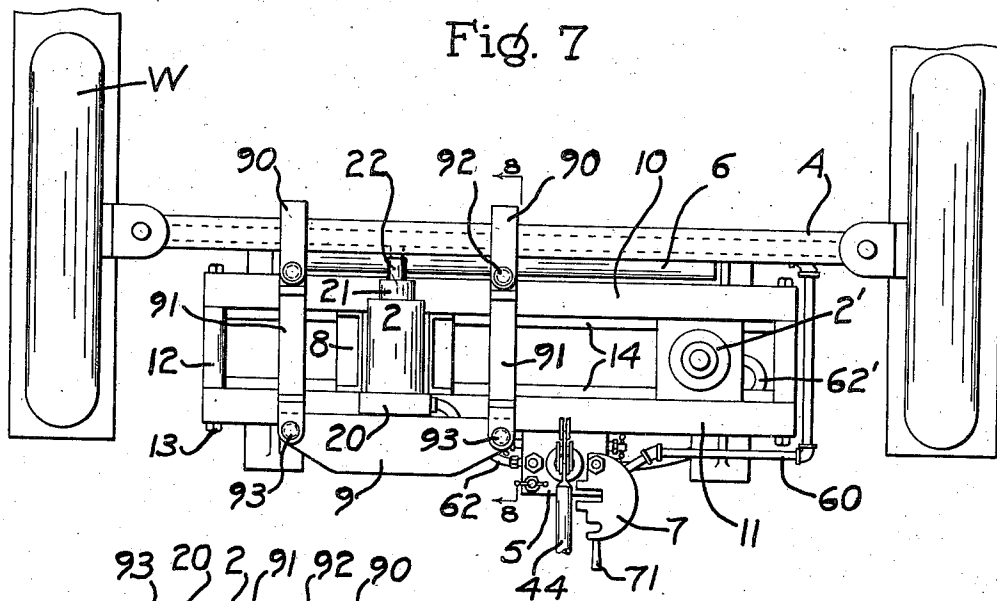
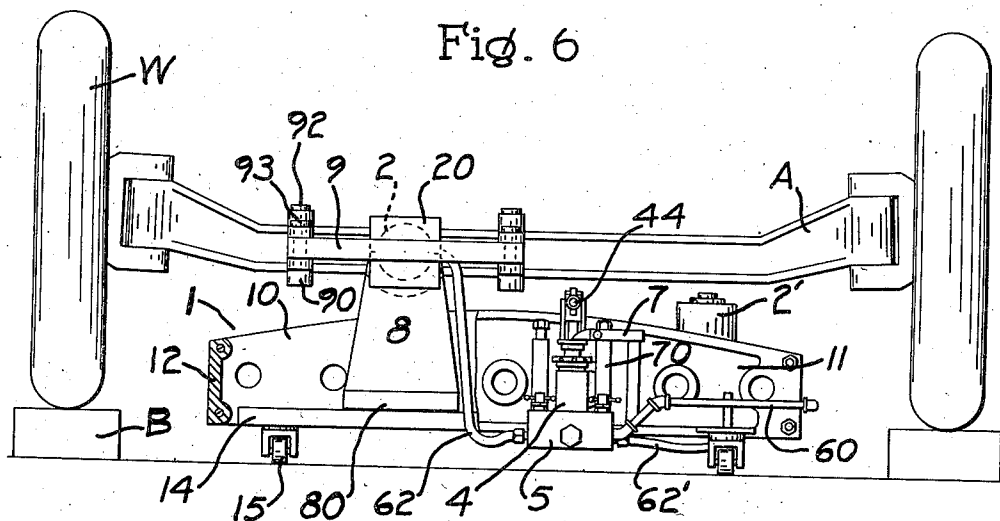
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,134,501

AXLE PRESS

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Application October 18, 1935, Serial No. 45,572

9 Claims. (Cl. 153—32)

My invention relates to means for bending or altering the shape of heavy axles, such as the front axles of trucks.

It is the usual practice to bend axles while cold. An axle press of a size and built sufficiently strongly to bend the large heavy axles of trucks, is a large cumbersome device, yet it is desirable that it be mobile, at least to the extent where it can be moved from place to place over the floor of a garage, and be adjusted to position beneath the axle of the truck, rather than a device set in a frame or let into a pit, and it is an object of the present invention to provide an axle press for heavy duty which shall be sufficiently strong, yet which may be compact and mobile.

It is a further object to provide such an axle press which is provided with hold-down means and with hydraulic jacks, preferably both of which are shiftable to different positions lengthwise of the axle and strongback bar, to accomplish bending operations in any particular region of the axle where bending is likely to be required.

It is a further object, in conjunction with such an axle press which rests upon the floor, to provide means which enable the adjustment of the hold-down means to the height of any particular axle, which means may quickly and easily be adjustable, to the end that the axle is properly held down without undue movement and without the necessity of lifting the axle against the hold-down means.

It is also an object to provide such a device which can be employed equally well to change the wheel camber, and hence the king pin slant, and the toe-in of the wheels.

It is a further object to divorce the pump from the jack or jacks and to mount it in a convenient location on the strongback bar, and to provide valve means to control the flow of fluid through the pump from a reservoir and into the jack or jacks selected, yet through such a connection that the jacks may be shifted readily from place to place to accomplish bending in different locations.

It is a further object to provide in such an axle press a means, particularly in association with the pump, whereby the ram of each jack may be quickly projected into engagement with the axle, and which may then be operated to effect slower but more powerful pressure against the axle, to accomplish the bending.

It is a further object to devise such an axle press which shall be simple in construction, convenient to operate, and yet sufficiently strong and rugged, though sufficiently light and easy to handle that it can be moved about from place to place to locate it properly beneath the axle of a truck to be bent.

With these and other objects in mind, as will appear hereafter, my invention comprises the

novel parts and the novel combination and arrangement thereof, as is shown in the accompanying drawings and as will be explained more fully in this specification and defined by the claims terminating the same.

In the accompanying drawings I have shown my invention embodied in a form which is at present preferred by me.

Figure 1 is a front elevation of the axle press shown applied to an axle, and with parts broken away and shown in section.

Figure 2 is a transverse section on an enlarged scale through the apparatus illustrated in Figure 1, substantially on the line 2—2 of that figure.

Figure 3 is a transverse horizontal section through the valve block substantially on the line 3—3 of Figure 4, and Figure 4 is an axial section through the pump and valve block substantially on the line 4—4 of Figure 3.

Figure 5 is a plan view of the pump and valve block.

Figure 6 is a front elevation of the device, as it would be arranged to alter the toe-in of the wheels.

Figure 7 is a plan view of the latter arrangement, and Figure 8 is a section on line 8—8 of Figure 7.

The axle is illustrated as a large, heavy axle of the type used in trucks. It is usually desirable to bend such axles to straighten them without removing the axle from the car, and while the springs, shackles, and the like have not been illustrated, it will be understood that the axle remains in place beneath the truck and preferably the wheels W remain in place upon the ends of the axle. The wheels may rest upon blocks B, resting upon the floor F.

The axle press includes a strongback bar, generally designated by the numeral 1, and consisting of two vertical plates 10 and 11, spaced apart and held together by end plates 12 and bolts 13, or in any other convenient manner. Each of these plates is provided, in the form shown, with an inwardly directed flange 14 at its inner side, for the purpose of supporting the base block of a jack 2. Preferably two such jacks are employed, the second jack, to distinguish it, being designated by the numeral 2'. The strongback bar thus formed is in itself large and heavy, and to enable it to be moved about over the floor, it is provided with casters or rollers 15 resting upon the floor. For a purpose which will later appear, the plates 10 and 11 are provided with perforations 16 at intervals.

Suitable means are provided, extending upwardly from the strongback bar to the axle A, to engage the axle and to hold it down against an upwardly directed force. Such hold-down means are indicated in general by the numeral 3. As thus seen in Figure 2, such means may consist

of a clevis 30, adapted to straddle the axle A, a yoke 31, having an eye in its lower end for the reception of a pin 36, and a connection between the clevis 30 and yoke 31 which transmits stress from one to the other and which is preferably adjustable to vary the effective length of the hold-down device 3. This may be accomplished by employing a screw 32 received in the yoke 31 and secured to the clevis 30 by a pin 33. The screw 32 engages a nut 34 which is snugly held between the sides of the yoke 31, so that it may not rotate. Thus by rotating the clevis 30 or the head 35 of the screw, the effective length of the hold-down means 3 may be varied. The pin 36, it will be understood, is received in the holes 16 in the plates 10 and 11, and thus the hold-down means may be secured to the strongback bar 1 in any one of a number of positions lengthwise of the latter. Two such hold-down means are shown, though any convenient number may be employed.

Each of the jacks 2 and 2' is formed with a ram 21, which may in turn be provided with an adjusting screw 22. There is, however, no pump directly associated with either of the jacks, the jacks merely resting upon blocks 20, which rest upon the flanges 14, whereby the jacks may be shifted lengthwise of the strongback bar 1 to any desired position, for cooperation with the hold-down means 3 in applying a force to the axle to alter the shape of the latter.

A single pump, generally designated by the numeral 4, is provided for the supply of fluid to either or both of the jacks 2 and 2'. This pump 4 is shown as supported upon a valve block 5 which in turn is carried directly upon the strongback bar 1, so that all essential parts may be moved over the floor as one unit. This pump should be located on the front side of the strongback bar, so that it is convenient for operation when the strongback bar is located beneath an axle. Fluid is carried in a reservoir 6, which may be supported on the rear side of the strongback bar, and is delivered through piping 60 to the inlet port of the valve block 5 (see Figure 3). The fluid is carried through passages in the valve block, which will be described in detail hereafter, and then is delivered through flexible connections 62 and 62' to the jacks 2 and 2', respectively. These flexible connections should be sufficiently long to permit any desired shifting of the jacks lengthwise of the strongback bar, without kinking of such connections.

The pump 4 is preferably of a special type. The pump barrel 40 is provided with a bore or a plunger 41, which in turn is bored to receive a smaller plunger 42. An operating handle 44 is pivotally connected at 43 only to the smaller plunger 42. The handle 44, it will be understood, is fulcrumed at 45 upon a link 46, which in turn is pivotally carried at 47 upon the valve block 5. However, the plunger 41 is provided with a flange 48 at its upper end, and a dog 49, carried by the pin 43, is of such length that it may engage the flange 48 and thus lock together the plungers 41 and 42 for conjoint reciprocation. When so locked, the plunger 41 is in effect the only one operative, and this supplies a large volume of fluid at each stroke, and consequently effects rapid movement of the ram of the jack which is receiving fluid from the pump. When the dog 49 is disengaged from the flange 48, the plunger 42 is the only one which is operative, and this effects delivery of a smaller volume of fluid, but greater power is thereby developed.

As a convenient means of controlling the posi-

tion of the dog 49, I may employ a plate 7 which is pivoted upon the upper end of one of the hold-down bolts 70 (see Figure 5), and which is notched for engagement with the other such bolt, at the opposite side of the pump. A handle 71 permits the plate 7 to be swung from the full line position of Figure 5, wherein its cam surface 74 engages and forces the dog 49 out of engagement with the flange 48, as the pump handle 44 is oscillated, into the dotted line position, wherein it has released the dog 49, permitting the latter to swing downward as far as the pin 49', thus placing it in position to be re-engaged with the flange 48. In the full line position, it will be observed from Figures 4 and 5 that the plate 7 overlies the flange 48, and prevents the plunger 41 from rising, but does not interfere with the reciprocation of the smaller plunger 42. In the dotted line position it interferes with neither plunger.

It will be observed from Figures 3 and 4 that the valve block 5 is provided with a passage 51 leading from the inlet port 50, to which the supply pipe 60 is connected, to carry the fluid to a port 52 and thence past a check valve 53 to the pump chamber 54. The fluid passes from the pump chamber, past a second check valve 55, to a branch passage 56, and thence past valves 57 and 57', to outlet ports 58 and 58'. At the port 58 is connected the flexible connection 62 leading to the jack 2, and at 58' is connected the connection 62' leading to the jack 2'. By closing off one of the valves 57 or 57', the fluid is directed to one or the other of the jacks, or by leaving both open, both jacks are simultaneously operated. When it is desired to release the fluid from the jacks and to return it to the reservoir, by-pass valves 59 or 59' may be opened, returning the fluid from the port 58 or 58' back to the passage 51.

It will now be apparent that by proper manipulation of the valves 57, 57', 59 and 59', and by control of the plate 7, both jacks may be advanced simultaneously into contact with the under side of an axle, the hold-down means having been first adjusted, whereupon if it is desired that the jack 2' merely resist a downward movement, the valve 57' may be closed off (see Figure 3), holding the jack at its elevated position, and then the plate 7 may be thrown to the dotted line position of Figure 5, and the pumping continued, whereupon greater force will be exerted through the jack 2, to effect upward bending of the handle, in the arrangement shown in Figure 1, between the two hold-down means. When the bending is completed, or if it is desired to gauge the axle to ascertain if it has been sufficiently straightened, pressure may be relieved from the two jacks or from only the jack 2, if desired, by opening the valve 59, or if the jack 2' is to be released, by opening the valve 59', whereupon the fluid in each jack returns under the pressure of the jack ram to the reservoir 6.

The same arrangement can be conveniently used for bending the axle in a horizontal plane, for example to alter the toe-in of the wheels, or to straighten an axle which has been bent in this plane. To this end I provide a pedestal 8 which is provided with a base 80 of a size to rest upon the flanges 14 of the strongback, and which is shaped at its upper end as a saddle to receive the jack 2 or 2' resting on its side. Since the jacks merely rest with their base 20 upon the flanges 14, either one of them may be lifted, turned sideways, and placed in the saddle at the

upper end of the pedestal 8. The height of the axle A may be regulated by the provision of suitable blocks B, so that the ram 21 of the jack bears properly against the axle. The axle may then be engaged by clevises 90 at each side of the jack, each connected by links 91 and pins 92 and 93 to a bar 9, the latter of which bears against the base 20 of the jack when held in the pedestal. The jack may now be operated as previously described, through oscillation of the pump handle 44, solidly supported upon the strongback 1, and thus reacting from the bar 9 the jack serves to bend the axle A between the clevises 90. This operation is usually performed by one jack only. The other jack, for instance the jack 2' in Figures 6 and 7, may be moved to one end of the strongback, out of the way.

The drawings are not intended to represent the product in details as it would be actually manufactured, but rather are intended as simplified and illustrative drawings showing how the principles of my invention may be employed.

What I claim as my invention is:

1. A heavy duty axle press comprising a strongback bar, hold-down means engageable with an axle to be pressed, anchoring means to secure said hold-down means to the strongback bar, a plurality of hydraulic jacks resting upon and shiftable along the strongback bar, a pump independent of and operatively connected to the jacks, a valve block operatively connected to said pump, and including valve means controlling delivery of fluid from the pump to any selected jack or jacks, and flexible conduits connecting the valve block with each jack.

2. A heavy duty axle press comprising a pair of spaced plates disposed in parallel vertical planes, each having an inwardly directed, longitudinally extending flange, means rigidly connecting said plates, to constitute a strongback bar, hold-down means engageable with an axle beneath which the strongback bar is disposed, means to anchor the hold-down means to the strongback bar, an hydraulic jack resting upon said flanges for movement lengthwise of the strongback bar, a pump mounted externally of the strongback bar, and flexible means connecting the pump and the jack.

3. A heavy duty axle press comprising a support, means for rendering the support mobile, a jack, a pedestal supported upon and shiftable along the mobile support, and formed to support the jack in the horizontal plane of an axle to be bent, a strongback bar against which the horizontal jack rests, holding means engaging the strongback bar and the axle to limit their separating movement under the stress created by the jack, and a pump mounted upon said support and operatively connected to said jack.

4. A heavy duty axle press comprising a strongback bar, an hydraulic jack, a pedestal shiftable lengthwise of the strongback bar, and formed to support said jack in horizontal position, a pump independent of and operatively connected to the jack, a bar engageable with the base of the jack, and tension members extending from the bar to the axle, and engageable with the latter to resist bending stresses generated by operation of the pump and jack.

5. A heavy duty axle press comprising a strongback bar, hold-down means formed to engage an axle, anchoring means to secure the hold-down means to the strongback bar, an hydraulic jack supported upon the strongback bar and cooperating with the hold-down means to

alter the shape of an axle, a pump, a conduit connecting the pump and jack, said pump including a plunger of large diameter and a coaxial plunger of small diameter carried by the first plunger, and releasable means to lock the two plungers together, whereby operation of the pump will operate both plungers together when locked, for quick advance of the jack's ram, and when unlocked will continue slower but more powerful advance of the jack's ram.

6. A heavy duty axle press comprising a strongback bar, hold-down means formed to engage an axle, anchoring means to secure the hold-down means to the strongback bar, two hydraulic jacks supported upon and shiftable along the strongback bar, one or both of which may cooperate with the hold-down means to alter the shape of an axle, a valve block mounted upon the strongback bar, a fluid reservoir connected to the valve block, a pump mounted upon the valve block, said valve block having two ports, one corresponding to each jack, a flexible connection between each such port and the corresponding jack, a passage in the valve block leading from the fluid reservoir connection to the pump inlet, a check valve interposed therebetween, a second passage connecting the pump outlet with each of said two ports, a check valve in said second passage to prevent return of fluid to the pump, two valves, one between each port and the check valve, operable to cut off delivery of fluid to the corresponding port, and a valved by-pass passage connecting each port with the first passage, for return of fluid at will from either jack to the fluid reservoir.

7. A compact heavy duty axle press comprising a strongback bar including a pair of spaced plates rigidly connected together, each having along its lower edge an inwardly directed, longitudinally extending flange, casters supporting the strongback bar for movement over a floor and beneath the axle of an automobile, axle-engaging members adapted for securement to the strongback bar, and a jack disposed between said plates and resting upon said flanges in disconnected engagement therewith, said jack being thereby positioned to engage the lower surface of the axle to be bent.

8. An axle press comprising a strongback bar including a pair of spaced plates rigidly connected together, and having at intervals corresponding perforations, hold-down means including a yoke, an anchor pin extending through said yoke and a selected pair of corresponding perforations of the plates, a shank received by said yoke and adjustable relatively thereto to vary their combined effective length, and terminating in an eye at its upper end, a clevis engageable with an axle, and a clevis pin interengageable between said yoke and said clevis, and a jack reacting from said strongback bar and engageable with the axle to bend it.

9. A heavy duty axle press comprising a strongback bar provided with flanges, at the lower portion thereof, constituting a base, a pedestal slidably mounted upon the aforementioned flanges to adjust the pedestal lengthwise of the bar, a jack supported by said pedestal and mounted in the horizontal plane of the axle to be bent, a second strongback bar against which the horizontal jack rests, and holding means engaging the second strongback bar and the axle to limit their separating movement under the stress created by the jack.

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