June 3, 1930. C. H. LEWIS 1,760,989

PISTON PULLER AND CYLINDER BUSHING PRESS

Filed Aug. 24, 1928 4 Sheets-Sheet 1

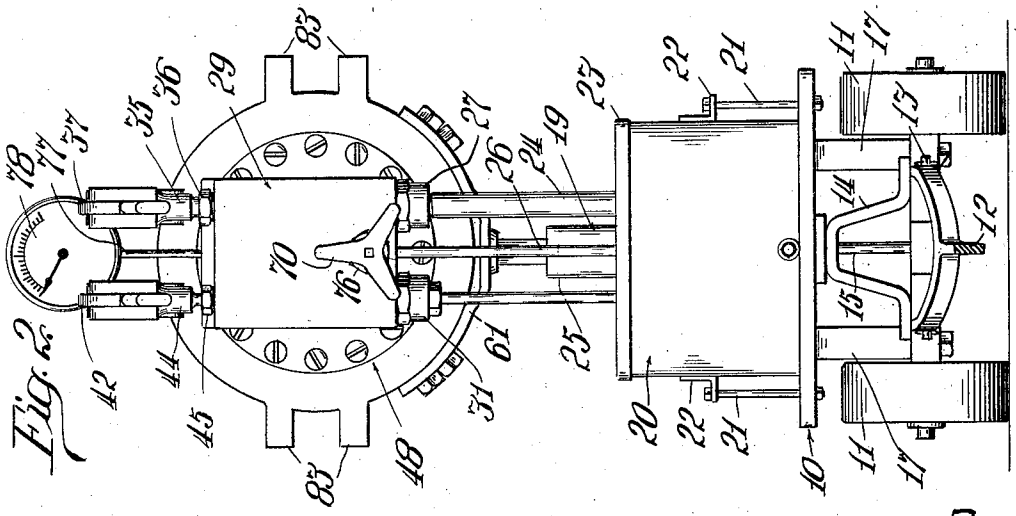


Fig. 2.

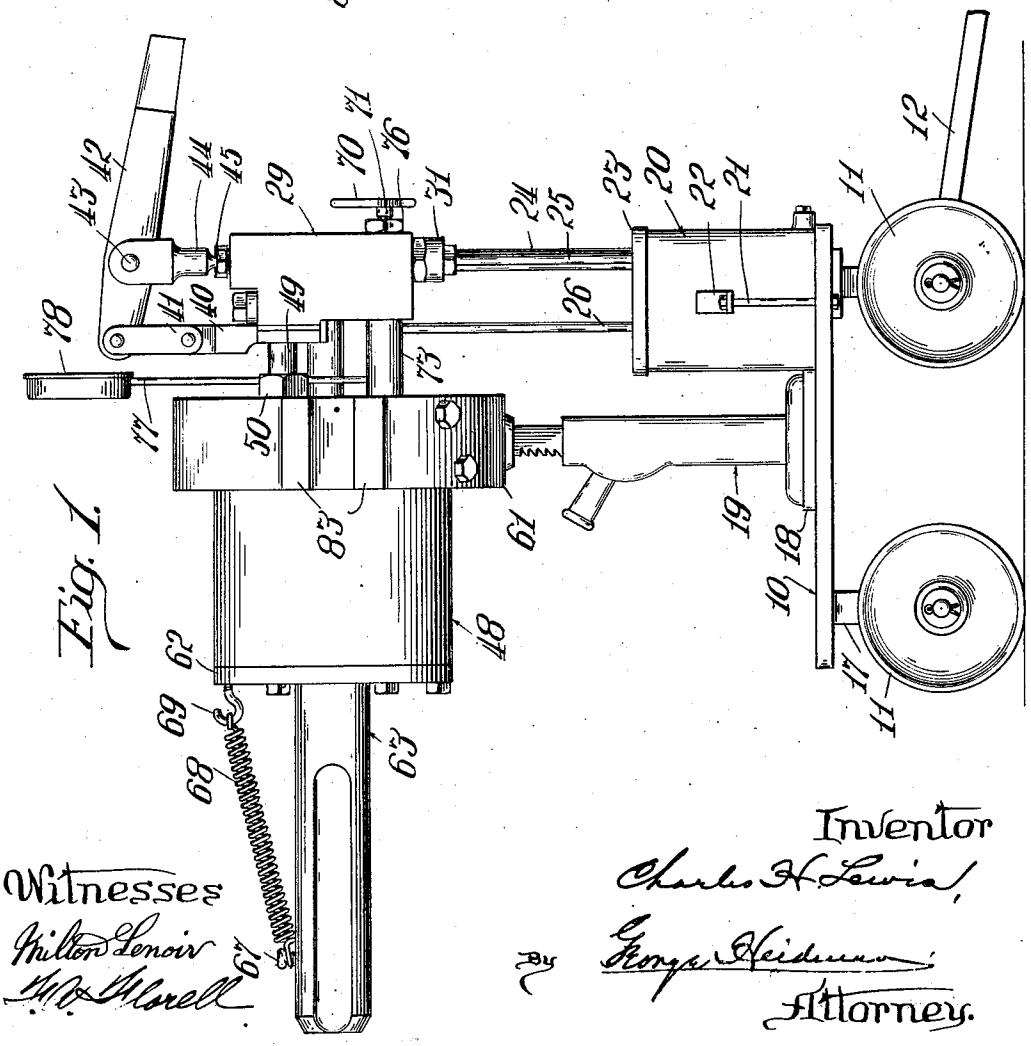


Fig. 1.

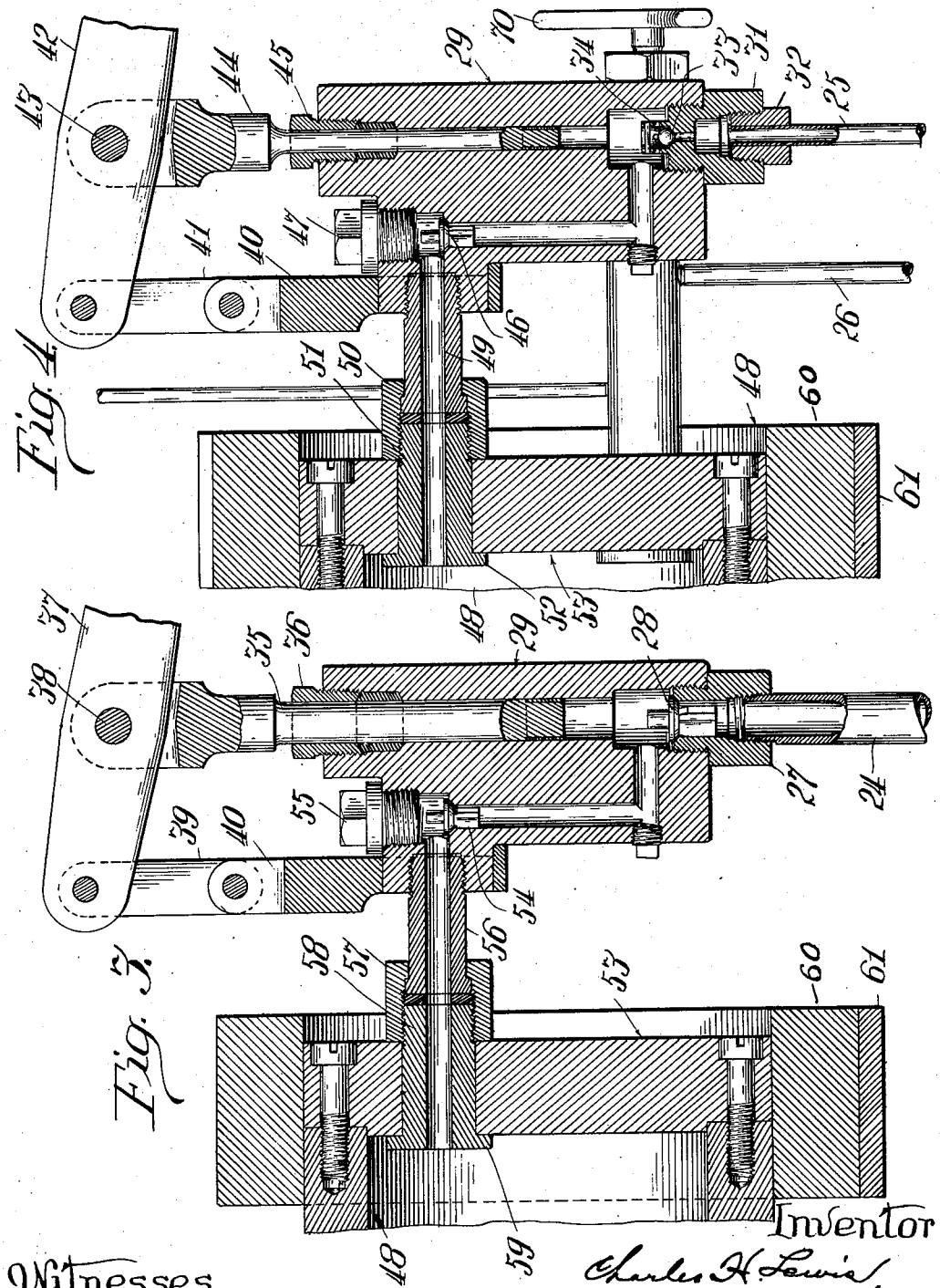
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PISTON PULLER AND CYLINDER BUSHING PRESS

Filed Aug. 24, 1928 4 Sheets-Sheet 2



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PISTON PULLER AND CYLINDER BUSHING PRESS

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Fig. 5.

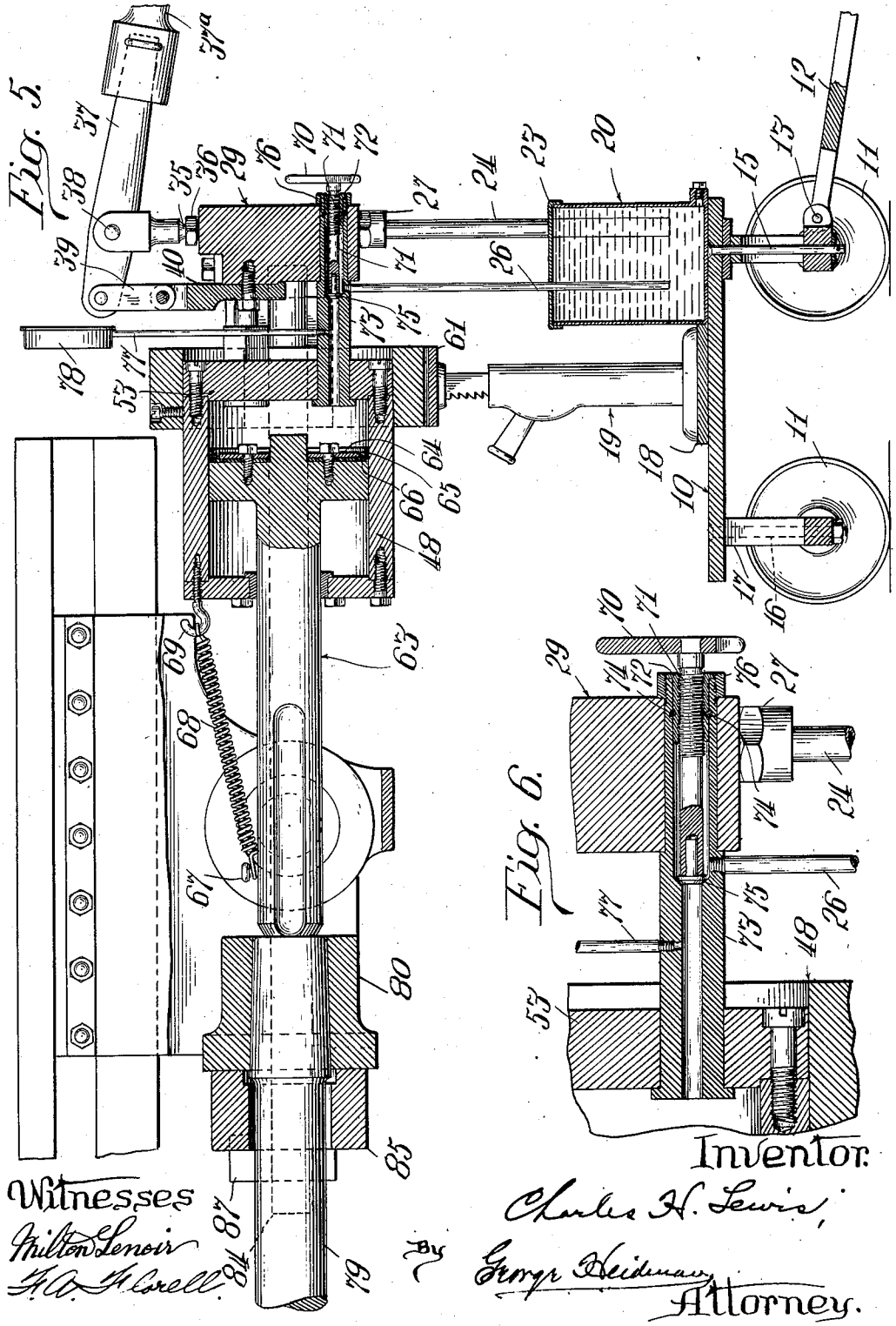


Fig. 6.

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Fig. 7.

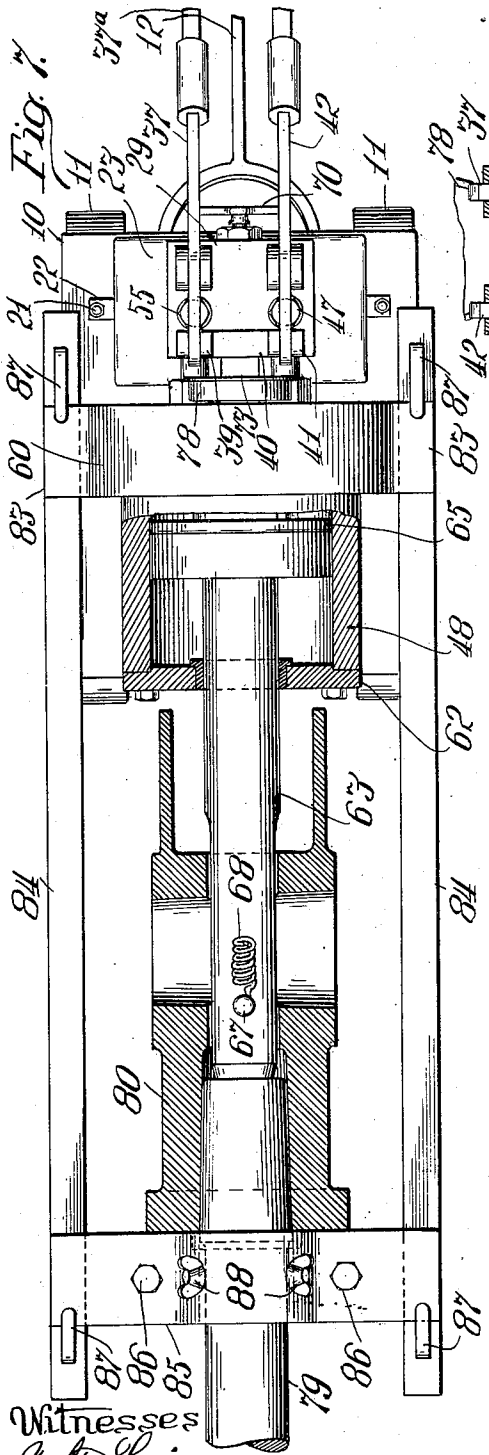


Fig. 9.

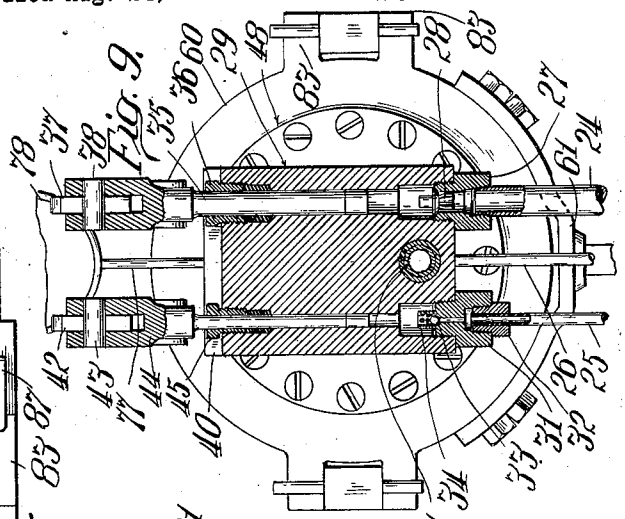
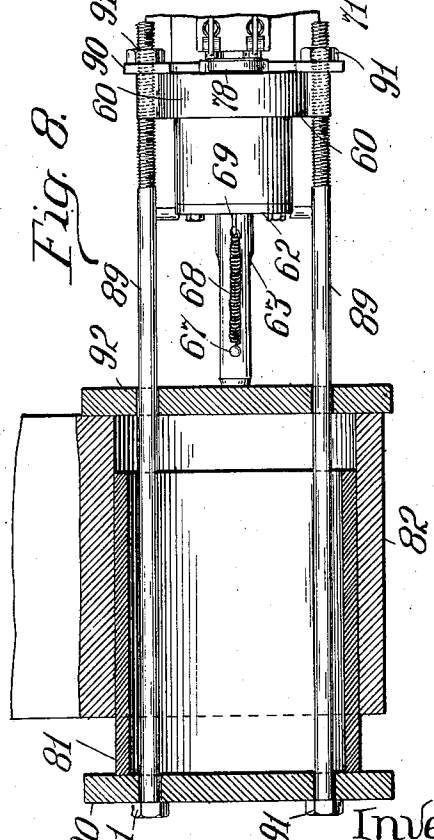


Fig. 8.



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Patented June 3, 1930 1,760,989

UNITED STATES PATENT OFFICE

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PISTON PULLER AND CYLINDER-BUSHING PRESS

Application filed August 24, 1928. Serial No. 301,784.

My invention relates more particularly to a hydraulic piston puller and cylinder bushing press adapted for use in connection with the piston rods of locomotives and the introduction of bushings into the cylinders of the locomotive.

The object of my invention is to provide means whereby the piston rod of the locomotive may be disconnected from the cross-head for the purposes of removal without injury to any of the parts; the device being hydraulically operated and also portable so as to be easily and quickly positioned adjacent to the side of the locomotive and which at the same time is readily applied or put into operative position.

The invention also has for its object a device which may be employed for pressing the bushings into the cylinders of the locomotive instead of pulling the bushings into the cylinders by means of a threaded rod, a method at present employed.

My improved device accomplishes the operations with a great deal less effort and therefore with a considerable saving of time.

The operations and advantages of my improved device will be readily apparent from the following detailed description of the drawings, wherein—

Figure 1 is a side elevation of my improved device.

Figure 2 is an end elevation.

Figure 3 is a detail sectional view of the low pressure side and valves of my improved device.

Figure 4 is a similar view of the high pressure side thereof and the valves.

Figure 5 is a longitudinal sectional view illustrating the application of my device to the cross-head of the piston for forcing the piston out of the cross-head.

Figure 6 is a detail sectional view of the return line and valve for the operating fluid.

Figure 7 is a partial plan and longitudinal sectional view of my improved device shown in position for forcing the piston out of the cross-head.

Figure 8 is a detail plan view and section of portions of the device shown in the operation of pressing a bushing into the cylinder.

Figure 9 is a sectional view of the pump portion looking toward the left of the device as illustrated in Figure 1.

In the particular exemplification of my invention where the device is shown portable to permit it to be readily transported from place to place and to a point adjacent to the locomotive, 10 represents a suitable plate or top provided with wheels 11 mounted on suitable axles; the front axle being provided with a tongue 12 which is pivotally secured in place in any suitable manner, as for example by pin 13. The front axle is also shown provided with a supporting bracket 14 which is pivotally connected with the top plate 10 by means of pin 15; the rear axle being secured to the top plate by means of bolts shown in dotted lines at 16 in Figure 5 and passing through tubes or pipes 17.

The top plate 10 is provided with a false top 18, which constitutes a rest for jack 19; the false top 18 being secured to the top plate 10 in any suitable manner. The jack 19 may be of any suitable construction such as that disclosed in the drawing or of the well known elevating screw type.

Also mounted on the top plate 10 is an oil supply tank 20 which is properly secured in any suitable manner to the top plate, as, for example, by means of the studs shown at 21 in Figure 2 which engage with the lugs or ears 22 secured to the side of the tank 20. The oil supply tank 20 is provided with a cover 23 having proper openings to receive a low pressure pipe 24; a high pressure pipe 25 and a return pipe 26; these pipes all extending down a proper distance into the tank 20.

Low pressure pipe 24 is screwed into a nut 27; the latter being provided with a valve 28.

The nut 27 is screwed in and secured to a pump body 29. The pump body 29 also is provided with a high pressure connecting nut 31; the nut 31 being provided with a high pressure supply connection 32 shown screwed into the nut 31 and to which the high pressure supply pipe 25 is suitably connected so as to effect a fluid-tight connection. The low and high pressure supply connections

and valves just described are shown in detail in Figures 3 and 4.

The high pressure supply connecting nut 31 is shown provided with a ball valve 33 normally seated on the port of the connection nut 31 and located within the ported cup portion 34 of the nut 31, see Figure 4.

The pump body 29 is provided with an opening or passage to allow travel of the low pressure piston 35; the latter being guided by a suitable packing gland 36 which is screwed into the opening in the pump body 29, as shown in Figure 3. The low pressure piston 35 is provided with a handle 37; the latter being secured to the piston by means of a suitable bolt or pin 38 so as to provide a proper pivotal relation between the piston and handle during operation. In Figure 5, I show the handle 37 provided with an extension lever 37^a (only a portion thereof being shown); the extension being employed for the purpose of providing suitable leverage and this extension is also adapted to be used in connection with the handle of the high pressure piston later to be described. The handle 37, beyond its pivotal point 38, is secured to union links 39 which in turn are pivotally secured to a bracket 40 formed on the pump body 29, see Figures 3 and 5.

The bracket 40 on the pump body 29 is also provided with the union links 41 pivotally secured thereto and which links in turn are pivotally connected to the high pressure handle 42 pivotally secured by means of a suitable bolt or pin 43 to the high pressure pump piston 44.

The pistons 35 and 44 travel vertically in the pump body 29; the high pressure piston 44 being guided by a suitable packing nut 45, see Figure 4.

On the upward stroke of the high pressure piston 44, a suction is created in the passage and port of the pump body, causing the ball-valve 33 to open or be lifted off its seat, allowing the oil (or other suitable fluid medium employed in the hydraulic pump) to pass up into the pump body above the valve 33. Upon the down stroke of piston 44, valve 33 will be reseated and closed, thus preventing the return flow of the oil or fluid medium. The oil will be compressed and the pressure created by the downward stroke of the piston 44 will cause a check valve 46 to open. The maximum extent of opening of valve 46 is determined by the high pressure plug 47.

The oil (which is under pressure) beyond the check-valve 46, will flow into a cylinder 48 by means of the flanged connection 49 which latter fits into a high pressure nut 50 which in turn is connected to or screwed onto the high pressure cylinder-head connection 51, see Figure 4. The nut 50 (which engages the flange on connection 49) is screwed onto the high pressure cylinder connection 51 sufficiently to draw the head 52 of cylinder-head connection 51 up flush against the inside face of the cylinder-head 53, thus effecting a fluid-tight relation.

Upon the upward stroke of the low pressure piston 35, the oil (or other suitable fluid medium) contained in tank 20 is drawn upwardly past the valve 28; and upon the downward stroke of the piston 35 low pressure valve 28 will be forced to its seat, thus preventing the return flow of the oil or fluid medium. The downward stroke of the piston 35 compresses the oil, or other fluid medium, and causes the low pressure check-valve 54 to move off its seat; the upward movement or degree of unseating of the valve 54 being controlled by the screw-plug member 55. The compressed oil, or other fluid medium, flowing past check-valve 54 passes into the cylinder 48 through the low pressure pump connection 56, which, like high pressure pump connection 49, is provided with a flanged end fitting into a nut 57, similar to nut 50. This nut 57 is screwed onto the end of the low pressure cylinder-head connection 58. The low pressure cylinder-head connection 58, on its inner end, is provided with a flange or head 59, similar to the high pressure cylinder-head connection 51, so that when nut 57 is properly screwed onto the connection 58, the flanged end or head of the connection 58 will be drawn up flush against the inside face of the cylinder-head 53.

The cylinder-head 53 is properly secured to the cylinder 48. The cylinder-head is provided with a cap 60 which latter is provided with a bracket 61 which provides a flat surface to receive the upper end of the movable member of jack 19. The object of the jack is to raise and lower the working mechanism to suit the various heights of cylinders and pistons on different types of locomotives relative to the top plate 10 of my improved portable device, so as to align the cylinder 48 with the piston-rods or cylinders of the locomotive.

The cylinder 48 is provided with a front cylinder-head 62, through which piston 63 passes. The piston 63, at its inner end or head, is provided with a follower-plate 64 whereby the packing leather or cupped disc 65 is held in place. The cupped leather packing is also provided with a packing spring 66, located on the inner or cupped side of the packing, which tends to hold the peripheral portion of the leather packing in snug relation with the inner walls of the cylinder 48.

The outer end of the piston 63 is shown provided with a lug or screw 67 to which one end of a suitable coil spring 68 is secured; the other end of the spring being shown secured by means of a hook 69 to the end wall or head of the cylinder 48. The purpose of this spring is to return the piston 63 with its follower-plate 64 and leather packing 65 to normal position after the piston 63 has trav-

eled sufficiently to perform its operation and the pressure medium in the cylinder 48 has been released.

When the piston 63 has traveled sufficiently to perform its operation, the pressure medium or oil is released by means of a suitable valve. A valve-handle 70 is secured to the end of a return valve-stem 71 rotatable in screw-nut 72 which latter is secured to the valve-stem casing 73 by means of dowels or pins 74. The inner end of valve-stem 71 is provided with a return valve 75 and proper rotation of valve-stem 71 by means of handle 70 will cause the valve 75 to be unseated from the port or end of the valve-casing 73 and thus allow the oil, or other fluid medium, to return from the cylinder 48 to the supply tank 20 by means of the return line 26.

The return line 26 is screwed into the valve-casing 73, as more clearly shown in Figure 6; the oil being forced out of cylinder 48 by piston 63 which is returned to normal position by the strong spring 68.

The valve-casing 73, secured to the rear cylinder-head 53, extends entirely through the pump body 29 and constitutes the means whereby the pump body 29 is secured to the cylinder-head 53; the casing 73 being firmly held in place by means of a nut 76 which is screwed onto the valve-casing 73 against the forward outer face of the pump body 29.

The valve casing 73 is shown provided with a tube or pipe 77 which leads to a gauge 78 which indicates the pressure developed in removing the piston 79 from the cross-head 80; as well as the pressure developed in applying the bushing, indicated at 81 in Figure 8, to the locomotive cylinder 82.

The cap 60, which surrounds the head 53 of the cylinder 48, is provided on each side with ears or lugs 83, through which bars or rods 84 extend; a bar or rod being employed on each side of the cylinder 48. The opposite ends of the bars or rods 84 pass through suitable lugs or ears of a box 85 when the device is employed for removing the locomotive piston from its cross-head. In order to permit application of the box 85, it is made in two sections or halves; the sections or halves being secured together by bolts 86.

The bars or rods 84, 84 are also provided at both ends with slots to receive the keys 87, thereby maintaining the proper relation between the cap and box or yoke 85.

The box 85 is also shown provided with a sufficient number of wing or thumb screws 88, which extend through the box for engagement with the locomotive piston for the purpose of centrally adjusting the box on the piston rod 79 of the locomotive.

In Figures 5 and 7, I show my improved device in position for removing or forcing the piston rod 79 from the cross-head 80; while in Figure 8 I illustrate the application of my device as a cylinder bushing inserter. When employing the device for the purpose of inserting a bushing 81 into the locomotive cylinder 82, instead of employing the bars 84, 84, rods 89, 89 may be employed, having threaded ends which receive the cross-bars or plates 90, 90, held in place by nuts 91 screwed onto the rods 89. The plate 90 at the outer end is of length somewhat greater than the diameter of the bushing 81, so as to engage the perimeter of the bushing as shown in Figure 8; it being understood that the plate 90 replaces the sectional box 85 previously described and employed for the operation of removing the piston-rod from the cross-head 80.

Where the device is to be employed for removing the locomotive piston-rod from the cross-head, the sectional box 85 is put into place against the end of the cross-head opposite to that where the piston containing cylinder 48 is located. When the device is properly positioned and the pressure fluid has been admitted through operation of the proper pump pistons 35 and 44, the piston 63 will engage the adjacent end of the locomotive piston-rod 79 within the cross-head 80.

With the device firmly clamped against movement, by reason of bars 84, 84 and box 85, it is apparent that the piston 63 will exert its pressure against the locomotive piston-rod 79 and cause the latter to be forced endwisely out of the locomotive cross-head; the operation not only being more quickly accomplished than heretofore, but accomplished without possibility of injury or damage to the cross-head, as the split or sectional yoke or box will bear against the cross-head boss which takes all strains. This operation of the device is clearly shown in Figure 7 of the drawings.

Where the device is to be employed for applying or inserting a bushing into the locomotive cylinder, I prefer to employ the rods 89, 89, which may be easily substituted for bars 84, 84.

These rods 89, 89, before being put into place and before the cross-plate or yoke 90 is attached thereto, is also provided with a cross-plate or yoke 92 (see Figure 8) which is adapted to engage the adjacent end wall of the locomotive cylinder 72. This plate or yoke 92 is adapted to be engaged by the piston 63. As is apparent from the device as shown in Figure 8, the pressure of piston 63 against plate or yoke 92 will induce the cap 60 to exert a pulling force through rods 89, 89, on the plate or yoke 90 and hence uniformly force the bushing 81 into the locomotive cylinder 82. As the pumps and cylinder 48 are all carried by the portable supporting table 10, it is apparent that the device may move backwardly in keeping with the outward movement of piston 63 and hence permit the pulling effect on rods 89, 89.

The extension handle or lever 37a is adapt-

ed for application to both piston handles 37 and 42 for the purpose of giving ample leverage for obtaining the necessary pressure.

I have illustrated what I believe to be the simplest and best embodiment of my invention; having described the same in terms employed merely as terms of description and not as terms of limitation, as modifications in certain details of construction may be made without, however, departing from the spirit of my invention.

What I claim is:

1. A device of the character described comprising a portable fluid medium holding container, fluid controlling means involving high and low pressure valved passages, pistons operable in said passages for controlling the flow of said medium, a cylinder secured to said means and provided with a reciprocable piston having a piston head at its inner end, fluid conveying connections between the head of said reciprocable piston and said passages, means whereby said reciprocable piston is returned to normal position, and means secured to the cylinder and extending beyond the maximum outward position of the piston whereby the outward moving force of the piston may be effectively applied.

2. A device of the character described comprising a fluid holding container, valved passages leading from said container, fluid compressing means in said passages, a closed cylinder having fluid receiving connections with said passages, means in said connections for preventing back flow of the fluid, a reciprocable piston in said cylinder, means for automatically returning said piston to normal position when said pressure fluid is released from the cylinder, yoke carrying members secured to opposite sides of said cylinder and extending in advance of the maximum outward position of said piston whereby pulling pressure at a point beyond the piston may be exerted.

3. A device of the character described comprising a fluid holding container, a pump element secured to said container and provided with high and low pressure valved passages, a closed cylinder having valved connections with said high and low pressure passages of the pump element, a piston reciprocable in said cylinder, a return connection intermediate of the cylinder and the pump element for returning the fluid from the cylinder to the container, said connection constituting means for securing the cylinder to the pump element, and yoke carrying members secured to the cylinder and extending beyond the maximum outward position of the piston for applying the outward moving force of the piston.

4. A device of the character described comprising a fluid holding container, a pump element mounted on said container and provided with high and low pressure valved passages, a closed cylinder having valved connections with said passages, adjustable means for positioning the cylinder, a piston reciprocable in the cylinder, means for returning the piston to normal position, a return connection intermediate of the cylinder and pump element, whereby the cylinder is secured to the pump element, and means secured to the cylinder for exerting pulling pressure at a point beyond the maximum outward position of the piston.

5. A device of the character described comprising a portable fluid holding container, a pump-element mounted on the container and having valved connections therewith, said element having high and low pressure passages, a closed cylinder having valved connections with said passages, a return connection between one end of the cylinder and said element whereby the cylinder is secured to the element, adjustable means mounted on the portable container support for positioning said cylinder, a reciprocable piston in the cylinder having a cupped washer and follower plate at one end, means whereby said washer is expanded into fluid-tight relation with the walls of the cylinder, yoke carrying bars removably secured to opposite sides of the cylinder and extending beyond the maximum outward position of the piston for exerting pulling pressure, and means for returning said piston to normal position when said pressure fluid is released from said cylinder.

6. A device of the character described comprising a wheeled support, a fluid holding container secured on said support, an adjustable jack mounted on said support, a pump element mounted on the container and provided with valved passages, reciprocable means in said passages for lifting the fluid from the container into said passages and placing the fluid under pressure, a closed cylinder supported by said jack and secured to said pump element, valved connections between one head of the cylinder and said passages, a reciprocable piston in said cylinder, controllable means for returning the fluid from the cylinder to said container, and a pair of yoke carrying members. secured to said cylinder and extending beyond the maximum position of the piston for applying the outward moving force of the piston.

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