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2,644,548

FLUID BLEEDING APPARATUS

Filed March 26, 1949

2 Sheets-Sheet 1

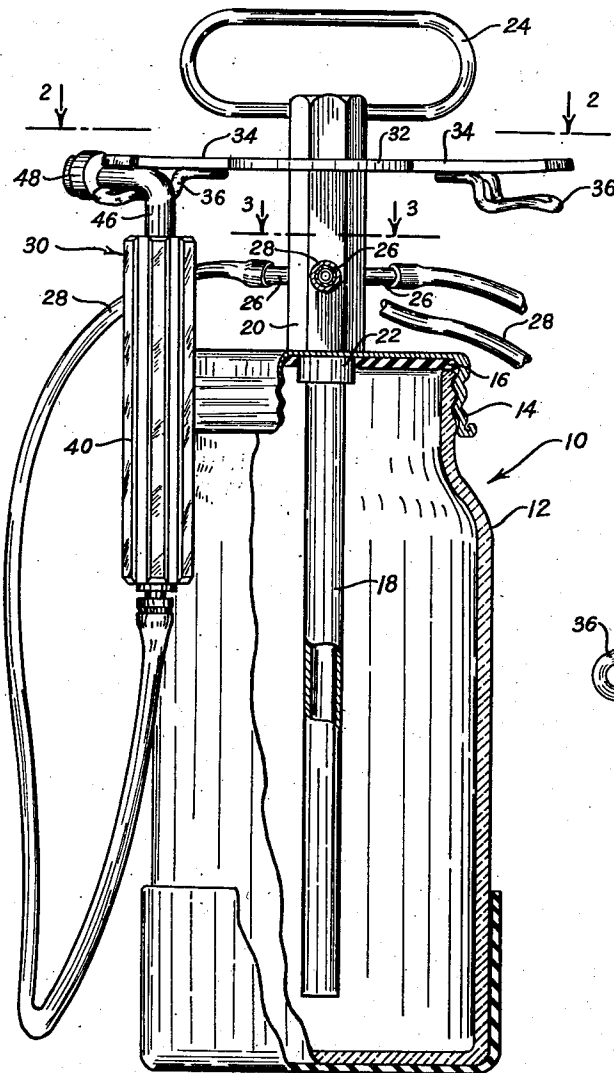


FIG-1

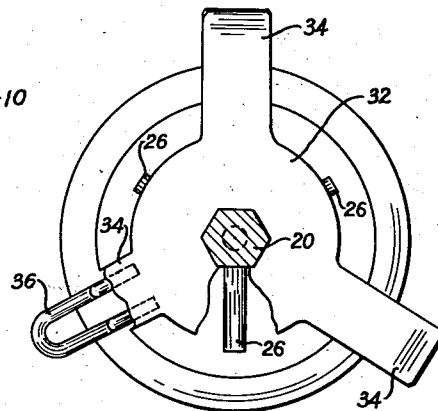


FIG.-2

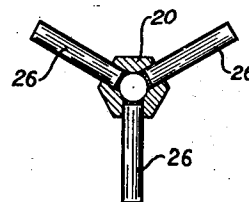


FIG-3

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2 Sheets-Sheet 2

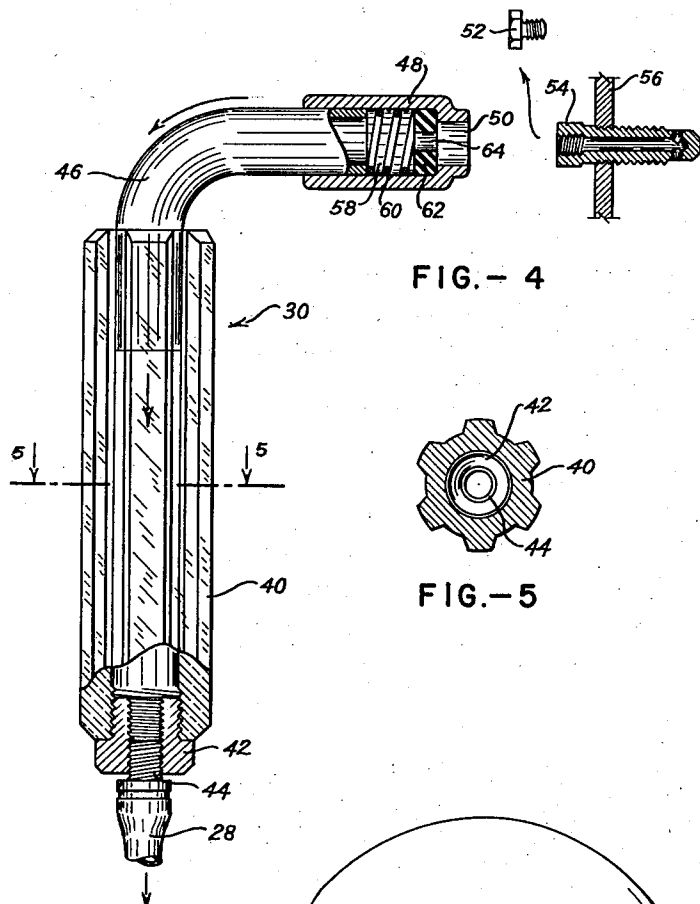


FIG.- 4

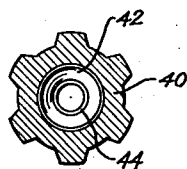


FIG.- 5

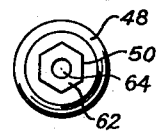


FIG.- 6

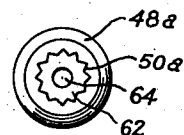


FIG.- 7

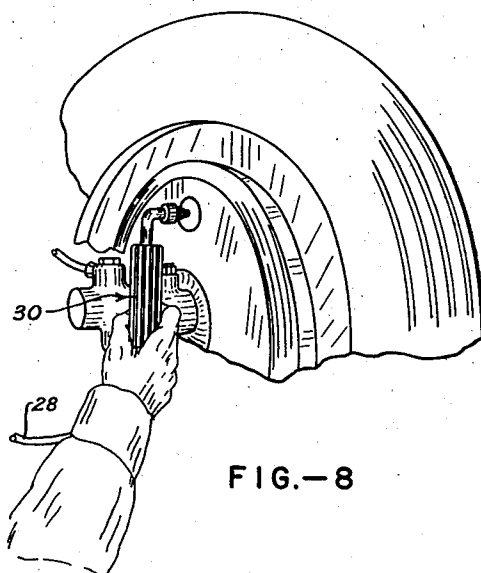


FIG.- 8

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FLUID BLEEDING APPARATUS

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5 Claims. (Cl. 188—152)

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This invention relates to fluid bleeding apparatus and more specifically to such apparatus including a container having inlets connected to one or more bleeding wrenches and preferably to a means for producing a vacuum.

One object of the present invention is the provision of apparatus for bleeding fluid systems such as hydraulic braking systems on automotive vehicles, fluid transmissions, and hydraulic power operating cylinders or systems used on tractors, on agricultural and road working machinery, and throughout industry.

In all of the above systems provision is made for introducing fluid to replace fluid lost by leakage or drainage and cocks are suitably located for bleeding the system to remove air and fluid having entrained bubbles of air.

This invention has for a further object the provision of a hollow tubular wrench adapted to engage the bleeding cocks, loosen them and transmit the air and fluid through suitable conduits to a container. The wrench is preferably formed with a transparent section through which the operator may observe the passage of fluid and/or air.

A still further object of the present invention is the provision of a container adapted to receive the fluid bled from the systems through suitable inlets and conduits connected to the different sizes of bleeding wrenches, and provided with means for mounting the bleeding wrenches when not in use. The container may also be provided with a pressure relief valve and/or a suitable connection to a source of vacuum.

Other and more detailed objects of the invention will be apparent from the following description and drawings in which:

Fig. 1 is an elevational view of the container and attached bleeding wrench with portions broken away;

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

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is an enlarged view of the bleeding wrench and a conventional bleeding cock with portions broken away and shown in section;

Fig. 5 is a sectional view taken on line 5—5 of Fig. 4;

Fig. 6 is an end view of the wrench socket shown in Fig. 4;

Fig. 7 is an end view of a modified wrench socket; and

Fig. 8 is a view of a bleeding wrench in operative position on one of the bleeding cocks of a hydraulic brake system.

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Referring now more specifically to the drawings in detail, a container 10 is shown in Fig. 1 comprising preferably a glass jar 12 having a cover 14 with a gasket 16 screwed onto the upper open end.

Cover 14 is provided with a central opening through which extends a hollow tube 18 extending downwardly from a hollow hexagonal stem 20. A bushing 22 holds the tube 18 and stem 20 in position on the cover 14. A handle 24 is provided on the upper portion of the stem 20 to facilitate carrying the container 10.

Stem 20 has a plurality of hollow connectors 23 in communication with the hollow interior of stem 20 and tube 18 as clearly shown in Fig. 3. Each of the connectors 23 is provided with a flexible tube or conduit 25 attached at the opposite end to a bleeding wrench 30.

A support 32 attached to stem 20 is provided with a plurality of ears 34, each of which has a resilient clip 36 attached to the lower surface for holding one of the bleeding wrenches when not in use. A rubber boot 38 covers the bottom of the glass jar 12 to prevent breakage thereof.

One of the bleeding wrenches 30 is more clearly shown in detail in Figs. 4 to 6, wherein portions are broken away and shown in section to illustrate one preferred construction.

The bleeding wrench 30 comprises a transparent handle 40 internally threaded at one end to receive a bushing 42 having an adapter 44 extending outwardly for connection to one of the flexible tubes 25. The handle 40 as shown in Figs. 4 and 5 has a fluted or splined outer surface but may have a smooth cylindrical surface of circular, hexagonal or other desirable cross section.

Handle 40 at the other end receives one end of an elbow 46 and the other end of the elbow 46 has a wrench socket 48 secured thereto. Wrench socket 48 is formed with an opening 50 of hexagonal or other suitable shape adapted to engage the head of a machine screw 52 for removing it from a hollow bleeding cock 54 suitably located in a wall 56 of a fluid chamber in a hydraulic system such as the braking system shown in Fig. 8.

Wrench socket 48 has a cylindrical chamber 58 containing a compression spring 60 which acts against a plunger 62 having a small bore 64 therethrough. After removal of screw 52 hexagonal opening 50 is passed over the hexagonal head of bleeding cock 54 to press the head into engagement with spring pressed plunger 62. Since the bore 64 is aligned with the longitudinal bore in cock 54 the air and/or fluid having en-

trained bubbles of air will pass through the aligned bores, elbow 46, handle 40, and tube 28 into container 10.

A modified form of wrench socket 48a is shown in Fig. 7, which is formed with a twelve point box opening adapted to fit the hexagonal head of a standard machine screw in the same manner as a twelve point box wrench.

The use of the apparatus will be apparent from the above description, and one typical use is illustrated in Fig. 8, wherein the bleeding wrench 30 is shown applied to the bleeding cock 54 on the hydraulic brake 66 of an automotive vehicle.

In the apparatus shown in Fig. 1 three connectors 26 and three bleeding wrenches 30 are provided. Each of the bleeding wrenches is of identical construction except for the provision of different sizes of openings 50 in the wrench sockets 48 to accommodate different sizes of bleeding cocks. Three sizes of wrench sockets will usually accommodate all sizes of cocks commonly used on different hydraulic systems.

In some cases the bleeding operation may be facilitated by connecting one of connectors 26 not in use with a vacuum pump (not shown) or some other source of vacuum. It may be preferable to provide a separate connector extending through the cover 14.

Under other circumstances it may be desirable to provide a pressure relief valve extending through the cover 14, which may also be used for a connection to a suitable source of vacuum. The pressure relief valve would provide an outlet for entrapped air in the upper portion of jar 12 when fluid is forced into the jar by pressure in the system and when connected to a source of vacuum would draw the fluid and entrained air out of the system through the bleeding cock.

In the use of the bleeding apparatus the bleeding wrench 30 is used as a wrench to remove the machine screw 52 and is then pressed forcibly against the end of the bleeding cock 54. Pressure is then applied to the system, as by stepping on the brake pedal in the system shown, and the air and/or fluid with entrained air is forced through the bore in cock 54, bore 64, elbow 46, handle 40, adapter 44, flexible tube 28 and thus through connector 26, stem 20 and tube 18 into jar 12. The operator by watching through transparent handle 40 can tell when all of the air and air bubbles have been removed from the system. Where desirable, as when it is impossible or inconvenient to apply pressure to the system during the bleeding operation, a vacuum can be applied to the glass jar in the manner previously described to draw the air and entrained air bubbles out of the system. When the bleeding operation has been completed, the screw 52 is reinserted in cock 54 and tightened by using the bleeding wrench 30 again as a conventional wrench.

When the operation has been completed the bleeding wrench is hung on one of the clips 36. Any fluid bled out of the system is recovered in the jar without any loss and can be reclaimed and reused.

In some instances the bleeding cock may be so constructed that a partial turn will align openings within the cock to permit outward flow of air and/or fluid, in which case the bleeding wrench 30 of the proper size need only be pressed over the hexagonal head of the cock and turned to the position starting the flow.

Various changes in the size, shape and arrangement of parts may be resorted to without departing from the scope of the invention.

What I claim and desire to secure by Letters Patent is:

1. Bleeding apparatus comprising a container, a bleeding wrench having a transparent hollow handle and a socket communicating therewith, said socket being suitably shaped and adapted to engage the head of machine screw, and a conduit communicating with said hollow handle and said container.

2. Bleeding apparatus comprising a transparent jar, a cover on said jar, a tube extending through said cover, a hollow stem secured to the outer end of said tube, a plurality of connectors extending outwardly from said hollow stem, a flexible tube secured to at least one of said connectors, a bleeding wrench having an elongated hollow handle, an adapter in one end of said handle connected to said flexible tube, an elbow in the other end of said handle, a wrench socket secured to the outer end of said elbow, a spring pressed plunger mounted within said socket, said plunger having a central bore adapted to align with the bore in a bleeding cock, a support on said hollow stem having at least one resilient clip for holding said bleeding wrench when not in use, a handle on said stem, and said other connectors being adapted to be connected to bleeding wrenches having different sized wrench sockets and to a source of vacuum.

3. A bleeding wrench as set out in claim 1 wherein said wrench socket is provided with a spring pressed plunger having a central bore therethrough and adapted to resiliently engage the head of a bleeding cock.

4. A bleeding wrench comprising a transparent hollow handle, a wrench socket secured to and communicating with said hollow handle, and means for connecting a flexible tube in communication with said hollow handle.

5. A bleeding wrench comprising an elongated hollow handle, an adapter in one end of said handle for connecting a flexible tube, an elbow in the other end of said handle, a wrench socket secured to the outer end of said elbow, a spring pressed plunger mounted within said socket, and said plunger having a central bore adapted to align with the bore in a bleeding cock.

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