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ADJUSTABLE STAND

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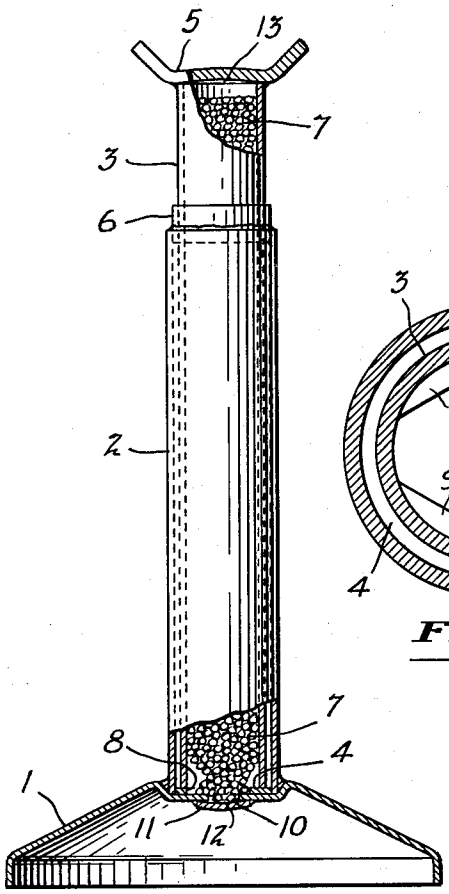


Fig. 1

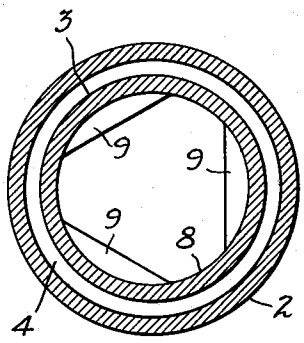


Fig. 2

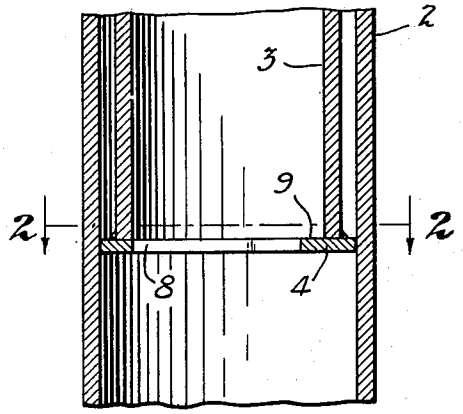


Fig. 3

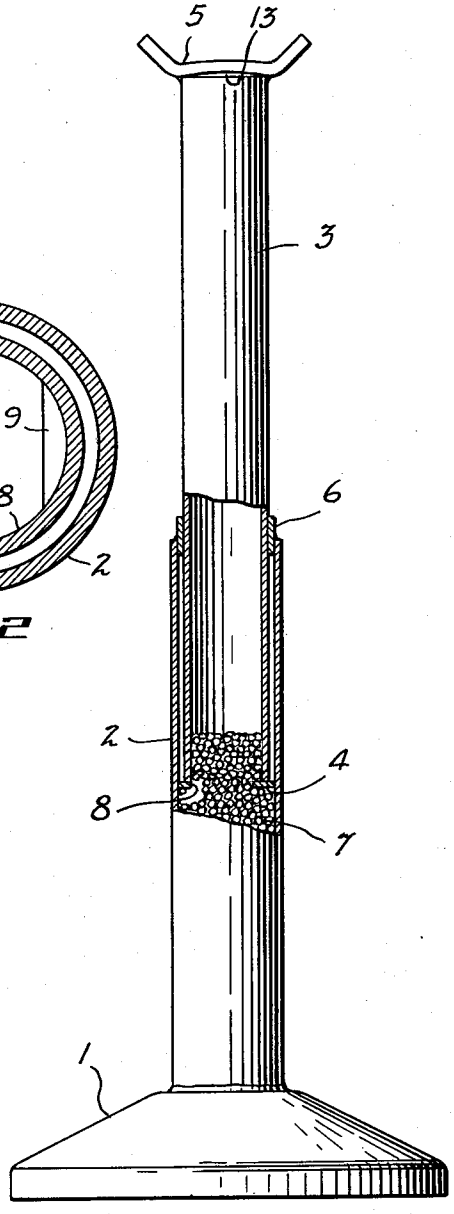


Fig. 4

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ADJUSTABLE STAND

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4 Claims. (Cl. 248—354)

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This invention relates to stands, and in particular to a vertically adjustable supporting stand.

It is an object of the present invention to provide a vertically adjustable stand of the positive displacement type adapted to carry considerable weight which is adjustable to an infinite number of vertical locations between the limits of its travel, without the use of ratchet, gear or pin locating mechanisms.

Another object is to provide a vertically adjustable stand of the positive displacement type, utilizing a hollow piston operable within a cylinder and a load sustaining material flowable from said piston to said cylinder which is simply designed so that it has a minimum number of parts and can therefore be produced more economically than has been done in the past.

A further object is to provide a positive displacement type stand designed and constructed so that the load sustaining material will flow freely from the piston to the cylinder and return with a minimum of clogging or air locking.

Other objects and advantages of the present invention will become apparent from the following detailed description accompanied by the drawings, in which:

Figure 1 is an elevational view of the stand, with parts broken away, to illustrate features of its construction;

Fig. 2 is an enlarged sectional view, taken substantially on line 2—2 of Fig. 3;

Fig. 3 is an enlarged fragmentary view of a portion of the stand; and

Fig. 4 is an elevational view of the stand in one of its operating positions, with parts broken away, to illustrate the construction and operation.

Vertically adjustable stands of the positive displacement type may briefly comprise a base member, a cylinder member, a hollow piston operable within said cylinder, a load supporting surface on said piston and a load sustaining material flowable from within said piston into said cylinder so that when said piston is raised with respect to said cylinder, the load sustaining material will flow into said cylinder to a sufficient height to support said piston.

In the drawings a preferred form of such a stand is illustrated and comprises a roughly conically shaped base member 1 which may be stamped or forged from a relatively heavy piece of sheet metal or otherwise formed to provide a sturdy solid base. At the top of the base a well or recess may be provided to accommodate an end of a tubular member 2 which forms a working cylinder. The cylinder 2 may be welded to the base member 1 while its end portion is disposed within the well in the base member, thus affording an especially strong and secure connection between the cylinder and the base member. Disposed within the cylinder 2 is a second tubular member or piston 3 of smaller diameter than the cylinder member 2 and having a greater length so that when the second tubular member or piston 3 is inserted within the cylinder 2, it will extend upwardly therefrom, as may be seen in Fig. 1. At its lower end the tubular member or piston 3 may have secured thereto a disk 4 of a diameter larger than that of the piston, but slightly smaller than the interior diameter of the cylinder 2. Thus, the disk 4 provides a piston head having a sliding fit with the cylinder wall. At its opposite end the piston 3 may be provided with a member 5 which performs the functions of closing the upper end of the piston and providing a load supporting surface. Preferably this member is a strip of sheet metal of a width approximately corresponding to the exterior diameter of the piston and having its end portions which extend beyond the piston inclined upwardly so that the stand may be readily used to adequately support objects having either a flat or a curved undersurface.

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At the upper end of the cylinder 2 a retaining member 6 may be provided. As shown in the drawings, the member 6 is a collar disposed within and secured to the mouth of the cylinder and having an inner diameter only slightly larger than the diameter of the piston 3 so that it may have a sliding engagement with the exterior surface of the piston 3. The interior diameter of the retaining member is less than the diameter of the disk 4 on the piston so that the piston is prevented from being withdrawn from the cylinder.

The interior of the hollow piston 3 may be filled with a load supporting material 7 of any suitable nature. In the past sand has been often used and is satisfactory from the standpoint that it is substantially incompressible. However, it has been found that sand has a tendency, particularly when contaminated, to cake and it is highly objectionable for this reason. Metal balls or shot will also provide a very satisfactory load sustaining material, but since a large number of these are required, this is relatively expensive and unduly increases the cost of the stand. It is accordingly preferred to fill the piston 3 with small disks resulting from a punching operation, which can generally be bought as scrap and will

provide an extremely satisfactory load sustaining material.

The disk 4 is provided with a port or opening 8 to permit free flow of the load sustaining material 7 from the piston to the cylinder and from the cylinder back into the piston. It has been found that a very desirable port or opening is provided by a substantially triangularly shaped opening in the disk 4, as may best be seen in Fig. 2. The apices of the triangle are positioned near the external periphery of the piston so that the opening at these points extends to or beyond the inner piston wall, obviating reentrant corners at these three locations along the circumference of the junction of the piston and the disk 4. The sides of the triangle thus form cords on the disk 4 or piston head, thus forming flange portions 9, shown best in Fig. 2, to adequately support the piston on the load sustaining material.

The bottom of the well or recess in the base member 1 is provided with an aperture 10 which may be sealed by a cover 11. This construction permits the stand to be assembled by inserting the piston in the cylinder and then securing the retaining collar 6 at the mouth of the cylinder to prevent disassembly of the piston and cylinder and inverting the stand so that the piston may be filled with the load sustaining material through the aperture 10. Following this the cover 11 may be secured to the base 1 to secure the load sustaining material within the assembled stand. If desired, the cover 11 may be removably secured to permit access to the interior of the stand for cleaning or replacement of the load sustaining material should this become desirable after extended usage.

To facilitate free flow of the load sustaining material and prevent air locking of the piston and cylinder, the cover 11 may be slightly bent, as shown in Fig. 1, so that when it is secured to the base a slight air vent, indicated by the numeral 12, will be provided. In the same manner the member 5 providing the load supporting surface at the top of the piston may be slightly bent so that when it is secured to the piston an air vent, indicated by the numeral 13 in Fig. 1, will be provided at the top of the piston.

In operation the object to be supported on the stand, such as, for example, a car, may be lifted to the approximate height which it is desired that it be supported. The stand may be placed beneath the load in a position where the load supporting member 4 will have adequate contact with an undersurface of the object and the piston lifted until the load supporting member 5 is in contact with the object. As the piston is lifted the load sustaining material 7 within the piston will flow into the cylinder and shortly after the piston has been raised to the desired height, the portion of the cylinder beneath the disk 4 will be filled with the load sustaining material to such an extent that the weight of the object to be supported may be applied to the stand and the load sustaining material in the cylinder will support the piston at substantially the desired height. A load supporting position of the stand is shown in Fig. 4.

To release the stand and return it to its closed position the object being supported is lifted and the stand is removed and inverted. The load sustaining material will then flow from the cylinder into the piston through the port 8 and in this inverted position the cylinder and piston may be telescoped until the piston head 4 is returned to its position abutting the base 1. If pieces of the load sustaining material are disposed between the flanges 9 of the disk 4 and the base 1, rotation of the base will expose the portions of the triangular port 8 in the region of its apices, affording entry of such pieces to the interior of the piston.

It is desirable to facilitate smooth functioning of the device to maintain a film of oil on the exterior of the piston and also on the individual pieces of load sustaining material. This will insure smooth movement of the piston and smooth flow of the load sustaining material and will also prevent rusting of the load sustaining material. If after extended usage the interior of the cylinder and the load sustaining material become contaminated with dirt or gummy, the construction of the stand shown in the drawings permits ready cleaning of these parts. It is only necessary to immerse the stand in a bath of a suitable cleaning agent such as a soap, a detergent, a hydrocarbon solvent or a mixture of these cleaning agents, and due to the presence of the openings 12 and 13 and the slight clearance of the piston in the cylinder, the cleaning agents can gain access to the interior of the cylinder and also may be readily drained therefrom. After cleaning, lubricants or rust-preventatives may also be readily applied to the surfaces of the piston and the load sustaining material.

Thus it may be seen that a stand embodying the present invention is an exceedingly useful article for a large number of applications. It is especially adapted for use in automotive repair shops and the use of these stands permits a suspension of a greater number of vehicles at the desired height where work is to be done upon them, with the use of a limited number of jacks or cranes required to lift the articles. Thus a substantial savings in the investment and shop equipment can be made as the lifting devices are relatively expensive as compared to a stand embodying the present invention.

As may be seen, the stand may be made of a minimum number of parts, all of which are simple in design and may be readily produced. For economy of manufacture the parts may be welded together and thus a very strong but inexpensive stand can readily be made.

It will be understood that the foregoing description of preferred embodiments of the invention is for the purpose of explanation and illustration and is not intended to limit the scope of the invention as described and claimed in the following claims.

What we claim is:

1. An adjustable supporting stand which comprises a base member, a hollow cylindrical member extending upwardly from said base member, a hollow piston slidably mounted within said cylindrical member, a cover member for the lower end of said hollow piston member disposed within said cylindrical member, a load supporting material of smooth surfaced regularly shaped particles carried in said piston, an aperture in said cover member opening into said cylinder to permit free flow of load supporting material from said piston to said cylinder when the piston is raised and from said cylinder to said piston when the stand is inverted, said aperture having portions extending to the wall of said hollow piston member, and intervening supporting surfaces carried by said cover member between said apertured portions and extending

radially inwardly of the wall of said hollow piston member.

2. An adjustable supporting stand which comprises a base member, a hollow cylindrical member extending upwardly from said base member, a hollow piston member slidably mounted within said cylindrical member, a cover member for the lower end of said hollow piston member disposed within said cylindrical member, a load supporting material of smooth surfaced regularly shaped particles carried in said piston, an aperture in said cover member opening into said cylinder to permit free flow of load supporting material from said piston to said cylinder when the piston is raised and from said cylinder to said piston when the stand is inverted, said aperture having portions extending to the wall of said hollow piston member, intervening supporting surfaces carried by said cover member between said apertured portions and extending radially inwardly of the wall of said hollow piston member, and normally open vents in said piston and said cylinder to facilitate free flow of said load supporting material between said piston and said cylinder.

3. A vertically adjustable stand which comprises a base member, a hollow tube secured to said base to form a cylinder closed at one end by a portion of said base member, a tubular member of less diameter than said cylinder member, a disk carried at one end of said tubular member, a load supporting surface secured at the other end of said tubular member whereby said tubular member with said disk and said load supporting member provide a substantially closed piston movable in said cylinder, a free flowing load sustaining material disposed in said piston, apertured portions of said disk extending to the wall of said tubular piston member at spaced points about the circumference of said tubular piston member, supporting surfaces of said disk adjacent said apertured portions for engagement with said load supporting material to support said piston, and a restricted portion at the open end of said cylinder having sliding engagement with said piston, said restricted portion having a smaller diameter than said disk to prevent withdrawal of said piston member from said cylinder.

4. A vertically adjustable stand which comprises a base member, a hollow tube secured to said base to form a cylinder closed at one end by a portion of said base member, a tubular member of less diameter than said cylinder member, a disk carried at one end of said tubular member, a load supporting surface secured at the other end of said tubular member whereby said tubular member with said disk and said load supporting member provide a substantially closed piston movable in said cylinder, a free flowing load sustaining material disposed in said piston, an aperture through said disk to facilitate flow of the load sustaining material between said piston and said cylinder, said aperture having the form of a substantially triangularly shaped opening with the apices of said triangle disposed in the region of the piston wall and the sides of said triangularly shaped opening comprising chords on the head of said piston to provide flange portions which engage said load sustaining material and support said piston, vents in said piston and said cylinder to facilitate free flow of said load sustaining material between said piston and said cylinder, an inlet through said base to said cylinder to permit filling said piston with load sustaining material after assembly of said stand, and a cover for said inlet.

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The following references are of record in the file of this patent:

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