Oct. 22, 1940. J. G. STEPHENSON 2,218,963

FLUID SUPPORTED STOOL

Filed Dec. 13, 1938

Fig. 1

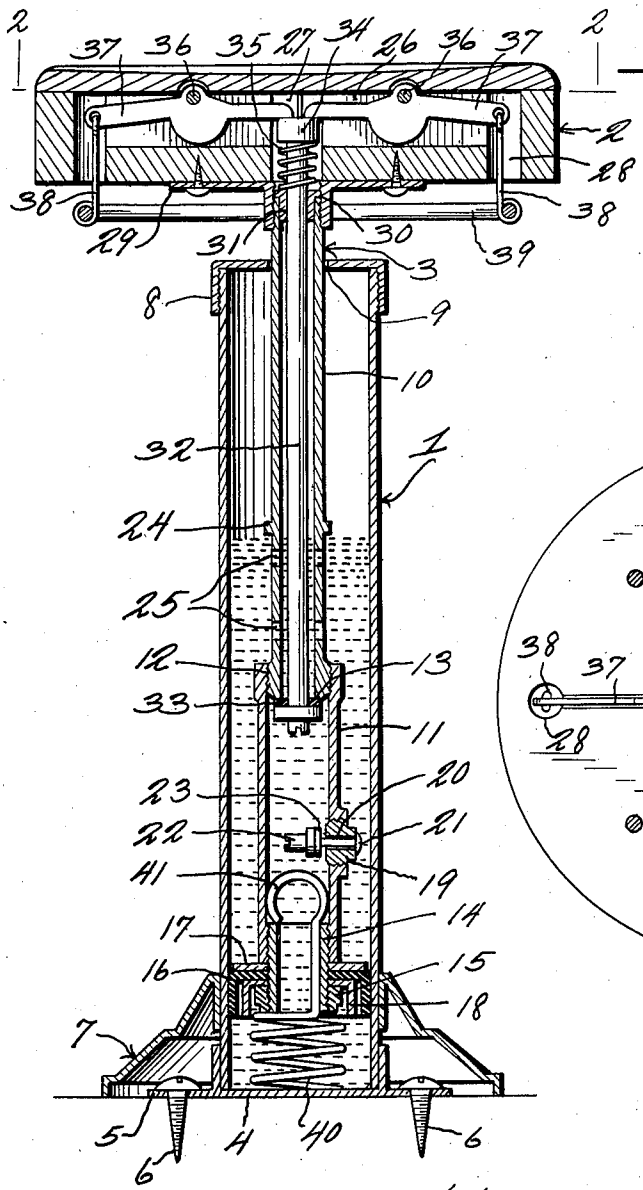


Fig. 2

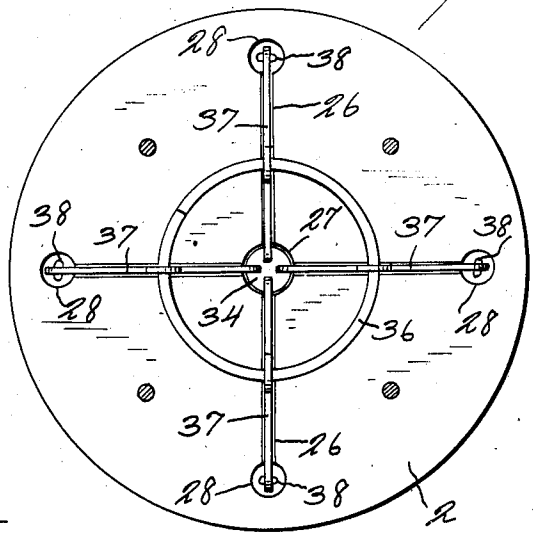
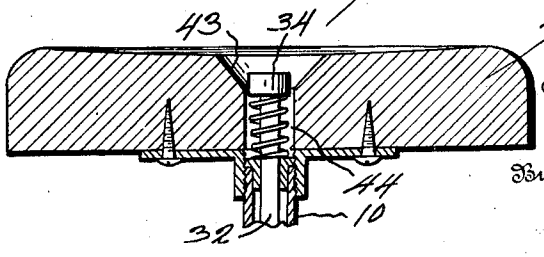


Fig. 3



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FLUID SUPPORTED STOOL

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Application December 13, 1938, Serial No. 245,494

10 Claims. (Cl. 155—94)

This invention relates to improvements in stools and pertains particularly to stools of the type which may be employed at lunch counters, soda fountains or similar places.

The present invention has for its primary object to provide a stool which may be easily and quickly vertically adjusted to suit the occupant and which, when adjusted, is supported upon a compressed fluid which may be released to lower the stool when the occupant wishes to leave it.

Another object of the invention is to provide a stool which is adapted to be vertically adjusted and maintained in adjusted position upon a fluid cushion and which, if left by an occupant in the raised position, will automatically return to its lowered position after the weight of the occupant has been removed.

Another object of the invention is to provide in a fluid supported stool of the above described character, a novel means whereby the occupant may release the compressed supporting fluid so that the occupant's weight will cause the stool to return to its lowermost position.

Still another object of the invention is to provide in a stool of the above described character, a cushion means which when compressed by the weight of an occupant of the stool, after the compressed fluid cushion has been released, will re-elevate the stool to a normal predetermined elevation after the weight of the occupant has been removed.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawing forming part of this specification, with the understanding, however, that the invention is not to be confined to any strict conformity with the showing of the drawing but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawing:

Fig. 1 is a view in vertical longitudinal section through a stool constructed in accordance with the present invention.

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

Fig. 3 is a view in section of a modified seat and means for facilitating the release of the fluid valve.

Referring now more particularly to the drawing, the numeral 1 generally designates a vertically disposed fluid cylinder which forms one element of a standard for the support of a stool seat which is indicated by the numeral 2, the other element of such standard being in the form of a hollow piston stem which is generally designated by the numeral 3.

The cylinder 1 is shown as having its lower end secured in a flanged cap 4, the flange portion 5 of which is provided with suitable apertures for the extension therethrough of securing screws 6. Surrounding the lower end of the cylinder is a collar 7 which may be of any suitable ornamental form to contact the floor and cover the flange 5 and the screws passing therethrough into the floor. This base construction is only one of a number of forms of base which may be employed as it will be obvious that the lower end of the cylinder might be supported in various ways as, for example, it may have supporting feet connected with the flange 5 or with the cap 4, so that the stool may be moved about.

The top of the cylinder 1 is closed by the threaded cap 8 which has a central opening 9 through which the tubular piston stem 3 passes.

The piston stem 3 is divided broadly into the upper and lower portions 10 and 11, the lower portion being interiorly threaded at one end to threadably connect with an end of the upper portion, as indicated at 12, whereby the two portions of the stem are coupled in alined relation. The lower end of the upper portion 10 being housed within the upper end of the lower portion 11 forms a seat 13 for a fluid control valve hereinafter specifically referred to.

The lower end of the lower portion 11 of the stem 3 has threadably secured therein a thimble 14 upon the lower end of which a nut 15 is threaded, and this nut secures to the lower end of the portion 11 the cup piston 16 and the upper and lower plates 17 and 18 between which the cup piston is secured. This cup piston fits snugly in the cylinder 1 and is directed downwardly as shown, so that fluid trapped beneath it will be compressed when the piston is forced down in the cylinder.

The wall of the lower portion 11 of the stem is provided with a threaded plug 19 through which a bore 20 passes and extending through this bore is a valve stem 21, which is of materially smaller outside diameter than the inside diameter of the bore and the inner end of this stem 21 carries a head 22 and a washer 23, the washer being disposed between the head and the adjacent portion of the piston stem 3, so that when the valve stem 21 is moved outwardly, the washer will be brought into contact with the inner end of the plug 19, so as to close the passage 20. Due

to the smallness of the diameter of the valve stem 21 and the length of the same, it will be obvious that when there is no internal pressure in the fluid within the portion 11 of the piston stem which would tend to hold the washes 23 seated, the weight of the head will cause the stem to drop so that the bore 20 will be opened and thus permit fluid to leak through the bore into the cylinder.

Formed upon the outer side of the upper portion 10 of the piston stem is a stop 24 which limits the upward movement of the stem through the opening 9 and below this stop are one or more apertures 25 through which fluid may pass out of the piston stem into the cylinder.

The seat 2 is provided with a number of radial chambers 26, each leading from a central axial chamber 27 which opens through the bottom of the seat, to an outer downwardly directed chamber 28 which is parallel with the central chamber 27. There are here shown four of the outer chambers 28 and four of the radial chambers 26, but it is obvious that there may be more or less of these as may be found desirable.

The underface of the seat 2 has secured to the central part thereof the plate 29 at the center of which is a collar 30 which alines with the central chamber 27 and which is interiorly screw threaded. Within the collar 30 is a sleeve 31, the outer end portion of which is spaced from the threaded inner surface of the collar and threadably secured to the collar between the latter and the outer end portion of the sleeve 31 is the upper end of the upper portion 10 of the piston stem 3. Thus the seat 2 is securely connected with the upper end of the stem 3 so that upward or downward movement of the seat will produce corresponding movement in the stem and the piston 16.

Extending through the collar and entirely through the upper portion 10 of the piston stem is a stem 32 carrying upon its lower end the valve washer or disk 33 which is housed in the upper end of the lower portion 11 and adapted to engage against the seat 13. This main valve stem 32 at its upper end carries a head 34 which is positioned within the central chamber 27 of the seat and confined between the head 34 and the upper end of the sleeve 31 is an expansion spring 35 which normally urges the main valve stem 32 upwardly so as to hold the valve disk 33 upon its seat.

Pivotally supported in each of the radial chambers 26 upon a transverse pivot pin 36, is an oscillatable finger 37, the inner end of which engages the top of the main valve stem head 34 while the outer end positions within an outer chamber 28 and has connected therewith a downwardly extending rod 38. The rods 38 of the several fingers 37 are joined, beneath the seat 2, with a ring 39 which is freely suspended from the rods and which is employed for oscillating the fingers 37 when it is desired to shift the main fluid control valve stem 32 downwardly when it is desired to unset the valve disk 33.

Disposed in the lower end of the cylinder 1 beneath the piston 16 is an expansible coil spring 40, the lower end of which seats or bears against the cover plate 4 while the upper end is secured to the stem 3 in a suitable manner as, for example, by passing the upper end through the nipple 14 and forming it in a ring as indicated at 41, which engages upon the upper end of the nipple and thus prevents the spring from moving independently of the piston.

In the operation of the seat structure described, the spring 40 normally maintains the piston at a predetermined distance above the bottom of the cylinder and also maintains the seat 2 at a predetermined distance above the upper end of the cylinder. The valve 23 normally hangs open, as shown, whereas the valve 33 is normally held upon its seat 13 by the spring 35 to close the lower end of the upper portion 10 of the stem.

The cylinder is filled to a desired height with a suitable fluid such as oil or the like, the height of the fluid being here shown as just below the normal low point for the stop 24. When the stool is to be occupied by a person desiring to have the seat 2 at a higher elevation than normal, the seat is lifted or pulled upwardly, thus drawing the piston with it and causing some of the fluid lying above the piston to move into the area beneath the piston. When the weight of the occupant is then placed upon the seat 2, the pressure established in the fluid beneath the piston, by the downward force applied thereto by the piston, will be transmitted through the fluid in the lower part or portion 11 of the stem 3 and will effect the closing of the valve 23. The valve 33 is already closed. Thus the occupant of the stool will be supported at the selected height. When the occupant wishes to leave the stool, he may, either before getting off the stool or after getting off, grip the ring 39 with the fingers and force the ring upwardly, thus effecting the oscillation of the fingers 37 and producing a downward movement of the stem 32. This unseats the valve 33 and permits the piston to move downwardly, the fluid in the lower portion 11 of the piston stem flowing past the valve 33 and into the cylinder by way of the apertures 25.

The spring 40 will maintain the seat at the proper height for a person of average height so that when the stool is set at a counter or table, the average occupant will be comfortably positioned without having to raise the stool. However, if a tall person wishes to occupy the stool, the valve 33 can be opened after the stool is occupied, thus permitting the piston to move downwardly beyond the normal position and compress the spring 40, thereby lowering the seat slightly so that the taller occupant will be more comfortably situated with respect to the adjacent counter or table. After such tall person leaves the seat, the spring 40 will return it to its normal height.

Fig. 3 illustrates a slight modification of the means by which the unseating of the valve 33 may be accomplished. In this form, the seat body, which is indicated by the numeral 42, is provided with a central depression 43 leading into the central passage 44 which extends through the seat. The same parts may be employed upon this form of the seat for connecting the seat to the upper end of the piston stem 3 and also the same main piston stem, head therefor and spring may be used, the head 34 of the stem 32 being extended slightly from the upper end of the passage 44 into the lower part of the depression 43. In this form the head 34 serves as a finger button whereby the stem may be forced downwardly, the occupant of the seat placing his finger in the depression 43 and pressing downwardly upon the head as will be obvious.

From the foregoing, it will be readily apparent that there has been disclosed herein a stool construction which may be easily, quickly and quietly adjusted to a desired height and when in the

adjusted position, it will maintain its place so long as the seat has the weight of an occupant thereon. With the construction shown, the seat can be easily and smoothly returned to its normal position by the occupant or if left by the occupant in the raised position, it will gradually automatically return of its own accord to its normal place. As previously stated, this automatic return of the seat is accomplished through the medium of the weight controlled valve **23**. When the pressure is removed from the stem **3**, the head **22** of the valve **23**, operating as a balance weight, will shift the valve **23** away from the inner end of the plug **19**, thus opening the passage **20**. The natural weight of the seat will be sufficient to cause the slow transferral of fluid from within the lower portion **11** of the stem through the passage **20** into the cylinder **1** until the spring **40** has been lowered into contact with the cover **4** and the seat is thus returned to normal position.

What is claimed is:

1. A seat structure of the character described, a vertically disposed cylinder, a piston within the cylinder having a tubular stem extending longitudinally upwardly through the upper end of the cylinder and opening down through the piston, a seat body supported upon the upper end of the piston stem, said cylinder containing a fluid surrounding and in the stem, said seat when raised shifting said piston upwardly in the cylinder and causing the fluid to flow thereby into the lower part of the cylinder, the said fluid being compressed below the piston when said seat is occupied, and valve means in the stem above the piston operable from outside the cylinder at any height of the piston therein for releasing the fluid compressed beneath the piston and permitting it to flow back through the stem into the cylinder above the piston.

2. A seat structure of the character described, comprising a base portion consisting of a vertically arranged cylinder, a piston slidable in the cylinder, a tubular stem carried by the piston and extending through the upper end of the cylinder, a seat body carried upon the upper end of the stem, the said cylinder containing fluid above and below the piston, said tubular stem having its lower end opening through the piston and having an aperture in the wall thereof at a point above the piston, valve means within the stem between the open lower end thereof and said aperture, means normally maintaining said valve means in closed position to prevent fluid passing from the lower end of the stem upwardly therethrough and through said aperture into the cylinder, and means facilitating the opening of said valve means by an occupant of the seat.

3. A seat structure of the character described, comprising a base portion consisting of a vertically arranged cylinder, a piston slidable in the cylinder, a tubular stem carried by the piston and extending through the upper end of the cylinder, a seat body carried upon the upper end of the stem, the said cylinder containing fluid above and below the piston, said tubular stem having its lower end opening through the piston and having an aperture in the wall thereof at a point above the piston, valve means within the stem between the open lower end thereof and said aperture, means normally maintaining said valve means in closed position to prevent fluid passing from the lower end of the stem upwardly therethrough and through said aperture into the cylinder, means facilitating the opening of said valve means by an occupant of the seat, and bleed means permitting the flow of fluid through the wall of the stem below said piston means whereby the slow transferral of fluid from beneath the piston to the upper side thereof may take place when the fluid beneath the piston is not under compression.

4. A stool of the character described, comprising a supporting base consisting of a vertically disposed cylinder, a piston slidably disposed within the cylinder, a tubular stem connected at one end with the piston and opening through the same and having its other end extended upwardly through the top of the cylinder, a seat supported upon the upper end of said stem, a fluid within the cylinder above and below the piston, a fluid port in the wall of the stem at a point a substantial distance above the piston, means forming a valve seat within the stem between said port and the piston, a valve disposed upon said seat and opening downwardly, a stem carried by said valve and extending upwardly through the upper end of the piston stem, and means at the upper end of the valve stem facilitating the longitudinal shifting of the latter for unseating said valve.

5. A stool of the character described, comprising a supporting base consisting of a vertically disposed cylinder, a piston slidably disposed within the cylinder, a tubular stem connected at one end with the piston and opening through the same and having its other end extended upwardly through the top of the cylinder, a seat supported upon the upper end of said stem, a fluid within the cylinder above and below the piston, a fluid port in the wall of the stem at a point a substantial distance above the piston, means forming a valve seat within the stem between said port and the piston, a valve disposed upon said seat and opening downwardly, a stem carried by said valve and extending upwardly through the upper end of the piston stem, resilient means normally urging the valve stem upwardly to position the valve upon its seat, a head carried upon the upper end of the valve stem in a central aperture in the seat body, and means facilitating the longitudinal shifting of the valve stem for the opening of the valve, by the application of pressure to said head.

6. A stool of the character described, comprising a supporting base consisting of a vertically disposed cylinder, a piston slidably disposed within the cylinder, a tubular stem connected at one end with the piston and opening through the same and having its other end extended upwardly through the top of the cylinder, a seat supported upon the upper end of said stem, a fluid within the cylinder above and below the piston, a fluid port in the wall of the stem at a point a substantial distance above the piston, means forming a valve seat within the stem between said port and the piston, a valve disposed upon said seat and opening downwardly, a stem carried by said valve and extending upwardly through the upper end of the piston stem, resilient means normally urging the valve stem upwardly to position the valve upon its seat, a head carried upon the upper end of the valve stem in a central aperture in the seat body, a finger member oscillatably mounted in a chamber within the seat and having an end engaging the top of said valve stem head, and means disposed beneath the seat and connected with the other end of the finger facilitating oscillation of the finger to effect longitudinal

movement of the valve stem and the unseating of the valve.

7. A stool of the character described, comprising a vertically disposed cylinder forming a base, a piston slidable in said cylinder, a tubular stem connected at one end with the piston and extending through the upper end of the cylinder, the stem opening at its lower end through the piston, resilient means in the lower part of the cylinder beneath the piston normally maintaining the piston at a predetermined distance above the bottom end of the cylinder, a fluid in the cylinder above and below the piston, means forming an annular valve seat within the stem, a fluid discharge port in the wall of the stem above said seat, an occupant seat secured to the upper end of said stem, a disk valve within the stem and engaging said seat and adapted to shift downwardly to open position, a stem secured at one end to said valve and extending upwardly through the piston stem into a central chamber in said occupant seat, a head upon the upper end of the valve stem, resilient means normally urging the valve stem to shift in a direction to maintain the valve upon its seat, said occupant seat having a series of chambers radiating from the central chamber thereof, a finger oscillatably mounted in each radial chamber and having one end engageable with the top of said valve stem head, a ring encircling the piston stem upon the under side of the occupant's seat, and connecting means between said ring and the other ends of the fingers facilitating oscillation of the latter for the unseating of said valve.

8. A stool of the character described, comprising a vertically disposed cylinder forming a base, a piston slidable in said cylinder, a tubular stem connected at one end with the piston and extending through the upper end of the cylinder, the stem opening at its lower end through the piston, resilient means in the lower part of the cylinder beneath the piston normally maintaining the piston at a predetermined distance above the bottom end of the cylinder, a fluid in the cylinder above and below the piston, means forming an annular valve seat within the stem, a fluid discharge port in the wall of the stem above said seat, an occupant seat secured to the upper end of said stem, a disk valve within the stem and engaging said seat and adapted to shift downwardly to open position, a stem secured at one end to said valve and extending upwardly through the piston stem into a central chamber in said occupant seat, a head upon the upper end of the valve stem, resilient means normally urging the valve stem to shift in a direction to maintain the valve upon its seat, said occupant seat having a series of chambers radiating from the central chamber thereof, a finger oscillatably mounted in each radial chamber and having one end engageable with the top of said valve stem head, a ring encircling the piston stem upon the underside of the occupant's seat, connecting means between said ring and the other ends of the fingers facilitating oscillation of the latter for the unseating of aid valve, and inertia controlled bleed means in the wall of the piston stem beneath said valve permitting fluid to bleed from beneath the piston into the cylinder when the piston is in raised position and the fluid therebeneath is not under pressure.

9. A seat structure of the character described, comprising a vertically disposed cylinder, a piston within the cylinder having a tubular stem extending longitudinally upward through the upper end of the cylinder and opening downward through the piston, a seat body supported upon the upper end of the piston stem, said cylinder being of an interior diameter greater than the overall diameter of the stem and containing a fluid surrounding and in the stem, said seat when raised shifting the piston upwardly in the cylinder and causing the fluid to flow past the piston into the lower part of the cylinder, the fluid being compressed below the piston when downward pressure is applied thereto, valve means in the stem at a point a substantial distance inwardly from the piston, the stem having apertures therethrough above the valve means, means for unseating said valve from outside the cylinder at any height of the piston therein for releasing fluid compressed beneath the piston that it may flow back through the aperture of the stem into the cylinder, and a bleed valve in the stem between the first valve and the piston which is constructed and arranged to open when pressure of the fluid beneath the piston is relieved.

10. A seat structure of the character described, comprising a vertically disposed cylinder, a piston within the cylinder having a tubular stem extending longitudinally upward through the upper end of the cylinder and opening downward through the piston, a seat body supported upon the upper end of the piston stem, said cylinder being of an interior diameter greater than the overall diameter of the stem and containing a fluid surrounding and in the stem, said seat when raised shifting the piston upwardly in the cylinder and causing the fluid to flow past the piston into the lower part of the cylinder, the fluid being compressed below the piston when downward pressure is applied thereto, valve means in the stem at a point a substantial distance inwardly from the piston, the stem having apertures therethrough above the valve means, means for unseating said valve from outside the cylinder at any height of the piston therein for releasing fluid compressed beneath the piston that it may flow back through the aperture of the stem into the cylinder, and a gravity opened relief valve in the wall of the stem between the first valve and the piston which is constructed and arranged to be maintained closed while the fluid beneath the piston is under compression.

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