C. L. HUNTLEY.
VARIABLE POWER HAND AIR PUMP.
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Inventor:
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by [Signature]
To all whom it may concern:

Be it known that I, Charles L. Huntley, a citizen of the United States, residing at Milwaukee, in the county of Clackamas and State of Oregon, have invented a new and useful Improvement in Variable-Power Hand Air-Pumps, of which the following is a specification:

The object of my invention is to provide an air-pump, which is adjustable to the power available, or required, for its operation, and is especially adapted for inflating pneumatic tires.

I attain my object by providing a pump comprising two pumping elements, one of larger capacity than the other, both discharging into a common compression chamber, and either of which elements may be coupled singly to the operating means, or both may be coupled to latter. Hence my improved air-pump gives three different powers, viz.—the power of the two pumping elements operating together, which is the greatest power; the power of the larger pumping elements which is the intermediate power, and finally the power of the smaller pumping elements, which is the smallest power. Hence the two pumping elements may be operated together in the first instance, to effect a rapid, partial filling of the deflated tire-tube, and the intermediate and smallest pumps may then be used individually, as convenient, for further and complete inflation of the tire to the desired degree.

The same features also adapt my air-pump for equally efficient use, though at different speeds, by a strong man or weaker person.

Another object of my invention is to provide a hand air-pump which is of simple construction, efficient and will keep in good condition.

The details of my invention are herein described and illustrated in the accompanying drawings in which:

Figure 1 is a perspective view of my improved air-pump;

Fig. 2 is a central longitudinal section on broken line 2—2 of Fig. 1, thus of the larger and smaller barrels and of the related working parts housed in the operating handle;

Figs. 3 and 4 are sectional details of construction fully described in the body of the specification;

Fig. 5 is a perspective view of the mechanism housed in the operating handle, and by which the pumps are individually operatively coupled to said handle;

Figs. 6—7—8, are diagrammatic views illustrating the operation of said pump coupling mechanism housed in the operating handle;

Fig. 9 is a plan section on the broken line 9—9 of Fig. 2;

Fig. 10 is a longitudinal central section of the cylinder constituting the air purifying chamber except that the section through the base of this chamber is taken on the broken line 10 of Fig. 9; and

Figs. 11 to 16 are details of baffling plates contained in said air purifying chamber and hereinafter fully described.

a is a casting or base in which are set the pump barrels b, b', the former being of much larger cross-section then the latter. On the upper ends of said pump barrels is affixed a reinforcing casting c, and thereon is removably fastened a guide plate d. c, c' are the pistons reciprocated in the pump barrels b, b'. Said pistons c, c' are respectively provided with rods d, d', and the upper ends of said rods are provided, respectively with heads e, e'. Said heads slide in guide tubes f, f' rigidly fastened in the sleeve g, g' of the plate h. The lower ends of the guide tubes are provided with guide-flanges f, f'. The heads f, f' of the pistons rods e, e' are provided with peripheral grooves i, for receiving locking-bars j, j', which are pivoted on the plate h as shown at k, k' in Fig. 5. The locking-bars j, j' are normally held against the closed ends of the guide-lugs 1, 1' by coil-springs m, m', thereby causing said locking-bars respectively to be engaged with the grooved heads f, f' of the piston-rods e, e'; and the locking-plates are moved out of engagement from said heads f, f' by the actuation of a 100 cam n, pivoting about a center n'.

The construction and operation of said cam is diagrammatically illustrated in Figs. 6, 7 and 8. As positioned in Fig. 6, its action on the locking-bars j, j' is neutral 105 and the springs m, m' have operated to...
throw the locking-bars into engagement with the grooved heads \( f, f' \) of the piston-rods \( e, e' \).

In Fig. 7 the cam \( n \) has been operated to throw the locking-bar \( j \) out of its engagement with the head \( f \) of the piston-rod \( e \), while the engagement of the locking-bar \( j' \) with the head \( f' \) of the piston-rod \( e' \) is maintained; and in Fig. 8, the cam \( n \) has been operated to disengage the locking-bar \( j' \) from the head \( f' \) of the piston-rod \( e' \), at the same time maintaining the engagement between the locking-bar \( j \) and the head \( f \) of the piston-rod \( e \).

The cam \( n \) is formed with a stub-shaft \( o \) provided with a finger piece \( o' \). The locking-bars \( j, j' \) and their operating mechanism are housed in the hollow \( p \) of the operating handle \( q \) as shown in Fig. 2 into which housing the extremities of the head \( f, f' \) of the piston-rods \( e, e' \) project. As apparent the pistons \( c, c' \) may be coupled singly or both together to the handle bar \( g \) according to the setting of the finger piece \( o' \) on the dial-plate \( r \), shown in Fig. 1, thereby arranging the cam \( n \) in either one of its three positions shown in said Figs. 6, 7 and 8. Thus, when the cam \( n \) is arranged as shown in Fig. 6, both piston-rods \( d, d' \) are connected to the plate \( h \) of the handle-bar \( q \), and my pump is adjusted to give its largest capacity; when the cam \( n \) is arranged as shown in Fig. 7, the piston-rod \( d \) is disengaged from the handle-bar, and therefore the piston \( c' \) of the smaller pump is operated only, while the head of the piston-rod \( d \) merely slides in the guide tube \( f, f' \); and when the cam \( n \) is arranged as shown in Fig. 8, the piston-rod \( d \) alone is coupled to the handle-bar \( q \), and the piston rod \( d' \) is disengaged therefrom, and merely slides in the guide tube \( f' \).

The lower ends of the pumping elements are connected by ducts \( s, s' \) as shown in Fig. 9 with an air purifying chamber \( t \), having vertical ducts \( t' \). In the latter figure the location of the pumping elements and the compression chamber is indicated by broken line circles bearing the reference letters \( b, b', b'' \).

The tubular cylinder constituting the body of the air purifying chamber \( t \), has its lower end set in a cap \( v \), and its upper end in a cap \( w \). It is mounted on the base \( a \), by screws \( x \).

Each of the vertical inlet ducts \( t' \) is controlled by a ball-valve \( w \) contained in the small chamber provided therefor in the base \( a \) and covered by the base or cap \( w \) having perforations \( z \).

In the lower part of the air purifying chamber \( t \), are placed a series of diaphragms 2 having a central hole 3, made with peripheral flange-segments 4, and diaphragms 5, made with peripheral flange segments 6, with parts of the periphery cut away so as to provide spaces 7. The diaphragms 2 and 5 alternate with each other as shown in Fig. 10; their function is to cause the air forced into the air purifying chamber to take a circuitous path in passing up through the air purifying chamber, as indicated by the arrows in Fig. 10, and thus induce the deposit on the diaphragms, as much as possible, of the oil carried by the air pumped in the air purifying chamber.

Above the diaphragm \( h \), is filled waste 11. In the upper end of the air purifying chamber is a perforated diaphragm 12 fastened to the cap \( v \) by screws 13. The function of the waste filling is to absorb all particles of foreign nature which are carried into the air purifying chamber from the pumps, thus permitting the lubrication of the latter without danger of the oil being injected into the air tube of the tire inflated by my pump.

The lower end of the tube 9 of the diaphragm 8 has a downward slope, so that drops of oil from the waste 11 will run down on one side of said tube and be deposited on the upper diaphragm 5. The waste is to be removed as often as it becomes saturated and replaced by other waste.

I have purposely so designed my pump that it may be amply lubricated. The bottom of the barrels \( b, b' \) should be kept filled with oil.

If oil is carried over into the air purifying chamber and collects in the bottom end thereof, it may be poured out by removing the tap-screw 26, bearing on a gasket 27.

The diaphragms 2, 5 and 8 are made to have a snug fit in the cylinder \( t \), so as to stay in place, at the same time being removable for cleaning the air purifying chamber.

On the cap \( v \) is secured, by screws 13, a plate 14 provided with a nipple 15 on which is fastened a rubber tube 16 for conveying the air to the valve of the tire.

The upper end of the air purifying chamber 5 is tapped by a tube 17 or hollow wire (see Fig. 1) leading to a pressure-gage 18, on a bracket 19.

Convenient details of construction of the pistons \( c, c' \) and the guide-flanges \( f, f' \) of the guide-tubes \( f, f' \) are shown in Figs. 3 and 4. Referring to Fig. 3; the piston-rod \( c \) is made with a peripheral flange 20. The piston-head \( c \) is provided with a leather cup 21 having a loose fit within the pump barrel to permit the air to pass the piston during the up stroke of the latter, and the cup being then flared out by the pressure of the air during the down stroke of the piston, and thus confining the air as usual in the type of construction illustrated. The piston-head \( c \) is secured to the flange 20 of the piston-rod by a screw 26.

The bottom end of each of the guide tubes \( f, f' \) is made with peripheral flange 22, 23.
spaced apart and holding between them a gasket 24 having a loose fit in the pump barrel (see Figs. 3 and 4).

The casting or base a is made with laterally projecting feet 25, so that the operator may bear down thereon with his foot for holding the pump while operating it.

In using my pump, the operator can turn the finger piece c' to any position desired so as to obtain pumping capacity in either the small or large pumping elements individually or together. In the first case the piston c becomes inactive and air from the small pumping element barrel b' is forced through the duct s' into the air purifying chamber. In the second case the piston c' becomes inactive and air from the large pumping element barrel b is forced through the duct s into the air purifying chamber and in the third case, both pistons are active and both pumping elements will work to their full capacity.

I claim:

1. In a pump comprising a plurality of barrels of larger and smaller cross-sections respectively, a piston in each barrel, a single operating element, and means for connecting both or either of said pistons to said operating elements.

2. A pump comprising a plurality of barrels of larger and smaller cross-sections, respectively, a piston in each barrel and a rod on each piston, an operating handle provided with tubular guides reciprocating in said barrels, said piston rods reciprocating in said tubular guides, and being of such length as to project beyond the latter, and means carried by the handle bar for connecting therewith both, or either of the piston rods.

3. A pump comprising a plurality of barrels of larger and smaller cross-sections, respectively, a piston in each barrel and a rod on each piston, an operating handle provided with tubular guides reciprocating in said barrels, guide flanges on the free ends of said tubular guides, said piston rods reciprocating in said tubular guides, and being of such length as to project beyond the latter, and means carried by the handle bar for connecting therewith both, or either of the piston rods.

4. A pump comprising a plurality of barrels of larger and smaller cross-sections, respectively, a piston in each barrel and a rod on each piston, an operating handle provided with tubular guides reciprocating in said barrels, said piston rods reciprocating in said tubular guides, and being of such length as to project beyond the latter, and into a hollow thereof provided in the operating handle, said projecting ends of said piston rods being provided with peripheral grooves, spring-controlled locking bars adapted normally to engage with the projecting ends of said piston rods, and other means carried by the handle-bar operable to disengage either of said piston ends from said locking-bars.

5. A pump comprising a plurality of barrels of larger and smaller cross-sections, respectively, a piston in each barrel and a rod on each piston, an operating handle provided with tubular guides reciprocating in said barrels, said piston rods reciprocating in said tubular guides, and being of such length as to project beyond the latter and into a hollow therefor provided in the operating-handle, said projecting ends of the piston rods being provided with peripheral grooves, a plate set in the hollow of the operating handle, locking bars pivoted in parallelism on said plate, springs drawing said locking bars toward said grooved ends of the piston rods, and a cam, located between said locking bars, having a finger-piece projecting exterior of the handle bar, whereby said cam may be arranged to throw either of said locking bars into disengaged position.

6. A pump comprising a plurality of barrels of larger and smaller cross-sections, respectively, a piston in each barrel and a rod on each piston, an operating handle provided with tubular guides reciprocating in said barrels, guide flanges on the free ends of said tubular guides, said piston rods reciprocating in said tubular guides, and being of such length as to project beyond the latter and into a hollow therefor provided in the operating-handle, said projecting ends of the piston rods being provided with peripheral grooves, a plate set in the hollow of the operating handle, locking bars pivoted in parallelism on said plate, springs drawing said locking bars toward said grooved ends of the piston rods, and a cam, located between said locking bars, having a finger-piece projecting exterior of the handle bar, whereby said cam may be arranged to throw either of said locking bars into disengaged position.

CHAS. L. HUNTLEY.