No. 842,142. PATENTED JAN. 22, 1907.

J. FUNCK.

PNEUMATIC PUMP.

APPLICATION FILED OCT. 3, 1906.

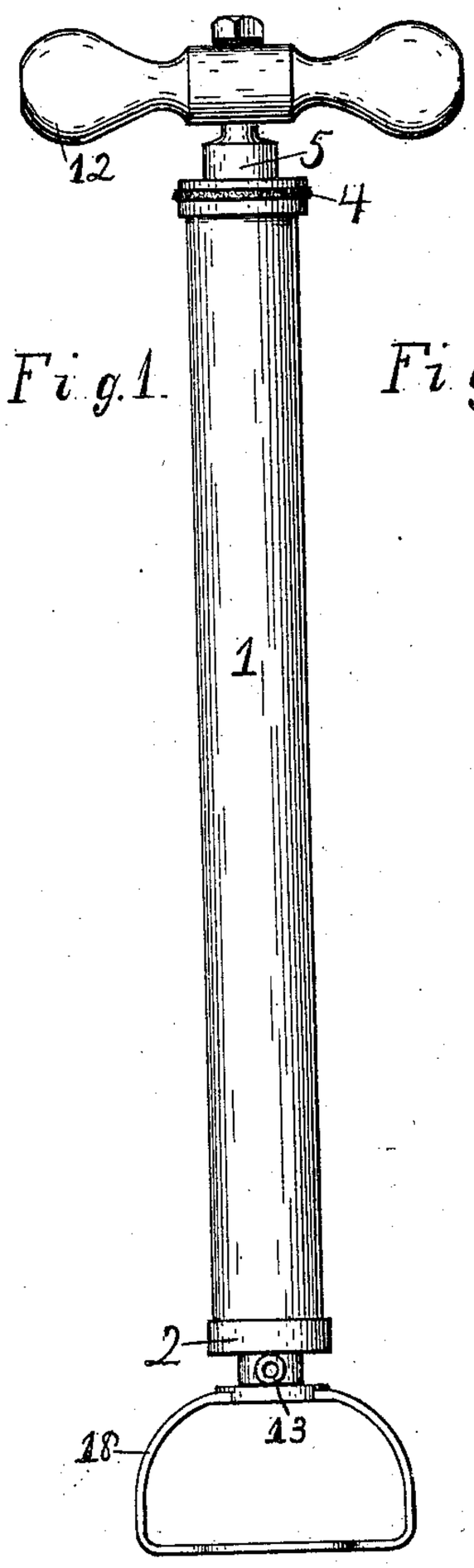

Fig. 1.

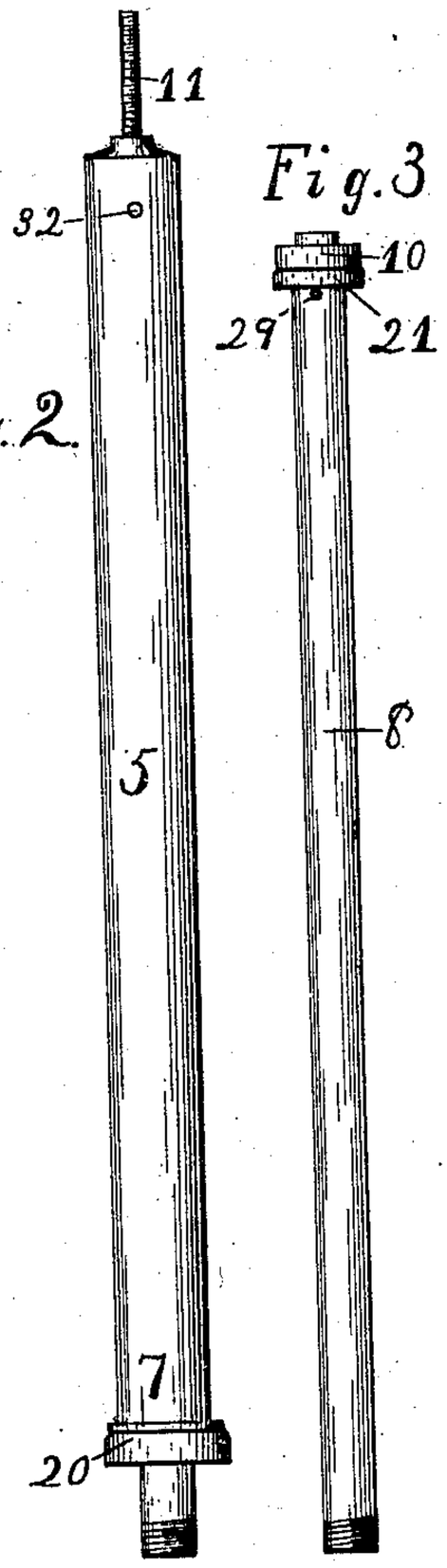

Fig. 2.

Fig. 3.

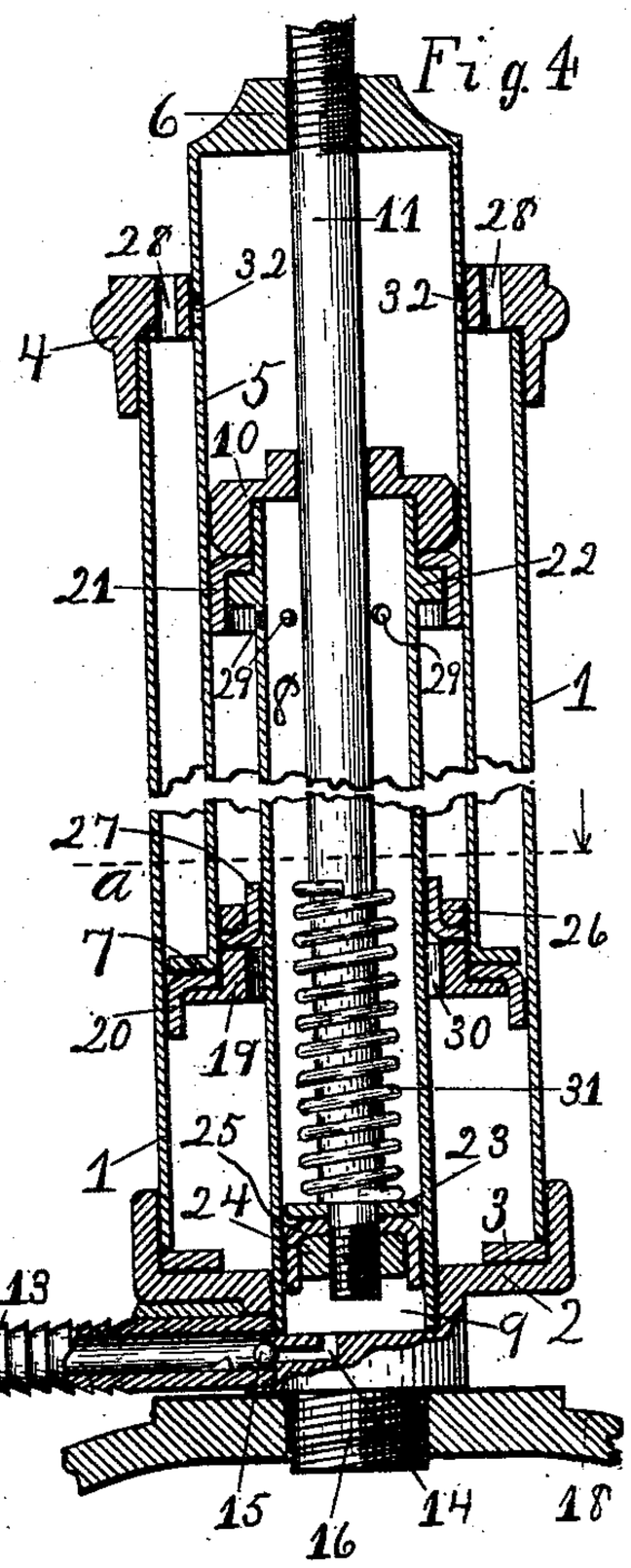

Fig. 4.

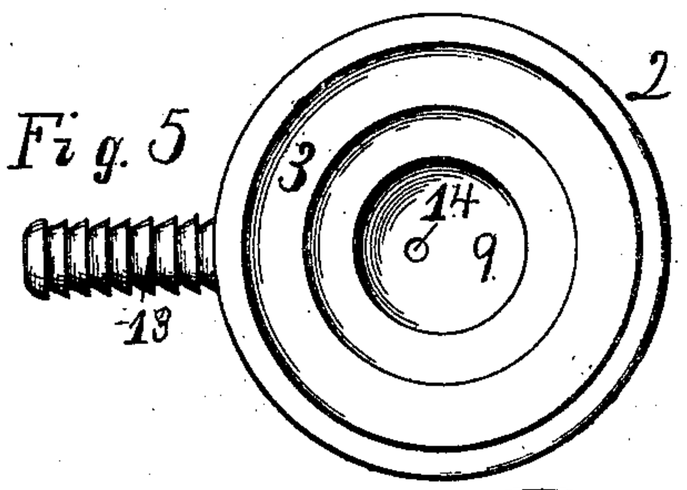

Fig. 5.

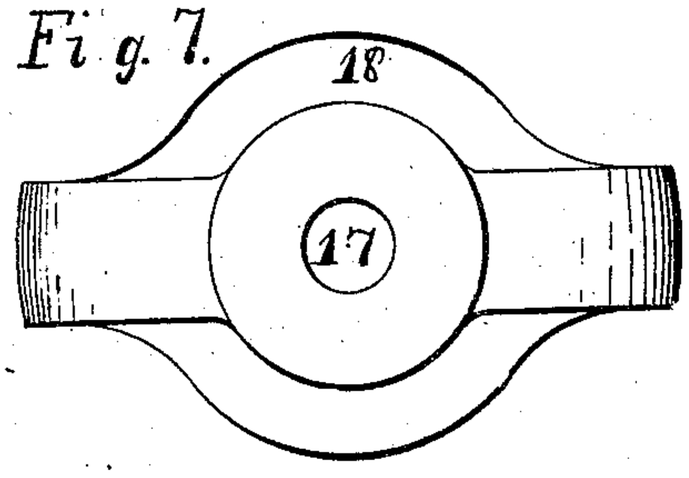

Fig. 7.

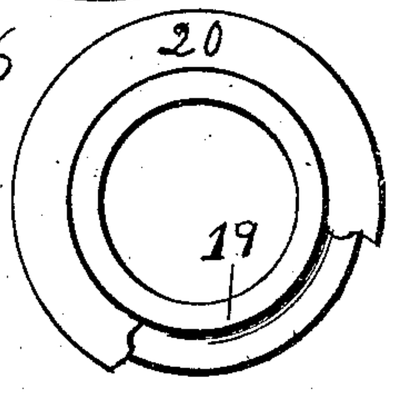

Fig. 6.

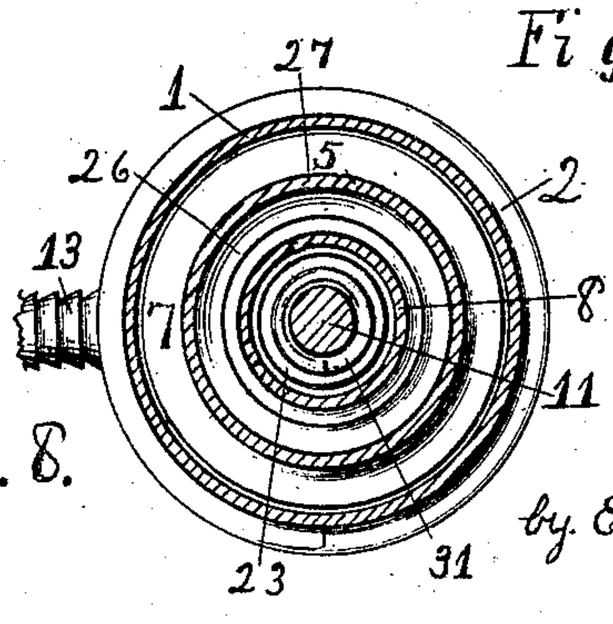

Fig. 8.

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UNITED STATES PATENT OFFICE.

JACOB FUNCK, OF ROCHESTER, NEW YORK, ASSIGNOR TO JUDD & LELAND MANUFACTURING COMPANY, OF CLIFTON SPRINGS, NEW YORK.

PNEUMATIC PUMP.

No. 842,142. Specification of Letters Patent. Patented Jan. 22, 1907.

Application filed October 3, 1906. Serial No. 337,297.

To all whom it may concern:

Be it known that I, JACOB FUNCK, of Rochester, in the county of Monroe and State of New York, have invented a new and useful Improvement in Pneumatic Pumps, which improvement is fully set forth in the following specification and shown in the accompanying drawings.

My invention relates to certain new and useful improvements in pneumatic piston-pumps of the class designed more particularly for inflating hollow vehicle-tires, as of automobiles.

This invention has for its objects, among others, to provide a convenient and compact multibarrel-pump without valves for compressing volumes of air progressively and forcing the same into a tire under the highest pressure. This pump comprises a progressive series of graded coaxial barrels to act successively upon separate volumes of air primarily taken into the outer barrel at normal atmospheric pressure as such volumes are forced onward toward the tire. As the volumes of air move successively onward through the chambers of the pump and become increasingly compressed the piston areas decrease, so that the air finally acted upon by the last reduced piston enters the tire under high pressure. The pump is double-pistoned, the middle barrel having all the functions of a piston, and in the operation of the pump each stroke of the double pistons, whether downward or upward, serves to compress one or more volumes of air, a given volume of air under high pressure being forced from the inner or final barrel of the series into the tire.

Other objects and advantages of the invention will be brought out and made to appear in the following description and the novel features pointed out in the appended claims, reference being had to the accompanying drawings, which, with the reference-numerals marked thereon, form a part of this specification.

Figure 1 is a side elevation of the pump complete. Fig. 2 is a side elevation of the second or middle barrel removed. Fig. 3 shows the third or inner barrel detached. Fig. 4 is a central longitudinal section of the pump with parts broken away. Fig. 5 is a plan of the base-piece. Fig. 6 is a plan of the primary piston with a part of the packing-ring broken away. Fig. 7 is a plan of the foot-piece at the bottom of the pump. Fig. 8 is a transverse section of the pump, taken on the dotted line *a* in Fig. 4. Figs. 1, 2, and 3 are drawn to a scale one-third size, Figs. 4, 5, 6, and 8 full size, and Fig. 7 two-thirds size.

Referring to the parts shown, 1 in the various figures is the outer or primary barrel of the pump, open at both ends, with its lower end threaded in the hollow base-piece 2, Figs. 4, 5, and 8, upon a ring of packing material 3.

4, Figs. 1 and 4, is an annular cap formed with a central bore, threaded upon and partially closing the upper end of the barrel 1.

5, Figs. 2, 4, and 8, is a secondary or middle barrel within the outer barrel 1, filling with a sliding fit the bore of the cap 4 and projecting longitudinally out at the top of barrel 1. The barrel 5 is substantially closed at its upper end by a head portion 6 and open at its lower end and having an annular outwardly-projecting flange 7, smaller in diameter than the interior of the barrel 1.

8, Figs. 3, 4, and 8, is a third or inner barrel within the barrels 1 and 5, open at both ends, with its lower end threaded into an axial recess 9, Figs. 4 and 5, in the base-piece 2, its upper end being partially closed by an annular cap 10 threaded thereon.

11, Figs. 4 and 8, is an axial plunger-rod within the barrel 8, having a sliding fit in the cap 10 and threaded in the head 6 of the barrel 5, it extending without the latter at the top and having an operating cross-handle 12, as appears in Fig. 1.

The barrels 1, 5, and 8 are coaxial and together constitute a series with graded diameters, the outer and the inner barrels 1 and 8 being rigidly connected with the base 2 and stationary, and the middle barrel and the piston-rod 5 and 11 being rigidly joined and movable, both being independent of the base 2.

The base 2 is formed with a laterally-projecting outflow or delivery tube 13, Figs. 1, 4, 5, and 8, for the compressed air, with which to connect a flexible hose leading to the nipple of the tire to be inflated. An opening 14 is formed in the base 2, communicating between the interiors of the tube 13 and the inner barrel 8 for the passage of the air from the latter to the tire, a ball 15 being provided in the tube to close the passage

against a backflow of air from the tire. The base 2 is further formed with a short downwardly-projecting axial stem 16, threaded in an opening 17 in the upper part of a foot-piece or stirrup 18, Figs. 1, 4, and 7, in which the foot of the operator is placed to hold the pump while operating it.

On account of the connections of the parts when the handle 12 is moved alternately upward and downward, the barrel 5, with its attached parts, and the rod 11, with its attached parts, will be reciprocated, respectively, without and within the inner barrel 8, the latter and the outer barrel 1 being motionless.

The middle barrel 5, which during the operation of the pump acts as a piston-rod, is provided at its inner or lower end with a flanged piston-head 19, Figs. 4 and 6, threaded in the end of the barrel and holding between it and the flange 7 a fibrous packing-ring 20, as of leather, with downwardly-turned free part or flap to meet the inner surface of the barrel 1. The barrel 5 is also provided with an annular ring 26, Figs. 4 and 8, threaded to place within it above the head 19 and holding with said head an inturned packing-ring 27, with upwardly-turned flap in position to meet the outer surface of the inner barrel 8, as shown. The inner barrel 8 is similarly provided with a piston-head at its upper end, consisting, with the screw-cap 10, of a fibrous ring 21, held between said cap and a ring or flange 22 upon the outer surface of the barrel, the pendent flap of the fibrous ring being in position to meet the inner surface of the middle barrel 5. The rod 11 is also provided at its lower end with a piston-head, as shown in Fig. 4, consisting of a flange 23 on the reduced lower end of the rod and a nut 24 threaded on the rod, holding between it and the flange a fibrous packing-ring 25, with flap pending over the nut and in contact with the inner surface of the barrel 8. Thus a piston-head with fibrous packing-ring is provided for each barrel 1 5 8.

I provide a spiral spring 31, Figs. 4 and 8, on the rod 11, resting upon the flange 23 in position to encounter the cap 10 of the barrel 8 each time the rod is pulled upward. This spring serves as a buffer and cushions the upward-moving parts.

In operating the pump an upward pull upon the handle 12 will tend to form a vacuum in the lower part of the outer barrel 1, resulting in a downward flow or rush of air through the openings 28, Fig. 4, in the cap 4, thence past the flange 7 and the packing-ring 20 of the middle barrel 5 into the space in the barrel 1 beneath. This upward pull of the handle also serves to compress the air in the barrel 5 between the packing-rings 27 and 21, forcing it laterally through openings 29, Figs. 3 and 4, into the interior of the inner barrel 8. This body of compressed air passes downward by the flange 23 and the packing-ring 25 into the space of the barrel 8 beneath the said packing-ring 25 as the plunger-rod and the barrel 5 move upward, similarly as a volume of air at normal pressure is simultaneously passing beneath the piston-head 19 into the lower part of the barrel 1, as above set forth. Furthermore, when the barrel 5 and the plunger-rod 11 are at their upper positions a downward push upon the handle 12 will compress the air in the barrel 1 beneath the head 19, forcing it upward through the opening 30 in said head and past the packing-ring 27 into the interior of the barrel 5, the external air simultaneously flowing into the barrel 1 through the openings 28 in the cap 4. This downward push of the handle will also cause the air under a pressure beneath the ring 25 to be further compressed and forced through the passage 14 and the tube 13 into the tire. The rings of packing 20, 21, and 25, as seen in Fig. 4, have downturned or pendent parts or flaps, while the flap of the similar ring 27 turns upward, the construction being such that when the pump is operated the air will rush past all the said packing-rings in the directions in which the flaps are turned, but it is prevented from flowing past any of them in the opposite directions or when moving against the edges of the flaps. The middle barrel 5 is provided with idle openings 32 near its upper end inwardly and outwardly, through which air may alternately flow as the barrel is moved upward and downward in the act of pumping. An upward pull of the barrel tends to cause a vacuum therein over the cap 10, which is filled by air flowing inward through said openings 32. A downward movement of the barrel tends to compress the air over the cap 10, which is relieved by the air flowing out through the openings.

From this description of the forms and the operations of the parts of the device it will be understood that at every upward and downward stroke of the movable parts of the pump air is being compressed in some of the apartments thereof, and that at every upward stroke of the parts a fresh supply of air at normal pressure is drawn into the pump and at each downward stroke a volume of air under compression is forced into the tire, there being no valves, as such, in the device other than the ordinary check-ball 15, as described.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A fluid-pump consisting of a series of concentric barrels of graded diameters, and an axial plunger-rod with handle, there being a piston for each barrel, the middle barrel and the plunger-rod being rigidly joined and together movable, and the outer and the inner barrels being rigidly connected and stationary.

2. A fluid-pump, such as described, having three concentric cylindrical barrels and an axial plunger-rod within, a base-piece rigid with the outer and the inner barrels, the plunger-rod piercing the head of the middle barrel and rigid therewith, the middle barrel having an outer and an inner packing-ring there being a packing-ring for the inner barrel and a packing-ring for said plunger-rod.

3. A device of the kind described, having a circular base-piece with large and small concentric chambers, a barrel held in said large chamber and an inner barrel held in the small chamber, a third barrel between said outer and inner barrels independent of the base-piece and having a plunger-head for said outer barrel, and an axial rod with plunger-head for the inner barrel and a plunger-head on the inner barrel for the middle barrel, said barrels and the rod being coaxial.

In witness whereof I have hereunto set my hand, this 20th day of September, 1906, in the presence of two subscribing witnesses.

JACOB FUNCK.

Witnesses:
E. B. WHITMORE,
A. M. WHITMORE.