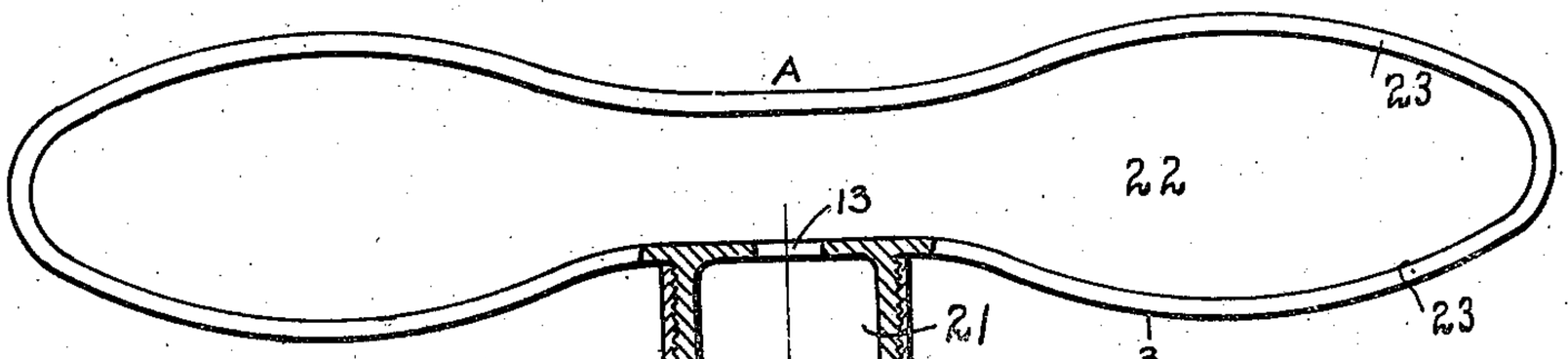
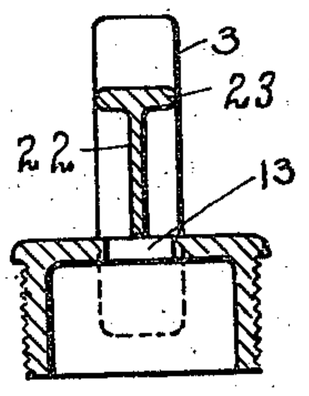
No. 847,785. PATENTED MAR. 19, 1907.

P. E. KLEINEBERG.

AIR PUMP.

APPLICATION FILED FEB. 26, 1906.





Section A-B.

Fig. 2.

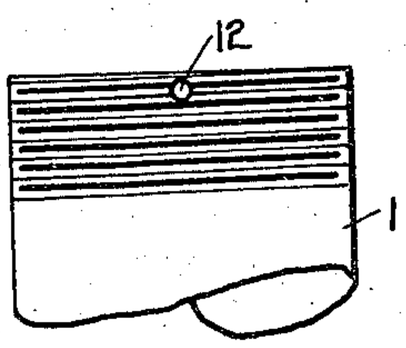
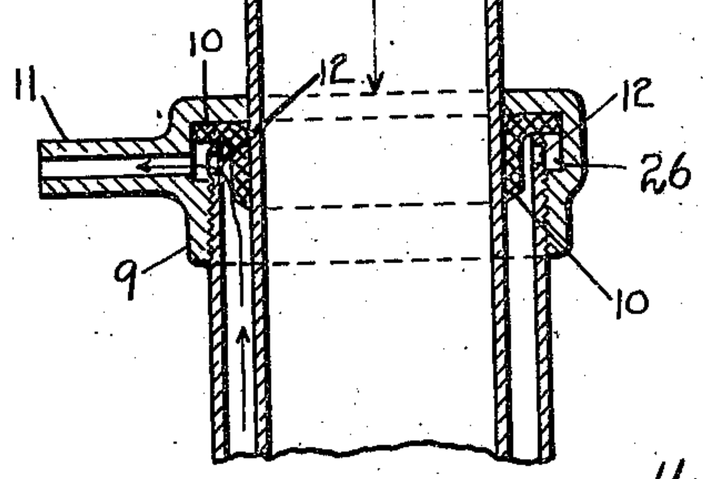


Fig. 4.



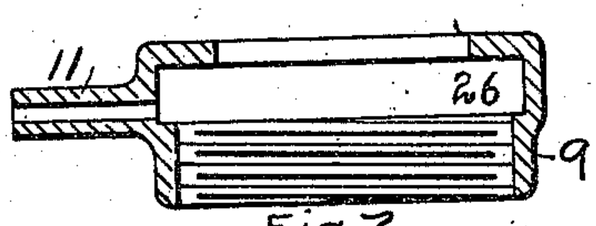


Fig. 7.

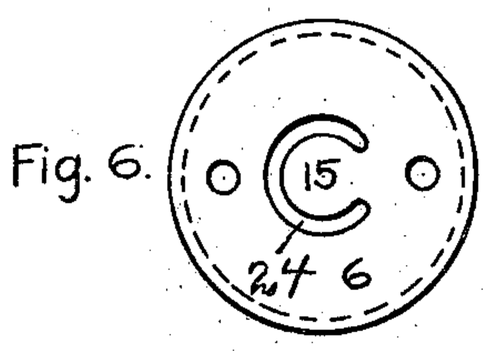


Fig. 6.

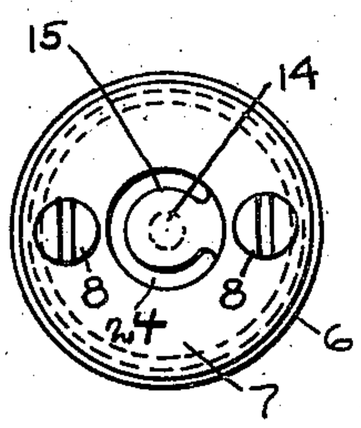


Fig. 3.

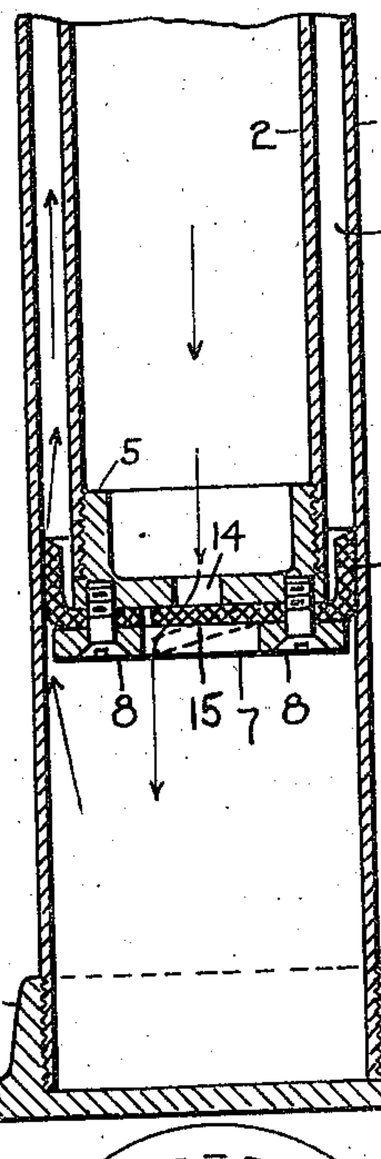


Fig. 1.

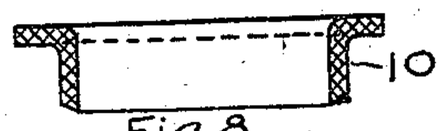


Fig. 8.

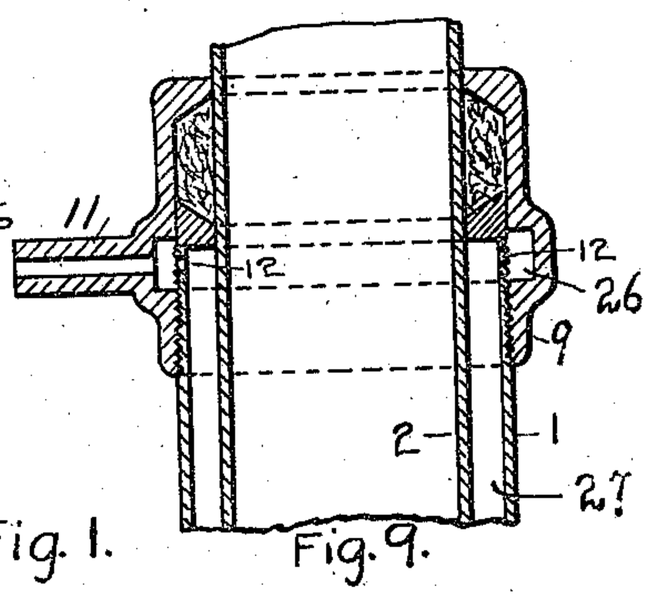


Fig. 9.

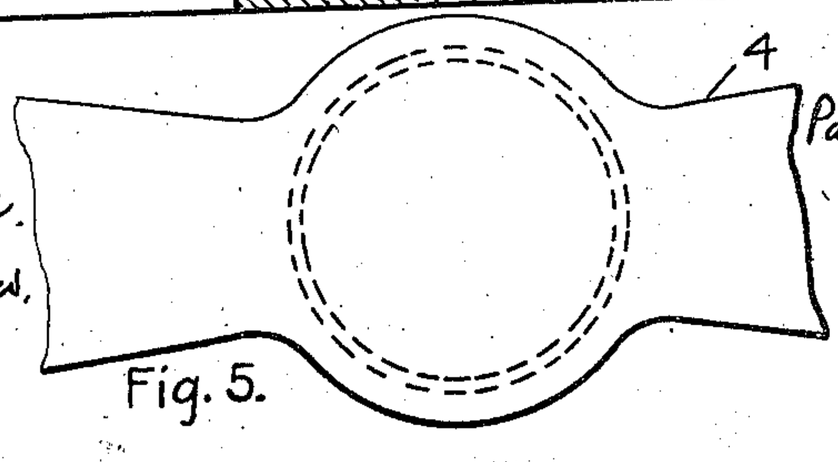


Fig. 5.

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AIR-PUMP.

No. 847,785. Specification of Letters Patent. Patented March 19, 1907.

Application filed February 26, 1906. Serial No. 302,920.

To all whom it may concern:

Be it known that I, PAUL E. KLEINEBERG, a citizen of the United States, and a resident of Croton Falls, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Air-Pumps, of which the following is a specification.

The invention relates to improvements in air-pumps for inflating tires and other purposes; and it consists in the novel features, construction, arrangement, and combinations of parts hereinafter described, and particularly pointed out in the claims.

The object of the invention is to provide a very simple durable air-pump of the type commonly known as "compound," in which the air is partly compressed on one stroke of the piston and is still further compressed on the other stroke of the piston and forced to the tire.

I present my invention herein as embodied in a pump comprising an outer tube, an inner tube having at its lower end a valved cup-piston, and a handle secured upon the upper end of the inner tube, whereat an inlet for air is provided. Upon the upstroke of the inner tube the air entering at the handle passes to the space within the outer tube below the piston, and during the downstroke of the inner tube the air below said piston is compressed and forced into an annular chamber between the inner and outer tubes and which connects with the tire to be inflated. Upon the succeeding upstroke of the inner tube air is again admitted to the space within the lower end of the outer tube, and the air which was partly compressed on the preceding downstroke and entered the annular chamber between the tubes becomes further compressed and forced along to the tire. Thus during each upstroke of the inner tube additional air is supplied to the chamber within the lower end of the outer tube and at the same time the air previously partly compressed during the downstroke of said tube is further compressed and forced to the tire, and during each downstroke of the inner tube the fresh air admitted during the upstroke thereof is placed under compression and forced into the said annular space between the tubes preparatory to being further compressed upon the succeeding upstroke of the inner tube.

The invention will be fully understood from the detailed description hereinafter presented, reference begin had to the accompanying drawings, in which—

Figure 1 is a central vertical section of an air-pump constructed in accordance with and embodying the invention. Fig. 2 is a detached central vertical transverse section of the handle and means thereon for connecting the same with the inner tube of the pump. Fig. 3 is a detached end view of the lower end of the inner tube with the cup-piston thereon. Fig. 4 is a detached side view of a portion of the upper end of the outer tube of the pump. Fig. 5 is a detached view of a portion of the lower end of the pump construction and illustrates more particularly the supporting-base of same. Fig. 6 is a detached lower end view of the cup-piston. Fig. 7 is a detached vertical section of the cap on the outer tube. Fig. 8 is a like view of the packing used in said cap, and Fig. 9 is a central vertical section showing a modified method of applying packing at the upper end of the outer tube.

In the drawings, 1 designates the outer tube or barrel of the pump; 2, the inner tube thereof; 3, the handle connected with said inner tube, and 4 the base upon which the pump structure is supported and to which the lower end of the outer tube is secured, said base being preferably in one integral casting and of elongated outline and having at its center an internally-threaded vertical hub 20, receiving and engaging a screw-thread on the lower end of said outer tube.

The inner tube 2 is internally threaded at its upper end and receives an externally-threaded depending hollow hub 21, formed integrally with the handle 3, which is preferably in the form of an integral casting of elongated outline, comprising a vertical web portion 22 and transverse flanges 23 at the edges thereof, said handle thus being of I-shape in cross-section and while possessing the requisite strength is of minimum weight and capable of being economically manufactured. The hub 21 is formed at the center of the lower edge of the handle 3 in the form of a hollow plug, whose upper end serves as a cap for the upper end of the inner tube 2, this cap being formed at its center with an opening 13, whose diameter is greater than the thickness of the web 22, as shown in Fig. 2. The opening 13 affords a convenient inlet for air to the chamber within the inner tube 2.

Within the lower end of the inner tube 2 is

secured, preferably by screw-threads, a hollow plug 5, having at the center of its lower end an outlet-opening 14, and upon the lower end of the inner tube thus furnished with the said plug is secured a cup-piston 6, whose side walls extend upwardly between the inner and outer tubes, as shown in Fig. 1, said cup-piston being secured to the inner tube by means of the ring 7 and screws 8, said screws passing through said ring and cup-piston and into the plug 5. At the center of the cup-piston 6 the latter is formed with a flap section or valve 15, this valve being greater in diameter than the diameter of the outlet-aperture 14 in the plug 5 and being formed by cutting a slot 24 in the leather or other fabric of the piston 6 and extending the same on the line of a part of a circle, the said section or valve being thus rendered capable of hinged movement toward and from the plug 5. During the downward movement of the inner tube 2 the valve 15 seals the aperture 14, and during the upward movement of said tube said valve 15 will yield downwardly, as indicated by dotted lines in Fig. 1, and thus permit the air entering at the inlet 13 to pass into the chamber formed within the lower end of the outer tube 1. The ring 7 is open at its center to permit the valve 15 to perform its proper movements, and said ring at its outer edges extends beyond the vertical plane of the outer edges of the inner tube 2, so as to afford a support for the vertical portions of the cup-piston 6, as shown in Fig. 1; but the outer edges of said ring do not touch the inner walls of the tube 1. I do not deem it to be essential that the valve 15 be formed of the material of the piston 6; but it may be conveniently and economically so formed.

Upon the upper end of the outer tube 1 is applied a threaded cap 9, which is open at its vertical center to permit the proper reciprocating movement through the same of the tube 2 and formed with an outlet-nozzle 11, to which will be attached the usual flexible tube leading to the tire-valve in the usual manner, and which nozzle is in communication with an inner annular chamber 26, formed within said cap 9 and extending around the upper end of the outer tube 1, which at its said upper end is formed with one or more apertures 12, leading into said chamber 26, whereby the nozzle 11 is placed into communication with the chamber 27 intermediate the outer and inner tubes. I preferably employ two of the apertures 12, one being at each side of the upper end of the tube 1. Within the cap 9 I provide a packing 10 to prevent the escape of air around the tube 2, this packing 10 being of angle-shape in cross-section, whereby one portion of the same may lie upon the upper edge of the tube 1 and the other or vertical portion of same engage the outer surface of the tube 2 and remain clear of the inner surface of the tube 1, an annular space being thus formed between the vertical portion of said packing and the adjacent inner surface of the tube 1, into which the air under pressure may pass and serve to bind said portion of said packing against the inner tube.

In operating the pump hereinbefore described the handle 3 will be grasped at its opposite ends by the operator, who will impart a vertical reciprocating movement to the inner tube 2. On the upstroke of the tube 2 a vacuum is formed in the space below the piston 6, the valve 15 turns downwardly, opening the aperture 14, and the air is drawn through the aperture 13 in the handle, whence it descends, as indicated by the arrows, through the inner tube 2 and aperture 14 to the said space below the piston. On the downstroke of the tube 2 the valve 15 closes, and the air below the piston is compressed within the lower end of the outer tube and, due to its compression, forces a passage around the vertical portions of the cup-piston 6 and enters the chamber 27 between the inner and outer tubes. On the succeeding upstroke of the inner tube 2 air is again admitted to the chamber below the cup-piston, and the air within the annular chamber 27 between the tubes becomes further compressed by the action of the vertical portion of the piston 6 and is forced through the apertures 12 into the annular chamber 26, nozzle 11, and connections attached thereto. During each upstroke of the tube 2 air is admitted, as above explained, to the chamber within the tube 1 below the piston 6, and the air within the annular chamber 27 is compressed and forced out through the nozzle 11, and upon each downstroke of the tube 2 the air admitted to the tube 1 during the preceding upstroke of the tube 2 is compressed and forced into the annular chamber 27 to be further compressed upon the upstroke of the tube 2. The pump is thus of the type commonly known as "compound," partly compressing the air on one stroke and still further compressing the same on its other stroke while forcing the same to the tire.

The entire pump is composed of but few easily-constructed durable parts of simple design and capable of economical manufacture.

The modification shown in Fig. 9 involves merely the use of a gland at the upper end of the pump in lieu of the packing 10.

I do not limit my invention to all of the details shown nor to the admission through the tube or member 2 of the air to the lower end of tube 1.

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

1. A pump of the compound type comprising the inner and outer tubes 1, 2 separated from each other by an air receiving and

compression chamber 27, said inner tube having at its outer end a handle and an air-inlet and at its inner end a cup-piston, an air-outlet opening and a valve therefor, said piston having its vertical yielding sides extended upwardly into the lower end of said chamber 27 around the lower end of said inner tube, and said outer tube having an outlet-nozzle leading from said chamber, the construction described permitting the air under compression below said piston during the downstroke of said inner tube to force its way into said chamber, where it is further compressed during the succeeding upstroke of said inner tube, while at the same time an additional supply of air passes through said valved-outlet-opening to the space below said piston; substantially as set forth.

2. A pump comprising the inner and outer tubes, the former having at its outer end a handle and an air-inlet and at its inner end a piston, an outlet-opening and a valve therefor, and said outer tube being separated by a chamber from said inner tube and having upon its upper end the cap and packing, said cap having a space formed in it in communication with said chamber and a nozzle leading from said space, and said chamber around the lower end of the inner tube being occupied by the vertical yielding portion of said piston; substantially as set forth.

3. A pump of the compound type comprising the inner and outer tubes 1, 2 separated from each other by an air receiving and compression chamber 27, said inner tube having at its outer end a handle and an air-inlet and at its inner end the plug 5 containing an air-outlet, the cup-piston, the ring 7 securing said cup-piston and extending outwardly beyond the sides of said inner tube and not to the inner walls of said outer tube, and a valve for said outlet, said piston having its vertical yielding sides extended upwardly into the lower end of said chamber 27 around the lower end of said inner tube, and said outer tube having an outlet-nozzle leading from said chamber, the construction described permitting the air under compression below said piston during the downstroke of said inner tube to force its way into said chamber, where it is further compressed during the succeeding upstroke of said inner tube, while at the same time an additional supply of air passes through said valved outlet-opening to the space below said piston; substantially as set forth.

4. A pump of the compound type comprising an outer tube, an inner reciprocatory member having a handle at its outer end and a cup-piston at its inner end engaging the walls of said tube and said inner member being separated by a chamber from said outer tube, an outlet-nozzle for compressed air from said chamber, and means for admitting air below said piston during the upstroke of said inner member, whereby during each downstroke of said inner member the air admitted below the piston is compressed and forces a passage around said piston into said chamber, and during each upstroke of said piston the air in said chamber is further compressed and additional air is admitted below said piston; substantially as set forth.

5. A pump of the compound type comprising an outer tube, an inner reciprocatory member having a handle at its outer end and a piston at its inner end engaging the walls of said tube and said inner member being separated by a chamber from said outer tube, an outlet-nozzle for compressed air from said chamber, means for admitting air below said piston during the upstroke of said inner member, and means for admitting the air under compression below said piston to said chamber and preventing the return of same, whereby during each downstroke of said inner member the air admitted below the piston is compressed and forced into said chamber, and during each upstroke of said piston the air in said chamber is further compressed and additional air is admitted below said piston; substantially as set forth.

Signed at New York city, in the county of New York and State of New York, this 23d day of February, A. D. 1906.

PAUL E. KLEINEBERG.

Witnesses:
ARTHUR MARION,
CHAS. C. GILL.