No. 698,710. Patented Apr. 29, 1902.

G. W. KELLOGG.

AIR PUMP.

(Application filed Feb. 13, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

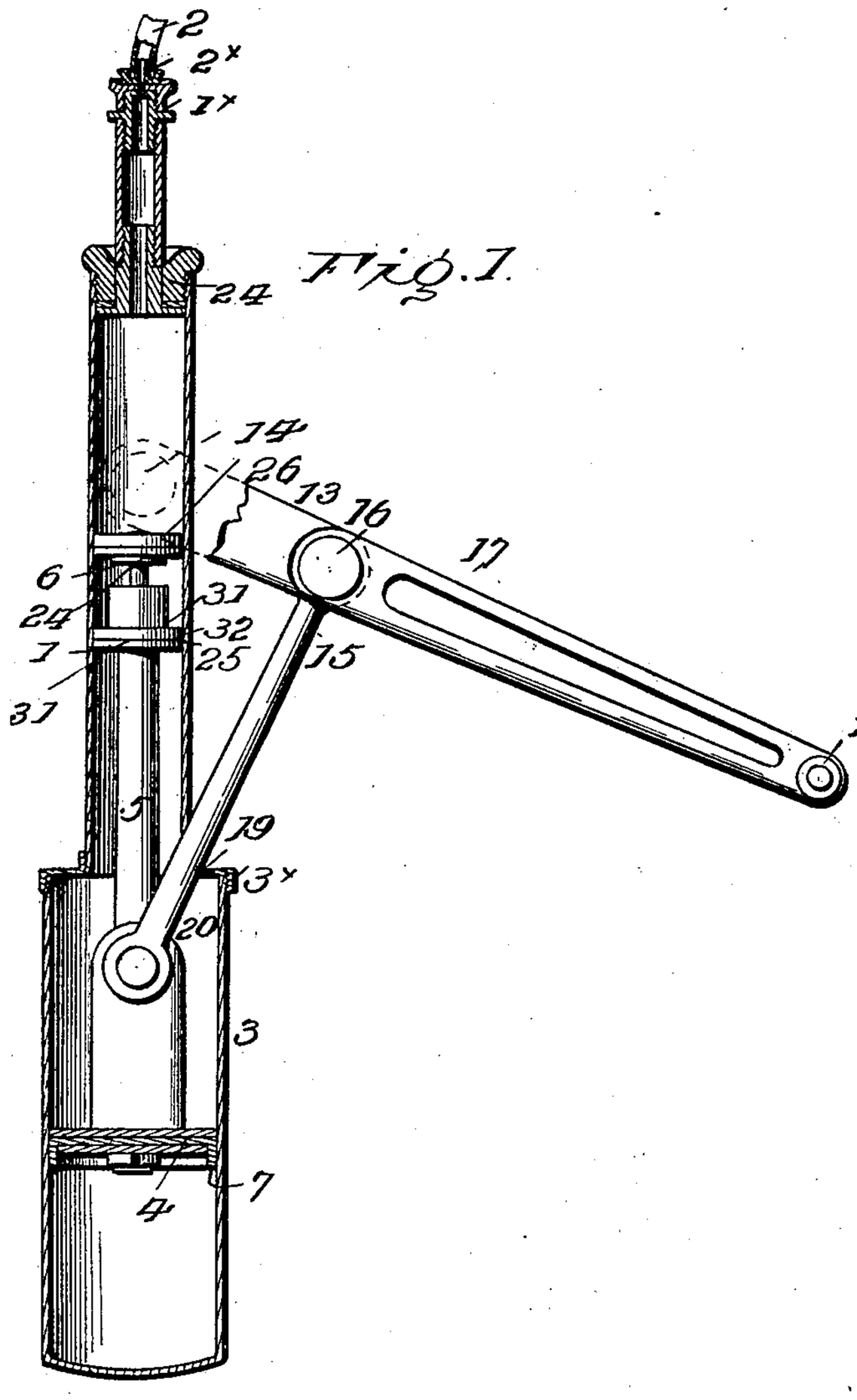
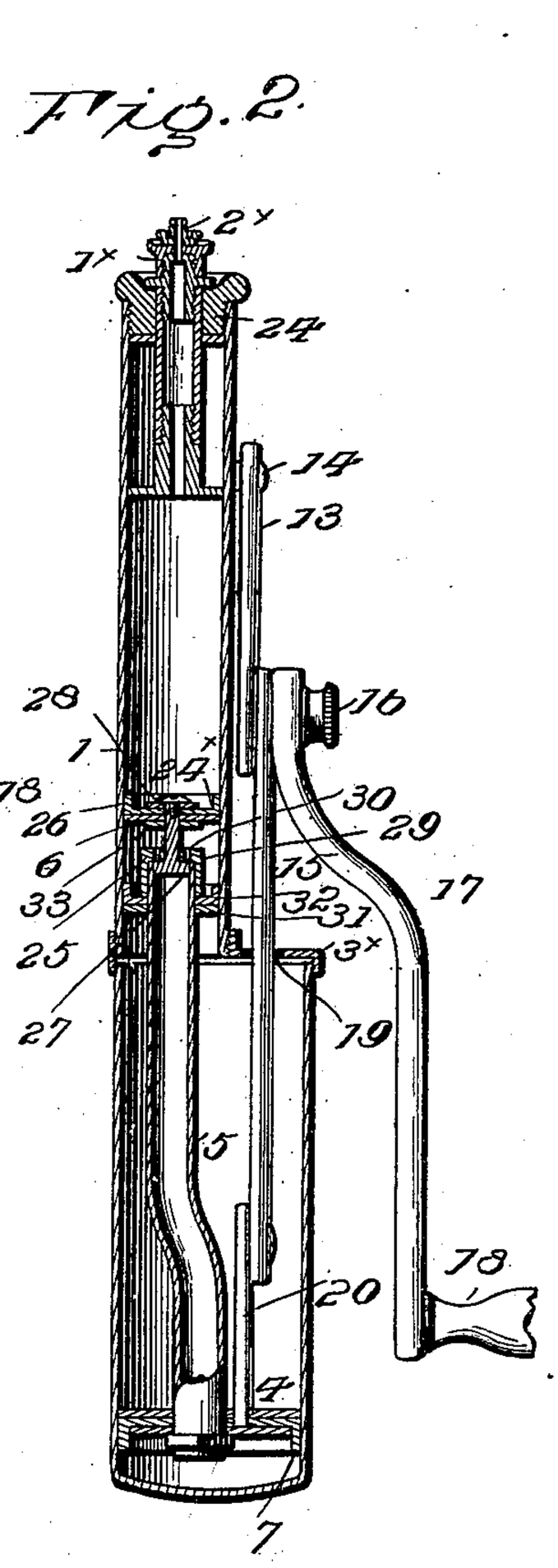


Fig. 2.



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2 Sheets—Sheet 2.

Fig. 3.

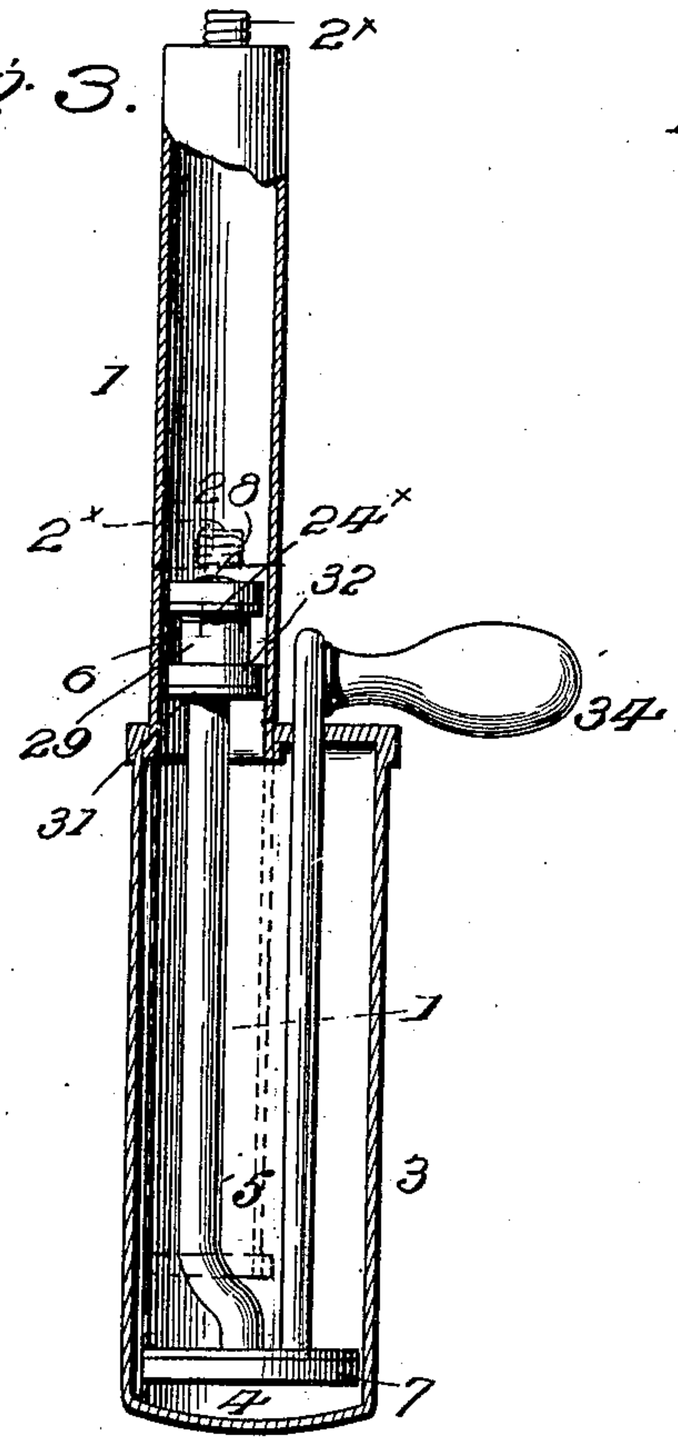


Fig. 4.

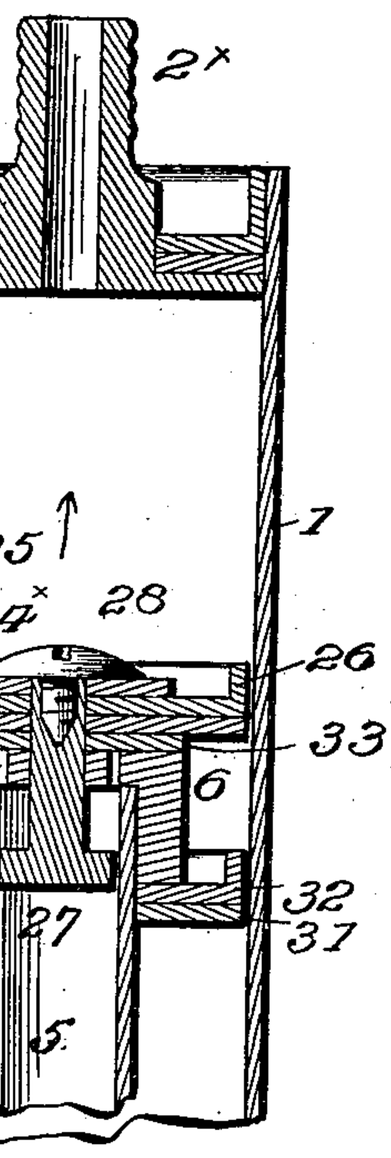
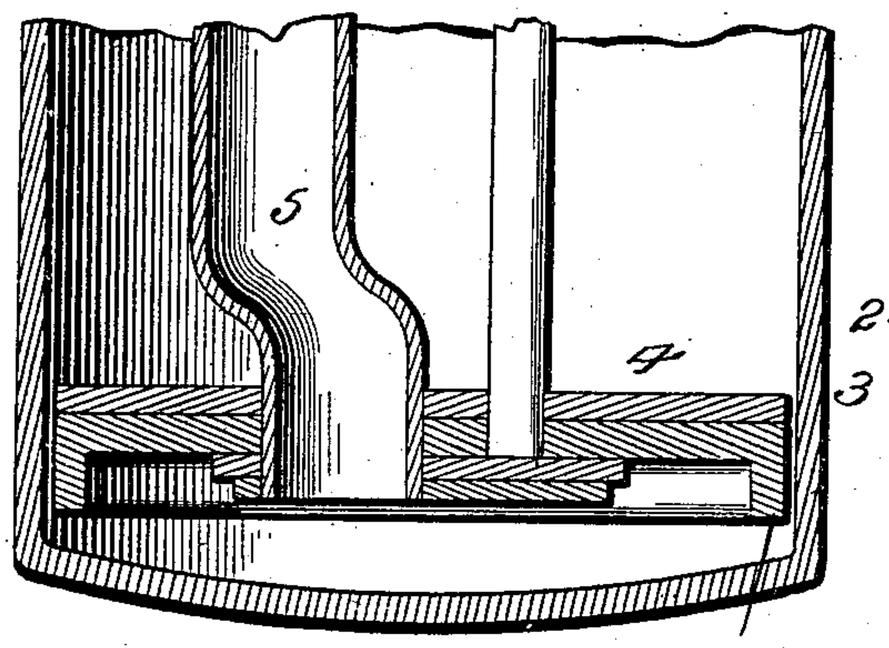
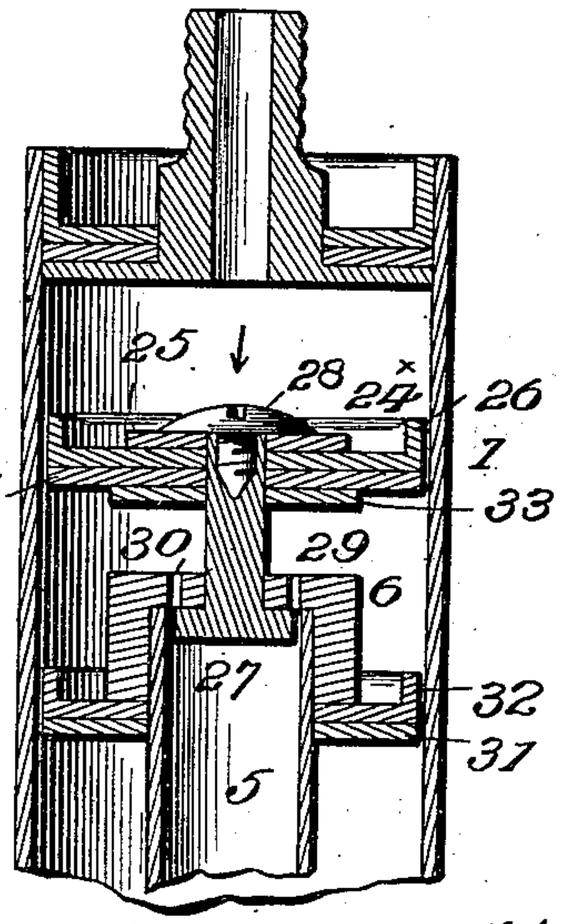


Fig. 5.

Fig. 6.





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UNITED STATES PATENT OFFICE.

GEORGE W. KELLOGG, OF HARTFORD, CONNECTICUT.

AIR-PUMP.

SPECIFICATION forming part of Letters Patent No. 698,710, dated April 29, 1902.

Application filed February 13, 1901. Serial No. 47,162. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. KELLOGG, a resident of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Air-Pumps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

The invention relates to air-pumps; and its object is to produce a simple, easily-operated, and economically-constructed device for producing a continuous increase of air compression or a continuous discharge of air.

The invention consists in the construction herein described and pointed out.

In the accompanying drawings, Figure 1 is a longitudinal section of the pump. Fig. 2 is a similar view taken transversely of the same, the movable parts being differently situated. Fig. 3 is a central longitudinal section showing a simpler form of operating devices and other modifications. Fig. 4 is a partial longitudinal section on an enlarged scale, the parts being situated as when the piston is moving forward. Fig. 5 is a partial longitudinal section of the same, showing a different situation of movable parts as when the piston is retreating. Fig. 6 is a partial longitudinal section of the larger cylinder of the pump.

Numeral 1 denotes a cylinder with a flanged head $3^{\times}$, which is screw-threaded to connect with the suitably-threaded end of a cylinder 3.

2 denotes a flexible air-tube, and $2^{\times}$ a discharge-nipple.

A coupling is denoted by $1^{\times}$.

The capacity of cylinder 3 is several times greater than that of cylinder 1, as indicated. The said cylinder 3 has a piston 4, connected by tube 5 to the piston 6, the latter being operative in the smaller or forward cylinder 1. The space below piston 4 communicates with the space above piston 6 by means of the tube 5, which may be bent, substantially as shown in Fig. 2, to provide a central or approximately central situation of its connections with the respective pistons of unequal diameters in case, as preferred, the forward cylinder 1 is mounted at one side of the proximate end of the other cylinder to provide for the convenient attachment of the piston-moving devices.

7 denotes a piston flange or packing arranged, as is common, to admit the passage of air around it into the space below when the piston 4 is moving forward or toward the cylinder 1 and to prevent its passage when the piston is oppositely moved. Thus when piston 4 moves away from the lower or free end of its cylinder the air passes freely around the flanged packing 7, but when piston 4 returns the flanged packing is expanded to pack the joint between itself and the cylinder-wall and the air is compressed and forced through the tube 5 and forward of said piston 6. The piston 6 acts as a check-valve to prevent the return of the compressed air through the tube 5, as indicated in Fig. 4, to be described.

The air compressed many times in cylinder 1 is forced out through tube 2 when piston 6 moves forward toward the outlet end of its cylinder. By this construction a continuous compressing effect may be produced in any air-receptacle suitably communicating with the pump-discharge pipe 2, or a continuous blast of air may be produced, as desirable, in a so-called "atomizer," for example.

The nipple, nipple-tube, and coupling can be pushed back through the hollow plug 24 and into the cylinder 1, if desired, as indicated in Fig. 2.

To suitably reciprocate the pistons, an arm 13 is loosely supported on a stud 14, fixed to the cylinder 1 and pivotally connected to an arm or rod 15, which latter has a pivot connection with the piston 4 by means of a plate 20, as shown in the present instance. The arm 13 carries the stud 16, fixed thereto, and the arm extension 17 is held against rotation on said stud and is fixed thereto by a suitable thumb-nut screwed upon the end of the stud. The construction is such that by turning arm extension 17 and arm 13 the stud 16, which is fixed to both, is turned about the stud 14. The rotation of arm 13 about the stud 14 causes the upper end of the rod 15 to move about said stud 14, with the effect to reciprocate said rod and pistons 4 and 6. The arm

extension 17 is made detachable by means of a removable nut, and this, together with the adaptability of the nipple-coupling and connecting-tube 2 to be depressed or retracted in the cylinder 1, enables the pump to be put in compact form when not in use. If desired, the two cylinders may also be uncoupled by unscrewing their connection in the flanged cap $3^{\times}$.

The upper head of the cylinder 3 has a slot 19 to permit the lateral movement of rod 15.

Although in the above description the pistons are said to move up and down, it is obvious that their movement may have any desired angle with respect to a vertical line or that the device may be supported to exactly reverse the direction of the movement. These differences and also mechanical changes that do not substantially alter the principles of construction and operation are contemplated.

Referring to Figs. 3 to 6, inclusive, for a more detailed description of the pistons, the piston 6 comprises two metal washers $24^{\times}$ and 25 and a cup-shaped packing 26. These parts are held on a headed stud or bolt 27 by means of a screw 28. The bolt 27 is movably connected with a cap 29, perforated at 30 and fixed upon tube 5. A washer 31 holds a cup-shaped packing 32 to the cap. The two cup-shaped packings 26 and 32 are pressed against the cylinder when the piston is forced forward, and when the piston retreats they permit passage of air. When the piston is forced forward to compress air, the ports 30 are closed by a leather packing 33, as indicated in Fig. 4, and when the piston is withdrawn said ports are opened, as indicated in Fig. 5, and at such time air compressed by piston 4 and driven through tube 5 is forced through said ports and past the cup-packing 26. These operations are effected by the handle 34. The descent of the piston 4 forces compressed air into cylinder 1, and the return of said piston 4 and the corresponding advance of piston 6 further compresses air in said cylinder or forces its contents out, according as the exit is closed or open. By this means compressed air may be constantly discharged or may be accumulated in a receptacle connected to the discharge-nipple. When piston 4 descends, air may enter through the head $3^{\times}$ about the operating-rod and by the piston 4.

For the purpose of storage or transportation the small cylinder 1 can be telescoped in cylinder 3, as indicated by broken lines in Fig. 3.

It should be understood that the telescoping of the cylinders though not essential in every case is applicable to the forms shown in the several figures substantially as indicated in said Fig. 3.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an air-pump, the two cylinders of unequal diameters, the smaller one being mounted end to end upon the other and at one side of its center, a piston in each cylinder having a hollow rigid connection with that in the other whereby the cylinders may communicate, and mechanism for moving the pistons mounted upon the side of the smaller cylinder and connected through the end of the larger cylinder to its piston.

2. In an air-pump, two cylinders mounted endwise one upon the other, two rigidly-connected pistons, one in each cylinder, an arm connected to a cylinder on its exterior to rotate about its support thereon, a rod pivotally connected to the piston of the other cylinder and to said arm, and an extension 17 fixed to the arm for rotating it and the proximate end of the rod about the exterior pivot-support of the arm.

3. In an air-pump, two cylinders mounted endwise one upon the other, two rigidly-connected pistons one in each cylinder, an arm connected to the exterior of a cylinder to rotate about its support thereon, a rod pivotally connected to the piston of the other cylinder and to said arm, a piston-actuating arm extension to rotate the arm and rod about the pivot-support of the arm, said arm, arm extension and rod being adapted to be held adjacent the cylinders and lengthwise thereof when at rest.

4. In an air-pump, two cylinders mounted endwise one upon the other, two rigidly-connected pistons one in each cylinder, an arm connected to the exterior of a cylinder to rotate about its support thereon, a rod pivotally connected to the piston of the other cylinder and to said arm, a piston-actuating arm extension to rotate the arm and rod about the pivot-support of the arm, said arm, arm extension and rod being adapted to be held adjacent the cylinders and lengthwise thereof, and said arm extension being detachable.

5. The pump comprising two lengthwise-connected cylinders of unequal size, the smaller being mounted eccentrically on the larger, a piston in each cylinder, a bent tube connecting said pistons, and a device for simultaneously operating said pistons comprising a member passing through the end of the larger cylinder adjacent the connected end of the smaller and connected to the piston of the larger cylinder.

6. The pump comprising two lengthwise-connected cylinders of unequal size, the smaller being mounted eccentrically on the larger, a piston in each cylinder, a bent tube connecting said pistons, and a device for simultaneously operating said pistons comprising a member passing through the end of the larger cylinder adjacent the connected end of the smaller and connected to the piston of the larger cylinder, said tube having a check-valve.

7. The pump comprising two lengthwise-telescoping connected cylinders of unequal size, the smaller being mounted eccentrically on the larger, pistons, one for each cylinder, and means for operating the pistons comprising a member passing through the end of the larger cylinder.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

GEORGE W. KELLOGG.

Witnesses:
GEO. E. MOSES,
LOUIS M. AMES.