(No Model.)

L. S. HOYT.

AIR PUMP.

No. 309,391. Patented Dec. 16, 1884.

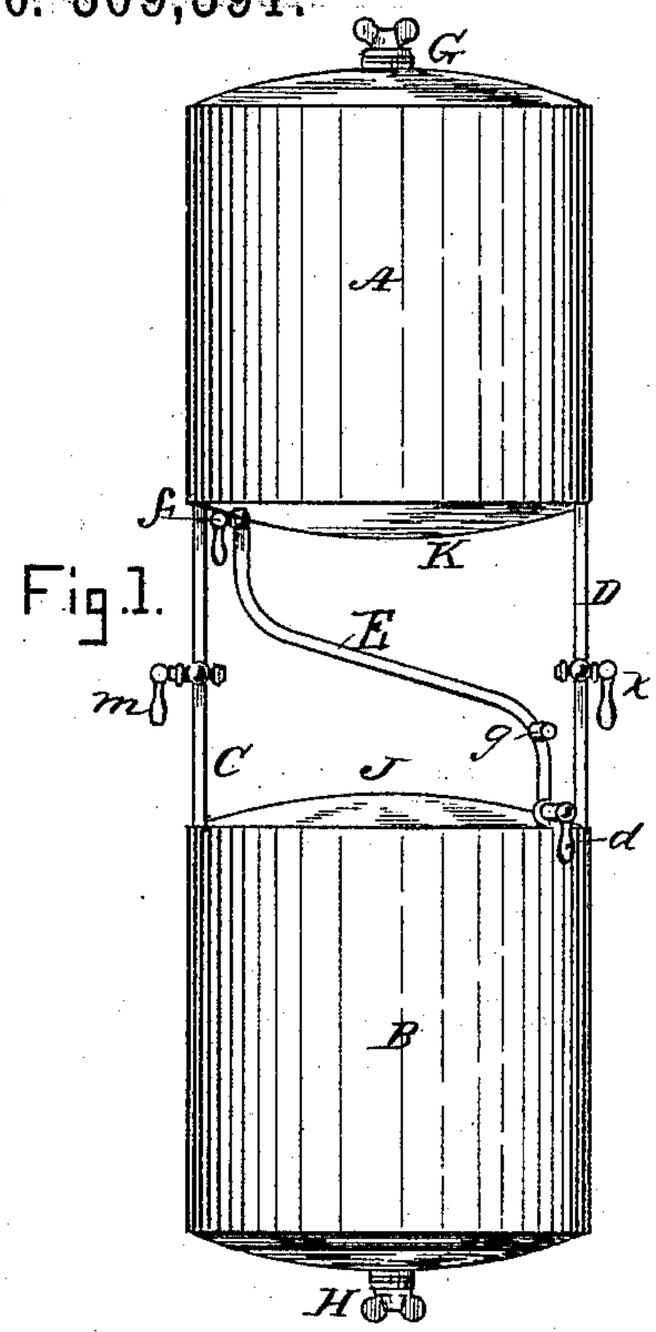

Fig. 1.

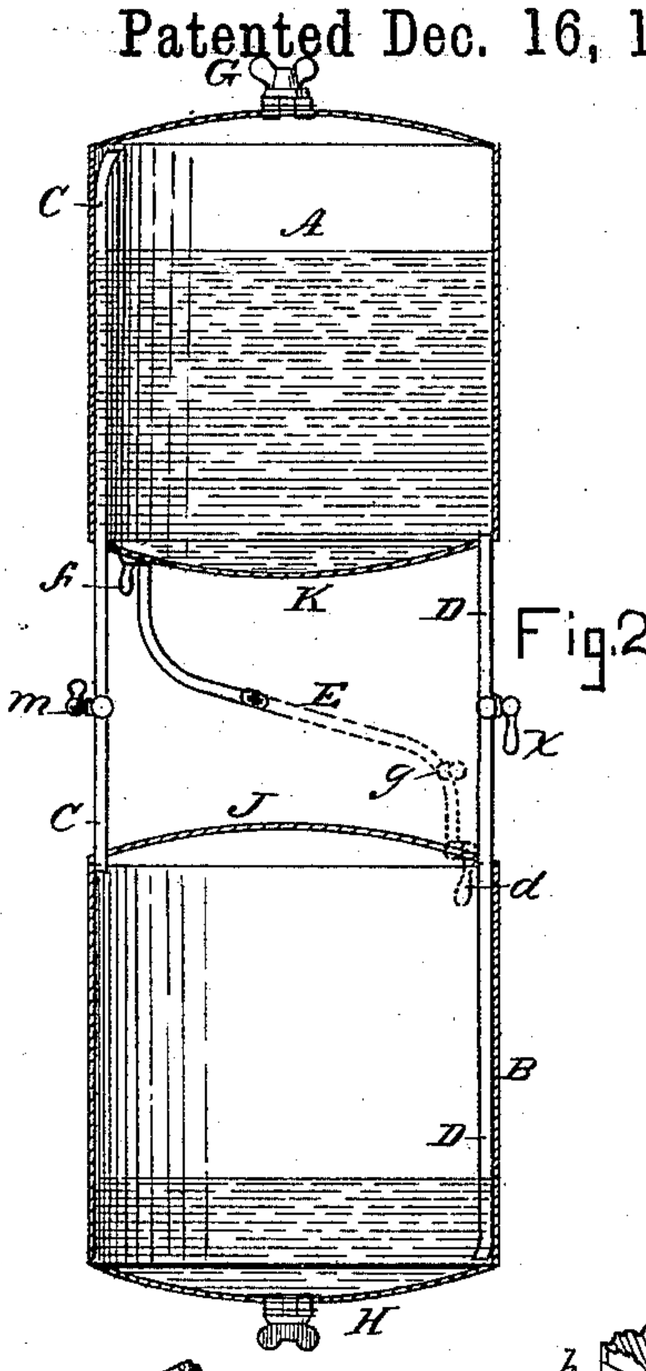

Fig. 2.

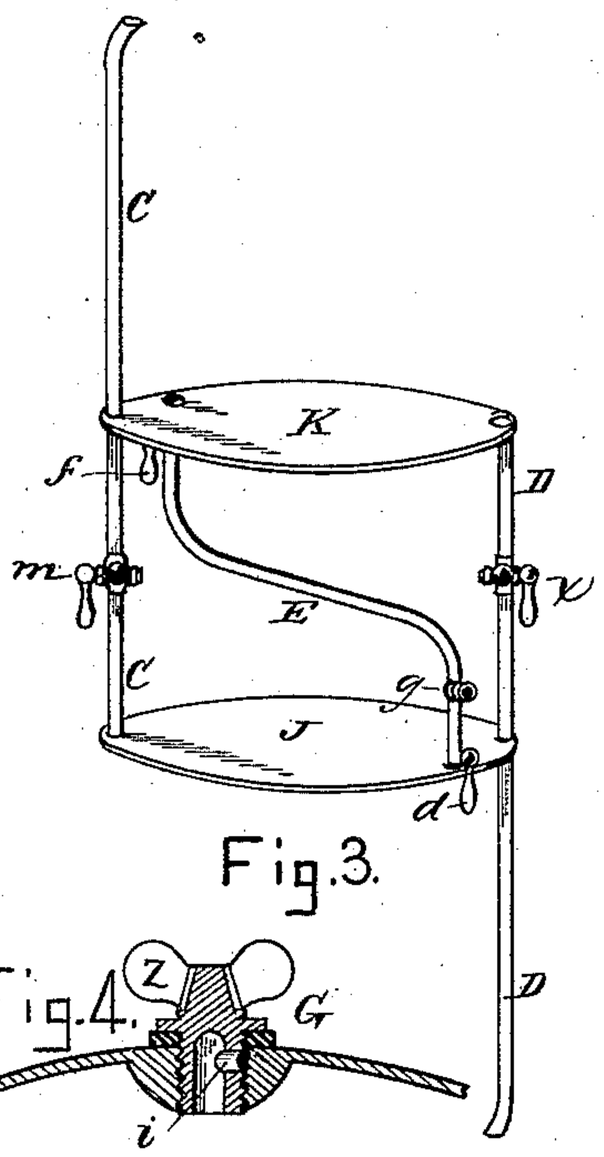

Fig. 3.

Fig. 4.

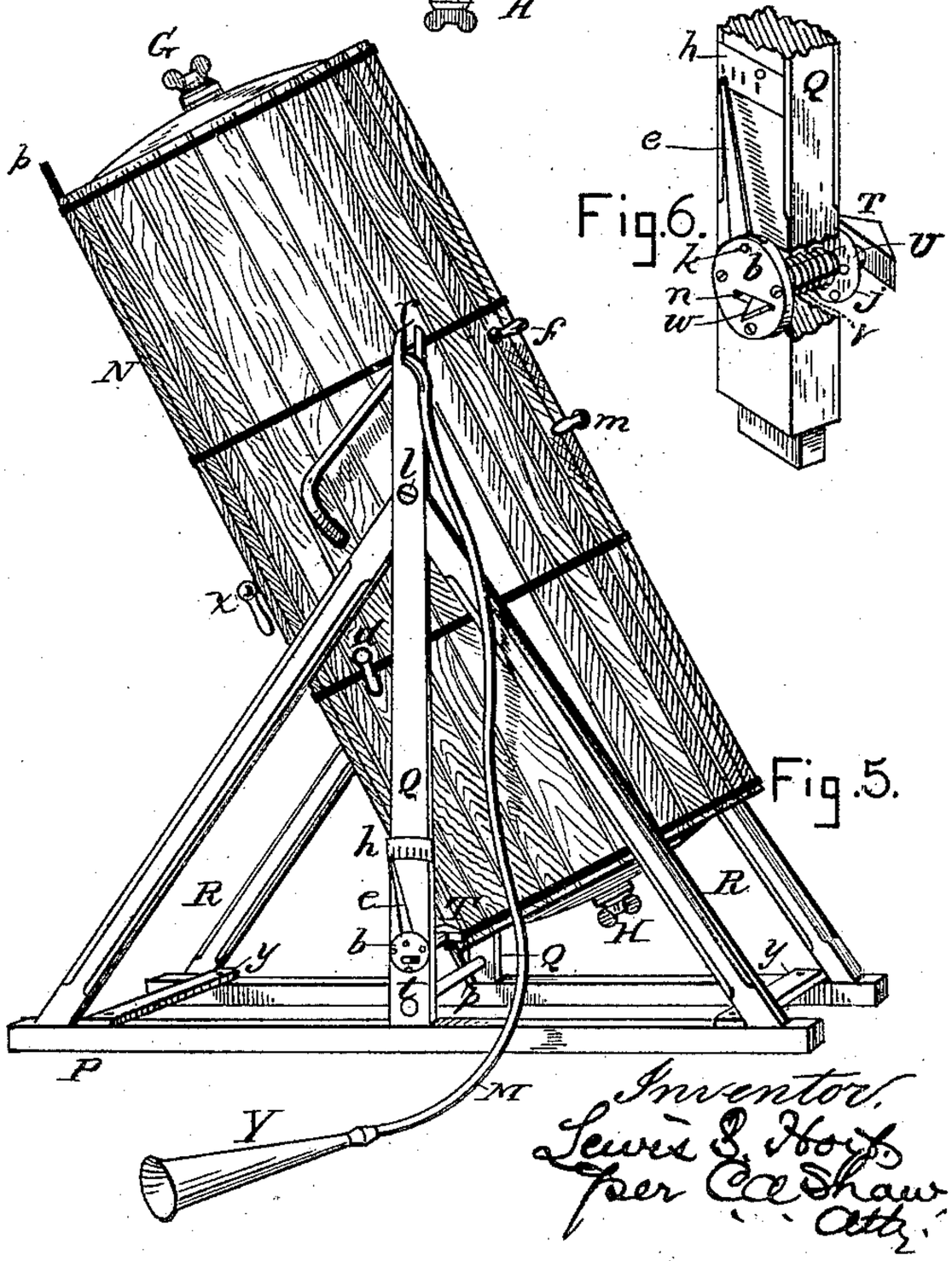

Fig. 5.

Fig. 6.

Witnesses:
H. C. Fenwick
L. J. White.

Inventor:
Lewis S. Hoyt
per C. C. Shaw
Atty.

UNITED STATES PATENT OFFICE.

LEWIS S. HOYT, OF BOSTON, ASSIGNOR TO HIMSELF, JOHN M. CULVER, OF ABINGTON, AND CHARLES A. SHAW, OF BOSTON, MASSACHUSETTS.

AIR-PUMP.

SPECIFICATION forming part of Letters Patent No. 309,391, dated December 16, 1884.

Application filed September 20, 1883. (No model.)

To all whom it may concern:

Be it known that I, LEWIS S. HOYT, of Boston, in the county of Suffolk, State of Massachusetts, have invented a certain new and useful Improvement in Air-Pumps, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention appertains to make and use the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation representing my improved pump with the case removed; Fig. 2, a vertical longitudinal section of the same; Fig. 3, a perspective view showing the inner ends or bottoms of the tanks and their connecting-pipes; Fig. 4, a vertical transverse section of the air-valve; Fig. 5, an isometrical projection showing the pump complete, and Fig. 6 a sectional view showing the indicator.

Like letters of reference indicate corresponding parts in the different figures of the drawings.

My invention relates to that class of air-pumps which are designed for forcing air into beer-barrels, supplying air to vapor-gas machines, blowing fog-horns, &c.; and it consists in a novel construction and arrangement of the parts, as hereinafter more fully set forth and claimed, by which a simpler, cheaper, and more effective device of this character is produced than is now in ordinary use.

The nature and operation of the improvement will be readily understood by all conversant with such matters from the following explanation.

In the drawings, A B represent the tanks or reservoirs; C D, the connecting-pipes; E, the eduction-pipe, and G H the air-valves. The connected tanks are reversible endwise, being pivoted by suitable means in a suitable supporting-frame.

The tanks, which are air-tight, are preferably cylindrical in form, composed of sheet-copper or other similar material, and provided with convex bottoms and heads, as shown.

The connecting-pipes C D are disposed on opposite sides of the tank, the pipe C opening downwardly through the bottom J of the tank B, and extending upwardly through the bottom K of the tank A, nearly to the top of the same. In like manner the connecting-pipe D opens upwardly through the bottom K of the tank A, and extends downwardly through the bottom J of the tank B, nearly to the bottom of said last-named tank.

The pipe C is provided with a stop-cock, *m*, and the pipe D with a stop-cock, *x*, these stop-cocks being preferably located midway between the bottoms J K.

The eduction-pipe E opens into the tank A through the bottom K, and, extending transversely across the space between the bottoms J K, also opens through the bottom J into the tank B, being provided near its ends with the stop-cocks *f d*, and centrally with the nipple *g*, to which the discharge-pipe M is attached.

The head of the tank A is provided with an air-valve, G, and the head of the tank B with a like valve, H, the valves preferably consisting of a hollow screw-plug, *z*, provided with the lateral opening *i*, so arranged that when the plug is partially turned out the air can pass freely through said opening into the tank, and when the plug is turned in the valve will be closed and air will be prevented from entering the tank, as best shown in Fig. 4, in which the plug is represented as turned in and the valve closed.

The tanks A B and pipes C D E are inclosed in a casing, N, preferably composed of staves and properly hooped. The casing is centrally pivoted or journaled in a suitable supporting-frame, as at 1, in a frame-work consisting of the bed-pieces P, standards Q, braces R, and cross-bars *y*, as shown in Fig. 5.

The pipe M is flexible, and passes through the side of the casing, its inner end being secured to the nipple *g* on the pipe E, and its body resting in the notch *r*, formed in the upper part of the standard Q.

In the use of my improvement the valve H is closed and the tank A filled with water nearly to the top of the pipe C, the water being introduced by removing the plug of valve G. The stop-cocks *m f d* are then closed and the cock *x* opened, permitting the water to pass through the pipe D into the tank B. As

the water passes downwardly through the pipe D into tank B, the lower end of the pipe, which opens near the bottom of taid tank, is quickly submerged, thereby preventing the air in the tank from escaping upwardly through said pipe into tank A. When the stop-cocks *m f d* are closed, the cock *x* and valve G open, and the mouth of the pipe D submerged, as shown in Fig. 2, the air in tank B will be prevented from escaping, while the water in the superposed tank A, in accordance with a well-known law ot hydrostatics, will continue to pass downwardly through the pipe D, and forcibly compress or condense the air in the lower tank, which may be drawn off for use as required through the pipe M by opening the stop-cock *d*. After all the water in tank A has passed into tank B and the air in tank B been used through the pipe M, the valve G and stop-cocks *x d* are closed and the stop-cock *m* opened. The tanks are then reversed or turned upside down, bringing tank B on top and tank A underneath, after which the valve H is opened, thereby permitting the water to pass downwardly through pipe C into tank A, and compress or condense the air in tank A in the same manner described for tank B, the compressed air being drawn off for use through the pipe M by opening the stop-cock *f*.

To protect the tanks and their connecting-pipes from injury, and to enable them to be easily turned or reversed, as described, they are provided with the casing N and mounted in a frame-work on the journals *l*, as shown in Fig. 5.

Projecting from either end of the casing N there is a pin or stud, *p*, adapted to strike a stop or cross bar, *t*, mounted in the lower ends of the standards Q, and thereby prevent the casing and inclosed tanks from performing an entire revolution in the frame-work.

When the pump is in use, it is desirable to have it stand in a slightly-inclined position, as shown in Fig. 5, in order that the pipes C D may draw the water from the lowest point in the upper tank, thereby enabling all of the water to be utilized. To accomplish this, or to hold the pump in a slightly-inclined position when in use, it is centrally journaled, so as to revolve freely in the frame, and provided with a stud, *p*, projecting on the same side from either end, so that when the pump is turned to reverse the tanks the studs will strike the stop *t* and hold it in the position as shown in Fig. 5.

It is also desirable to know when the water in the upper tank is exhausted, or has all passed through the connecting-tube into the lower tank. To determine this I make use of an indicator, constructed as best seen in Fig. 6, in which Q is the standard or upright of the frame-work; U, a sliding rod passing horizontally through the standard; *v*, a coiled spring disposed around the rod; *b j*, plates screwed to the sides of the standard; *e*, an index or hand, and *h* a scale. The rod U passes loosely through a hole in the plate *j*, and is provided at its inner end with the double inclined head T, and at its outer end with the inclined projection *w*, which is fitted to work in an elongated slot, *n*, in plate *b*. The finger *e* is pivoted near its lower end at *k* in such a manner that its upper end has a constant tendency to fall outwardly, and thereby keep its lower end against the inclined edge of the projection *w* of the rod U. One end of the spring *v* abuts against the inner side of the plate *b*, and its opposite end against a pin, (not shown,) which projects laterally from the rod U, the spring acting expansively to force the rod in the direction of the head T.

The operation of the indicator herein shown is as follows: When the upper tank is full and the pump in the position shown in Fig. 5, the center of gravity will be outside the center of motion, and consequently the stud *p* will be in forcible contact with the stop *t;* but as the water passes from the upper to the lower tank the center of gravity will change and the pump assume a perpendicular position, thereby causing the stud *p* to be moved away from the stop *t*. The indicator is so arranged in the standard Q that the head T projects inwardly from said standard, as shown in Fig. 5, and as the case N swings its lower end is brought into contact with said head, thereby forcing the rod U outwardly and causing the inclined side of the projection *w* to be brought into contact with the lower end of the finger *e* and to move said finger over the scale *h*, and thereby show the height of the water in the lower tank or indicate when all of the water in the upper tank has passed into the lower tank, in a manner which will be readily obvious without a more explicit description.

In addition to the stop-cock *d* the pipe M may be furnished with a stop-cock, if desired, and is designed to be properly connected with a beer cask or barrel, carburetor, fog-horn, blow-pipe, or any other vessel or thing in connection with which the pump is adapted to be used, a horn or wind-instrument, Y, being represented as connected with said pipe in Fig. 5.

The standards Q are not arranged in close contact with the casing N, a space being left between the same for the pipe M as the case swings. The standard is also elongated or extended above the journals or pivots *l*, and a notch or rest, *r*, formed in the upper end to hold the pipe M.

Having thus explained my invention, what I claim is—

1. The tank A, provided with the valve G, the tank B, provided with the valve H, the pipe C, provided with the stop-cock *m*, the pipe D, provided with the stop-cock *x*, and the pipe E, provided with the stop-cocks *f d* and outlet or nipple *g*, combined and arranged to operate substantially as set forth.

2. The combination, in a hydraulic air-compressor, of two connected air-tight tanks, one above the other, the connected structure being reversible endwise, a valved pipe extend-

ing from at or near the bottom of the upper tank to near the bottom of the lower tank, a valved pipe extending from at or near the top of the lower tank to near the top of the upper tank, air-inlet valves at the outer ends of said tanks, and air-discharge cocks or pipes at or near the inner adjacent ends of said tanks, substantially as set forth.

3. The combination, in a hydraulic air-compressor, of two connected air-tight tanks, one above the other, the connected structure being reversible endwise, a valved pipe extending from at or near the bottom of the upper tank to near the bottom of the lower tank, a valved pipe extending from at or near the top of the lower tank to near the top of the upper tank, inlet-valves at the outer ends of said tanks, and a pipe connecting said tanks, provided with two cocks and an intermediate discharge-nipple.

4. The combination, in a hydraulic air-compressor, of two connected air-tight tanks, one above the other, the connected structure being reversible endwise, a valved pipe extending from at or near the bottom of the upper tank to near the bottom of the lower tank, a valved pipe extending from at or near the top of the lower tank to near the top of the upper tank, air-inlet valves at the outer ends of said tanks, and a stop for holding the connected tanks in an upright or inclined position.

5. The combination of a suitable support, connected tanks, one above the other, pivoted to said support, and an indicator attached to said support for indicating the height of water in the connected tanks, substantially as described.

6. The indicator herein described, consisting of a sliding rod, U, which is provided with a double-inclined head, T, inclined projection *w*, and spring *v*, in combination with the finger *e* and plates *b j*.

7. The combination, in a hydraulic air-compressor, of two connected air-tight tanks, one above the other, the connected structure being reversible endwise, a valved pipe extending from at or near the bottom of the upper tank to near the bottom of the lower tank, a valved pipe extending from at or near the top of the lower tank to near the top of the upper tank, inlet-valves at the outer ends of said tanks, a pipe connecting said tanks, provided with two cocks and an intermediate discharge-nipple, and a flexible pipe connected to said nipple.

LEWIS S. HOYT.

Witnesses:
L. J. WHITE,
C. A. SHAW.