G. W. HARVEY & W. D. SEAL.

Apparatus for Compressing Air and Forcing Beer

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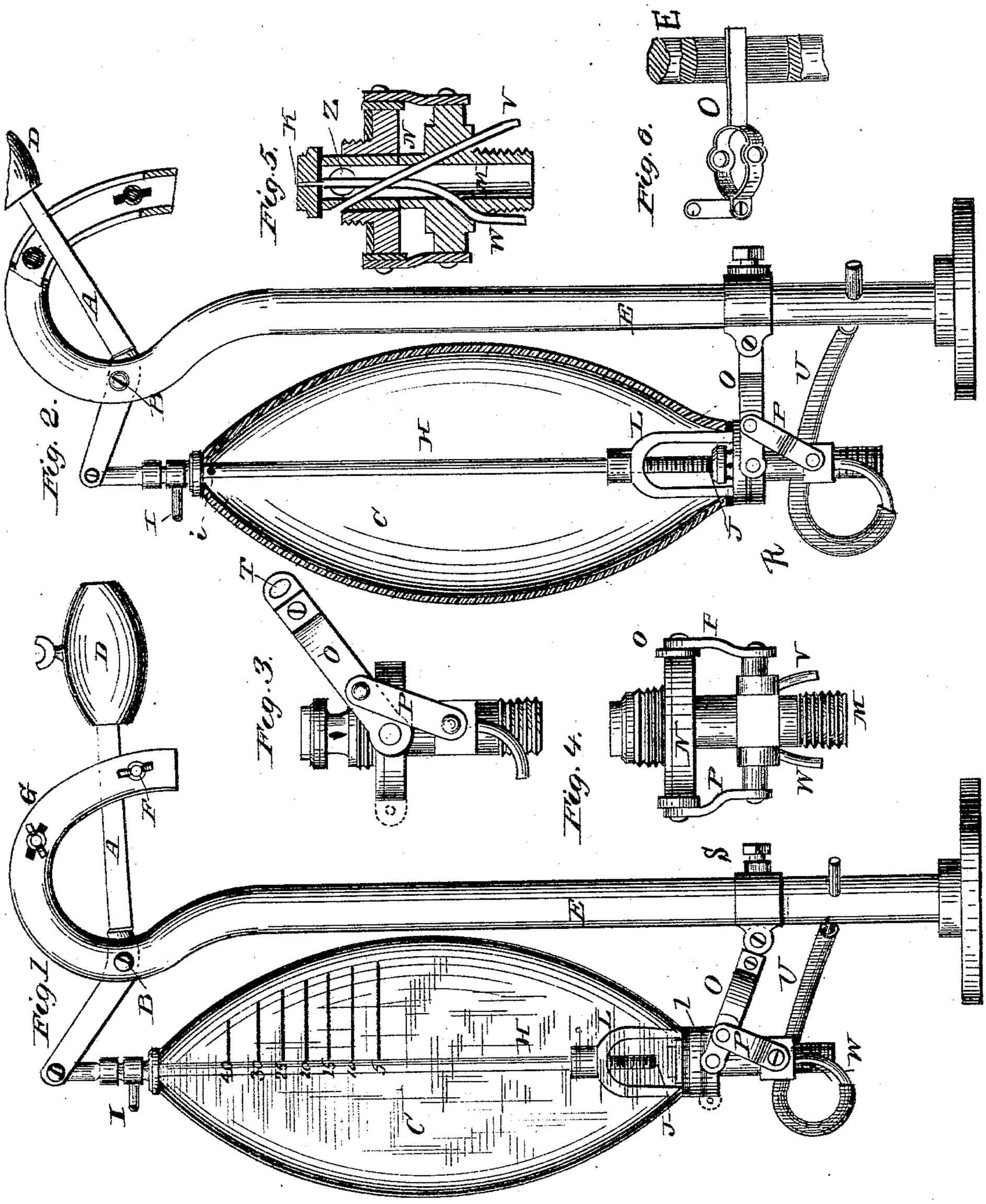

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IMPROVEMENT IN APPARATUS FOR COMPRESSING AIR AND FORCING BEER.

Specification forming part of Letters Patent No. **210,943**, dated December 17, 1878; application filed November 11, 1878.

To all whom it may concern:

Be it known that we, GEORGE W. HARVEY and WM. D. SEAL, of Washington, District of Columbia, have invented an Improvement in Apparatus for Compressing Air for Forcing Beer and other Liquids; and we do hereby declare the following to be a full and correct description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a front view of the apparatus at rest or in position to commence filling the compressing-chamber with water. Fig. 2 is a view partly in section, and showing the parts in position for discharging the water. Figs. 3, 4, 5, and 6 are detached views.

Our air-compressing apparatus is intended for forcing beer and other liquids, and it is both automatic and adjustable.

It consists of a bent lever, or the equivalent thereof, in combination with a compressing-chamber supported thereon and counterpoised by an adjustable weight, the vibration of the lever giving the chamber different motions and swinging it alternately to and from the perpendicular line of the fulcrum, and in other devices, all of which will be fully understood by the following description:

The lever A is supported on the fulcrum B, and carries on its short arm the compressing-chamber C and on the long arm the counterpoise or weight D, which is adjustable. As this lever vibrates, the chamber C swings away from the fulcrum in descending or describing the small arc, and this action increases the leverage and the consequent force and velocity of the chamber. On the other hand, the weight D in rising is brought nearer the perpendicular line with the fulcrum of its lever in describing the larger arc, and this motion diminishes the leverage of the weight D, and consequently causes the chamber C to gather velocity in descending, and thus facilitates the opening of the water-waste and air-induction tube by raising or sliding up the hollow stem M, as will be described.

After the chamber is emptied of water, in rising it swings toward the fulcrum, while the descending counterpoise D swings away from the same, thus facilitating the motion by the advantages of the change of leverage in these reverse motions.

The standard E is made of tubular iron, and has a horseshoe-curve at the top, thus affording two arms on a single standard, all in one piece. The standard has two slots for inserting the lever A and allowing proper motion of the same, and is provided with an adjustable rest, F, and an adjustable check, G, both of which have rubber pads to soften the stroke of the lever thereon. By adjusting this rest and check the motion of the lever is regulated, and thus the amount of water for a single charge in the chamber is under control. This tubular standard is stiffer on account of being hollow, and the slots are more easily cut; therefore it is cheaper and better.

The central rod H serves to tighten the caps of the chamber C by engaging with the stirrup L, which is made in the same piece with the flanged ring *l*, Fig. 1. This flanged ring holds the packing to form a close joint with the glass chamber, and also has a female screw to receive the neck of the valve casing or flange N. This rod H is made hollow at its upper end for the escape of the air, which passes through hole *i* and the air-tube I, which is provided with a common check-valve in order to prevent the compressed air in the beer-barrel from returning to the chamber C while the latter is being emptied of water and taking in a fresh supply of air.

In a recess on the lower end of rod H is a rubber or elastic pad, J, for the purpose of closing the hole K in the top of the hollow sliding stem M when the chamber C and rod H descend to discharge the water, as will be more fully explained.

The hollow stem M is arranged to slide up and down in the flange N, being operated by means of the forked lever O and side links P, which couple the sliding stem to the lever. The fulcrum of this forked lever is on the trunnions R, and the other end of the lever is loosely pivoted to the adjustable band S. A slot, T, allows the lever to drop with the chamber C. This lost motion of the lever gives the

chamber greater velocity and momentum, and thus insures the opening of the water-waste Z, Fig. 5.

The flexible tube U is to be provided with a stop-cock. It supplies water to the chamber C through the small tube W, and the air is admitted through tube V. The chamber C is made of glass, so that the water can be readily seen and chamber can be examined and always kept clean; also, the air can be seen bubbling up through the water, by which means all impurities are washed out and the air cooled down to the temperature of the water.

The chamber C has a scale running from 5 to 40, to indicate the pressure of air in the beer-barrel, the apparatus first being set according to the pressure desired. For instance, suppose we wish to make a pressure of fifteen pounds to the square inch, and are using a water-pressure of sixty pounds from the hydrant or water-supply. Then we first fill the glass chamber C with water to the line 15 on the scale. Now adjust the weight D and rest F, so that the water in the chamber vibrates the lever A, thus counterbalancing the weight. Then set the check G so that the empty chamber C will be again counterbalanced by the weight D. Thus arranged the apparatus will keep up the pressure of fifteen pounds as long as the water-supply flows to keep the apparatus in motion. This water-supply is to have a stop-cock for closing off the flow of water.

Operation: When the apparatus is to be set in operation, the empty chamber stands at its highest point, as shown in Fig. 1, and the lever A is on the rest F. This rest and the check G, and also the weight D, are all adjusted according to the pressure desired, as shown by the scale on chamber C, say 40, for the height of the water required to counterpoise the weight D. Now the water is allowed to flow from tube U into the chamber, thus compressing the air and driving it over into the beer-cask through tube I. When the water rises to 40 on the scale, the chamber C, on account of its increased weight, descends, as seen in Fig. 2. At the same time it swings away from the standard and acquires a greater leverage and velocity. This motion operates the lever O and raises the sliding stem M, thus opening the water-waste Z and the air-supply tube V. As the water flows out the air is seen bubbling up through the water to fill the chamber. When the chamber is empty of water the weight D reverses the lever A, and the chamber again resumes its position, as seen in Fig. 1. The apparatus thus works automatically, and is self-regulating until stopped.

It may be mentioned that a plate of metal or a flat wide lever may be used instead of the bent lever A, the essential feature being that the fulcrum and point of attachment for the support of the compressing-chamber shall be so set in relation to the weight D as to give the chamber an eccentric motion, or to swing the chamber away from the fulcrum or standard of support as the chamber descends.

Instead of the forked lever O and side links P, the same motion may be obtained by the devices shown in Fig. 6, which are a modification of lever O, which, in this case, has one end inserted into a slot in the standard E, while the other end has a link for connecting the lever to an ear. (Indicated in dotted lines, Figs. 1 and 3.) The ring in this modified lever embraces the sliding stem M, and is pivoted thereto in place of the two links P, above described.

If desired, a double machine may be used; but we prefer to use two separate machines, if necessary, to maintain a constant stream of air. With a double machine the whole must stop if any part is out of repair; but with two separate machines one may work while the other is being repaired.

In most cases we do not deem it essential to have a constant current of air, as the strong expansion of air will keep up the pressure upon the beer or other liquid.

Having described our invention, what we claim is—

1. In an automatic apparatus for compressing air, the bent lever A, or its equivalent, in combination with the compressing-chamber C and the adjustable weight D, for the purpose of giving the chamber a motion eccentric to the motion of the counterpoise or weight D, substantially as set forth.

2. In combination with the compressing-chamber C, the sliding hollow stem M, for the purpose of alternately opening and closing the supply-passages for admitting water and air to the chamber, and also discharging the water, as set forth.

3. The forked lever O and side links P, or their equivalents, for automatically operating the hollow stem M as the compressing-chamber rises and falls, substantially as described.

4. The slot T in the forked lever, or its equivalent, for allowing the lost motion as the chamber C begins to drop, thus increasing the velocity and stroke or momentum of the chamber in dropping, and insuring the motion of the hollow stem M by the consequent increased action of the forked lever O, as specified.

5. In an air-compressing apparatus, the standard provided with the adjustable rest F and adjustable check G, in combination with the bent lever A, substantially as set forth.

6. The combination of the air-compressing chamber C with the suspending rod H, having its upper end made hollow for the escape of air, and the lower end recessed to hold the rubber or elastic pad J, substantially as described.

7. The stirrup L and flanged ring *l*, in com-

bination with the tightening-rod H and valve-seat, substantially as set forth.

8. In an air-compressing apparatus, a transparent chamber provided with a scale for readily ascertaining the height of the water in the chamber and the amount of pressure exerted upon the beer or other liquid, and also when it is necessary to clean the chamber, substantially as set forth.

The above specification of our said invention signed and witnessed, at Washington, this 11th day of November, A. D. 1878.

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Witnesses:
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