No. 618,243. Patented Jan. 24, 1899.

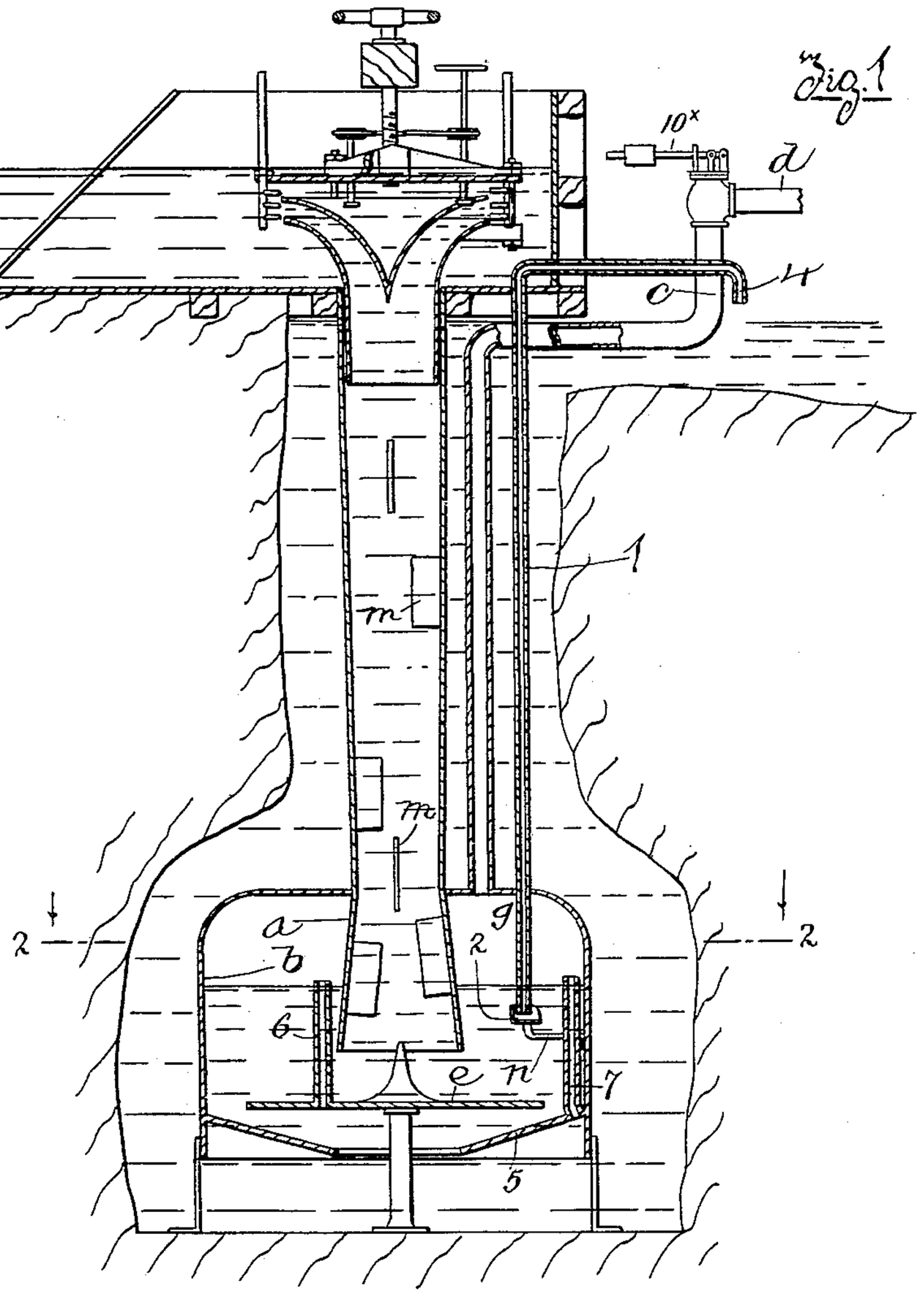
C. H. TAYLOR.

HYDRAULIC AIR COMPRESSING APPARATUS.

(Application filed Apr. 9, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1



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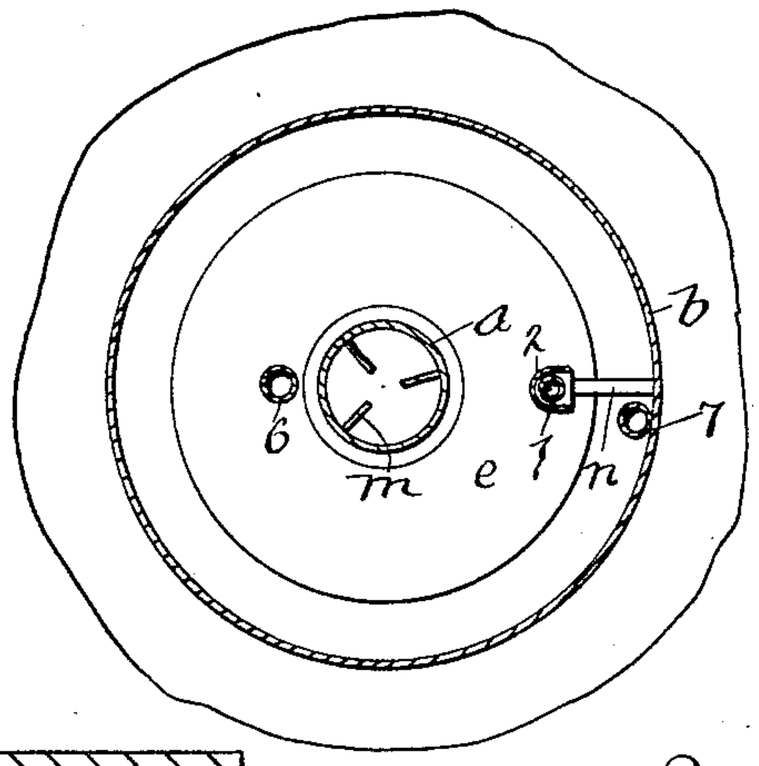

Fig. 2

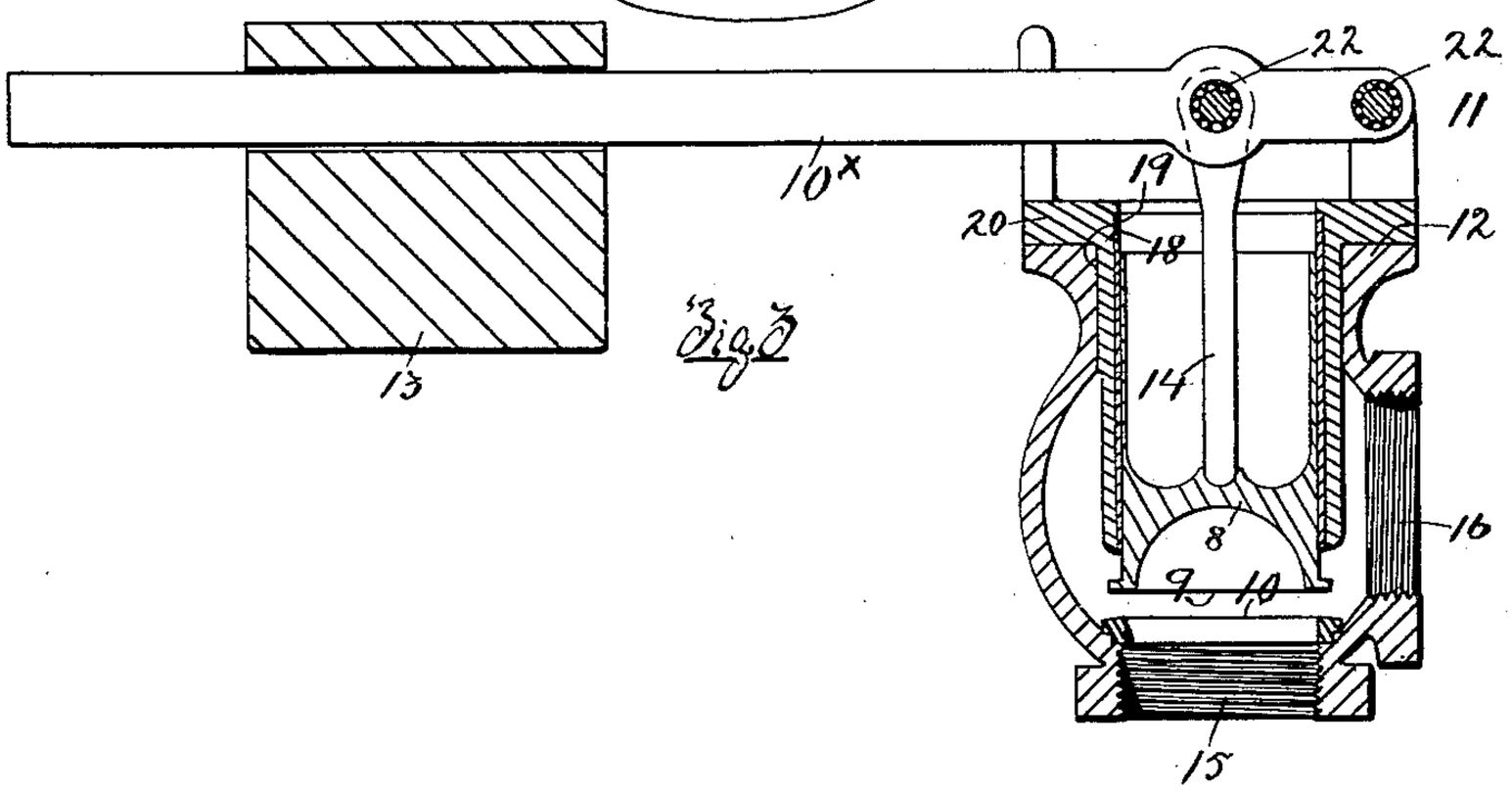

Fig. 3

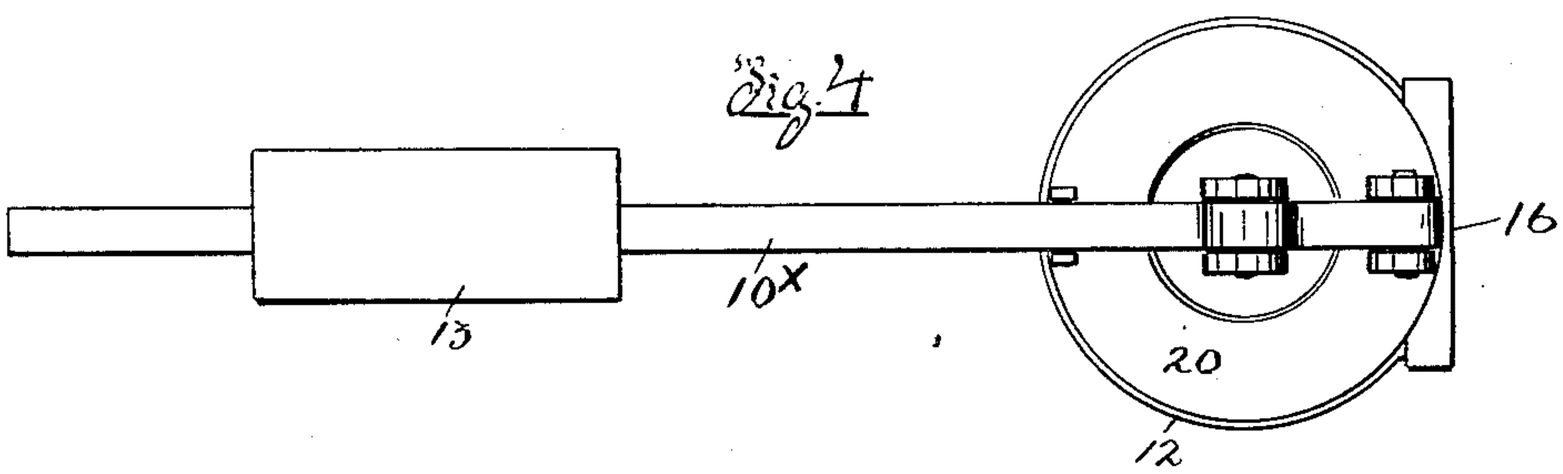

Fig. 4

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UNITED STATES PATENT OFFICE.

CHARLES H. TAYLOR, OF MONTREAL, CANADA, ASSIGNOR TO THE TAYLOR HYDRAULIC AIR COMPRESSING COMPANY, LIMITED, OF SAME PLACE.

HYDRAULIC AIR-COMPRESSING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 618,243, dated January 24, 1899.

Application filed April 9, 1897. Serial No. 631,480. (No model.)

To all whom it may concern:

Be it known that I, CHARLES HAVELOCK TAYLOR, of the city of Montreal, in the district of Montreal and Province of Quebec, Canada, have invented certain new and useful Improvements in Hydraulic Air-Compressing Apparatus; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention relates more particularly to air-compressing apparatus of the kind described by Patents Nos. 543,410, 543,411, and 543,412, granted to me on the 23d day of July, 1895, and comprises the following improvements: first, the employment of a blow-off for the purpose of preventing the water in the separating-chamber sinking to a level below the spreader or disperser plate, and so avoiding any possibility of the compressed air being carried downward and out into the return column of water; secondly, the use of an automatically-operated controller or valve adapted to control the passage of air through the air-conductor leading from the separating-tank; thirdly, the arrangement of a deflecting-plate in the separating-tank for the purpose of directing the water in a centripetal direction before it finally escapes from such tank in order to increase the length of travel in such tank and secure a more effective separation of the air from the water; fourthly, the connecting of the air-spaces beneath the spreader and the deflecting-plate in the separating-tank with the air-space proper in the upper portion of the tank in order that any air in such spaces may pass to the air-space proper, and all as more fully hereinafter described, and pointed out in the claims.

For full comprehension, however, of the invention reference must be had to the annexed drawings, forming a part of this specification, in which like symbols indicate corresponding parts, and wherein—

Figure 1 is a vertical sectional view of hydraulic air-compressing apparatus containing my improvements; Fig. 2, a horizontal section on line 2 2, Fig. 1, and looking down; Fig. 3, an enlarged detail view of controller or valve for air-chamber, and Fig. 4 a plan view of same.

The "blow-off" device consists of a pipe 1, extending from a point about on a level with or slightly above the lower end of the usual water-conductor *a* of the apparatus up to the open air. The lower end of such blow-off pipe projects into a shield or shoe-piece 2, supported by bracket or arm *n*, projecting from the wall of the tank and preferably of cup form, open at the top and at the side farthest from the water-conductor *a*, but closed on all other sides for the purpose of preventing any air from entering such pipe unless the body of water sinks to a level below the lower end of such pipe.

Should the water fall to a level beneath the lower end of the blow-off pipe by reason of the compressed air not being drawn off in any customary quantity, a portion of the water already filling the blow-off pipe will fall from the lower end of same into the tank, with the result that the remaining column of water in such pipe becomes lighter than the pressure of the air in the chamber beneath, and is consequently blown out and followed by the blowing off of the compressed air through the pipe until sufficient air is displaced to allow the water to again rise and envelop the lower end of the pipe and refill the same.

The upper end of the blow-off pipe is preferably bent, as shown at 4, to direct any discharge into the tail-race.

The valve or controller for controlling the passage of air through the air-conductor leading from the separating-tank is preferably in the form of a piston 8, with one end open to the atmosphere and the other end or "valve-face" 9, as it may be called, adapted to come in contact with the valve-seat 10, surrounding the opening at the upper end of the vertical portion *c* of the air-conductor.

The piston or valve proper, 8, is pressed downward, preferably by a lever $10^{\times}$, fulcrumed at the upper end of the valve-casing 12 and preferably, as at 11, upon the upper flanged end of a sleeve 18, to be presently

described, said lever carrying an adjustable weight 13, communication being effected between the lever and the valve or piston by a vertical arm 14, pivotally connected with the lever.

The valve-casing is in the form of a T-joint, the inlet 15 thereto being in line with the piston or valve and the outlet 16 at right angles thereto.

The piston works in a sleeve 18, projecting down through the opening 19 in the casing, opposite the inlet 15, such sleeve being suspended in place by a flange 20 on its outer end resting on the top edge of the casing.

It is desirable to provide antifriction-bearings 22 at the fulcruming-point of the lever and pivotal connection of the arm 14 therewith.

The object of the controller is to prevent any possibility of water entering the air-conductor, such as might occur in the case of an excessive demand on the supply, and yet to allow the free passage of the air under normal conditions.

In operation should the air-pressure in the vertical portion *c* of the air-conductor between the controller and the separating-tank fall below a given pressure—say fifty pounds—by reason of an excessive demand, the valve 8 being weighted, say, at fifty pounds will automatically close and remain closed until the air-pressure in the tank and conductor *c* is sufficient to reopen same, thus always providing a barrier between the water in the tank and the horizontal part *d* of the air-conductor beyond the controller, such barrier being either in the form of a body of compressed air or the closed valve, so that all chance of water passing beyond the vertical portion *c* of the conductor or, in fact, of ever entering the air-conductor is avoided.

An annular deflecting ring or plate 5 projects inwardly and downwardly from the wall of the separating-tank *b* of the apparatus and is situated lower than the usual central distributer *e* in order that the water after being first thrown centrifugally outward by the distributer-plate will then be directed centripetally inward before finally escaping from the bottom of the tank to the return passage or well *f* of the apparatus.

To prevent the accumulation of air beneath the distributer and deflecting-plates, communicating passages between the air-spaces beneath such plates and the air-space proper, *g*, of the apparatus are formed by vertical tubes 6 7, respectively passing through such plates and extending upward to the air-space proper of the separating-tank.

On the interior of the pipe throughout its length are preferably arranged in sections a number of projections *m* for the purpose of interfering with any tendency of the water to whirl around and so form a central vertical cavity, which it is desirable to avoid.

What I claim is as follows:

1. Hydraulic air-compressing apparatus having a chamber wherein the air and water are separated and provided with a "blow-off" device or conductor adapted to prevent the escape of air into the return column of water, as set forth.

2. Hydraulic air-compressing apparatus having a chamber wherein the air and water are separated, an air-conductor leading therefrom and an automatically-operated valve in said conductor, controlling the passage of the compressed air and arranged to close when the pressure falls below a given limit and thereby prevent the overflow of water through the said conductor.

3. In hydraulic air-compressing apparatus having a chamber wherein the air and water are separated, a distributer and a deflecting-plate in said chamber adapted to deflect the moving body of water and so increase the length of travel thereof while in such chamber, for the purpose set forth.

4. In hydraulic air-compressing apparatus having a chamber wherein the air and water are separated, and a spreader or distributer centrally of such chamber, an air-passage connecting the air-space beneath such spreader with the air-space proper of such chamber, for the purpose set forth.

5. In hydraulic air-compressing apparatus having a chamber wherein the air and water are separated and a deflecting-plate projecting inwardly from the walls of said chamber, an air-passage connecting the air-space beneath such deflecting-plate with the air-space proper of such chamber, for the purpose set forth.

6. In hydraulic air-compressing apparatus having a chamber wherein the air and water are separated, a spreader or distributer centrally of such chamber, a deflecting-plate projecting inwardly from the walls of said chamber, and air-passages connecting the air-spaces beneath such spreader and deflecting-plate with the air-space proper of such chamber, for the purpose set forth.

7. Hydraulic air-compressing apparatus provided with a "blow-off" consisting of an open-ended pipe leading from the compressed-air chamber proper of the apparatus to the open air, and a shield partially inclosing the end of the pipe that is within the compressed-air chamber as and for the purpose set forth.

8. In hydraulic air-compressing apparatus, the stand-pipe or conductor having a number of series of projections *m* on its interior surface at different levels throughout its length and disposed so that a section of the falling stream after passing a projection at one height or level and being broken or split up thereby shall be further broken by the other projections extending across its path at lower levels for the purpose of preventing swirling of the stream and liberating air-bubbles, as set forth.

9. Hydraulic air-compressing apparatus

having a chamber wherein the air and water are separated, an air-conductor leading from such chamber and an automatically-operated controller located in the air-conductor and comprising a valve-casing having inlet and outlet, a sleeve projecting into same in line with the inlet, a piston or valve movable in said sleeve, a lever fulcrumed to said casing, an adjustable weight on said lever and a connection between said lever and the piston, whereby the valve closes when the pressure falls below a given limit and prevents the overflow of water through said conductor all substantially as and for the purpose set forth.

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