(No Model.)

J. G. STAMP.

AIR INJECTOR.

No. 517,629. Patented Apr. 3, 1894.

Fig. 1.

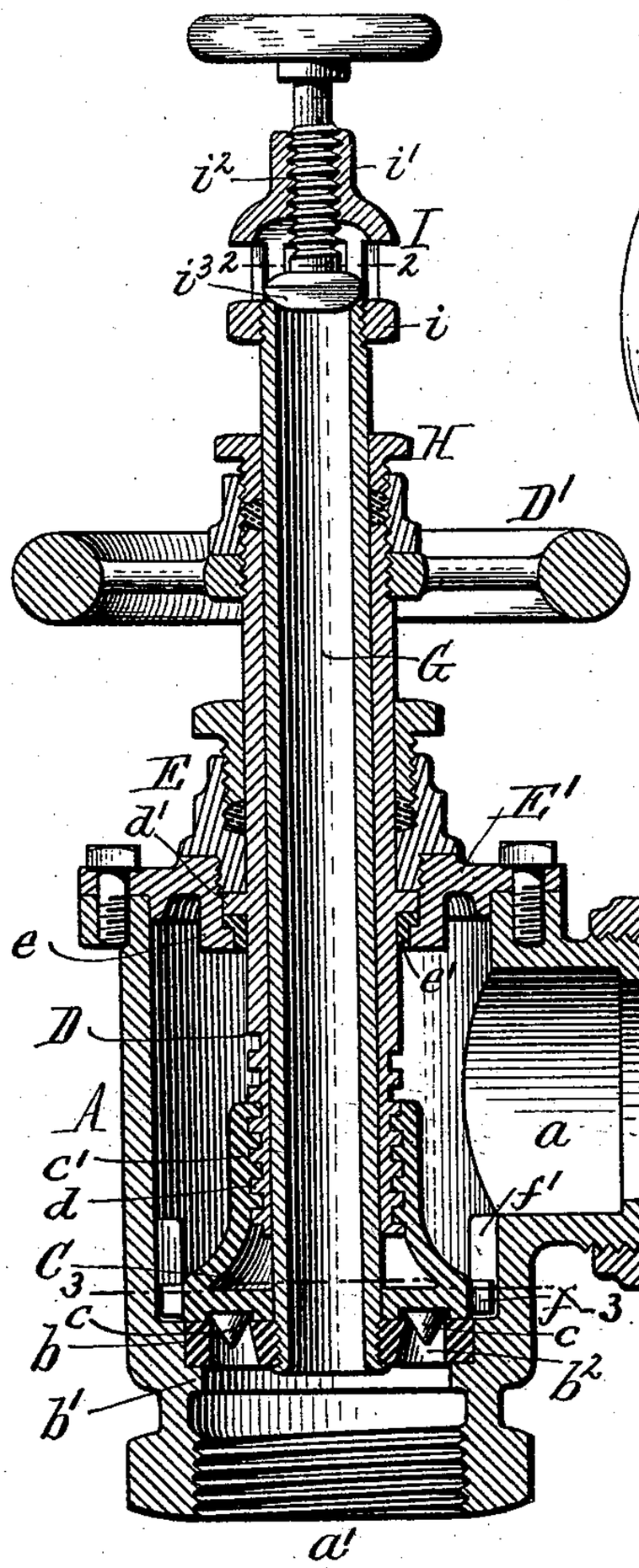


Fig. 2.

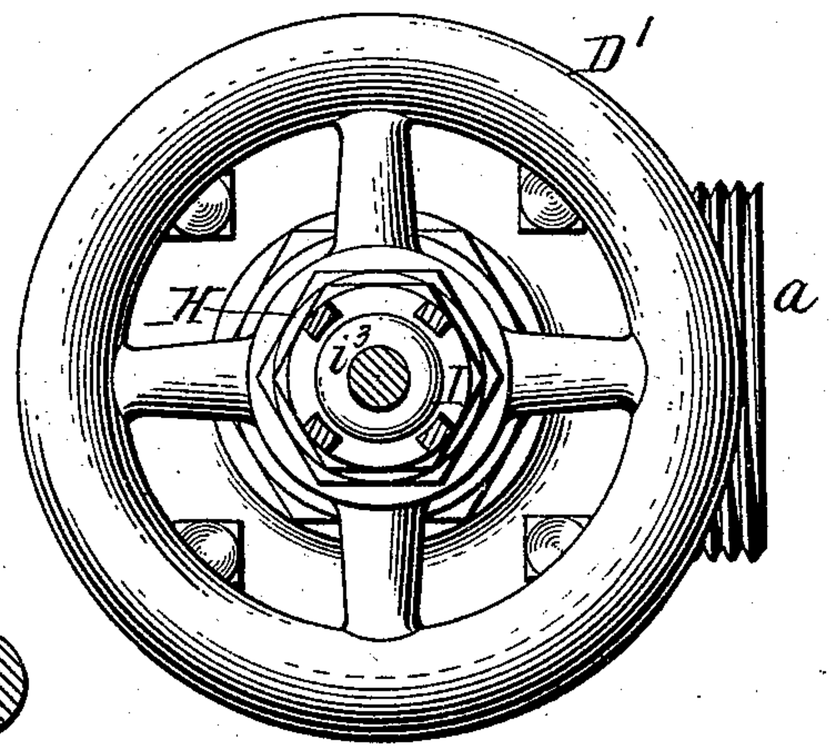


Fig. 3.

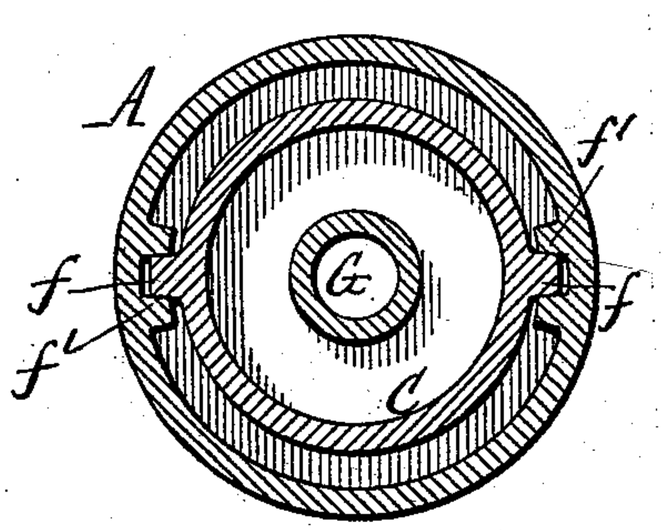
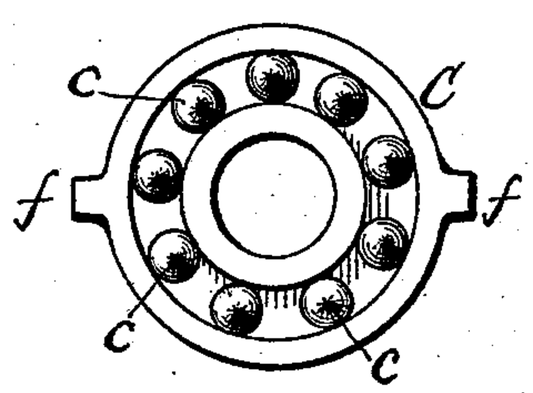


Fig. 4.



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AIR-INJECTOR.

SPECIFICATION forming part of Letters Patent No. 517,629, dated April 3, 1894.

Application filed January 22, 1894. Serial No. 497,600. (No model.)

To all whom it may concern:

Be it known that I, JOHN G. STAMP, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Air-Injectors, of which the following is a specification.

This invention relates to an air injector which is designed more particularly for restoring the loss of air to the compression tanks of elevator plants. An elevator containing an injector of this character is shown and described in Letters Patent of the United States No. 459,209, granted to me September 9, 1891.

My invention has the object to produce a compact air injector which can be conveniently regulated for supplying a greater or less quantity of air, in accordance with the average loss of air for a given period, and the size or capacity of the elevator plant.

In the accompanying drawings: Figure 1 is a sectional elevation of my improved air injector. Fig. 2 is a horizontal section thereof on line 2—2, Fig. 1. Fig. 3 is a similar section on line 3—3, Fig. 1. Fig. 4 is a detached bottom plan view of the movable valve disk.

Like letters of reference refer to like parts in the several figures.

A is the cylindrical casing of the injector having on one side a water inlet branch *a* which may be connected by a pipe with the water space of the compression tank of the elevator plant, as shown in the Letters Patent hereinbefore referred to, or with the discharge pipe of the pump leading to the compression tank, so that a current of liquid under pressure is delivered to the injector.

a' is an outlet or discharge branch arranged at the lower end of the injector casing and designed to be connected with the suction pipe of the pump of the elevator plant, or directly with the suction chamber of the pump.

b is a horizontal diaphragm secured in the lower portion of the injector casing below its inlet *a* and resting upon an annular shoulder *b'*. This diaphragm is formed with an annular row of openings b^2, for the passage of the water.

C is a horizontal valve-plate or disk arranged in the casing above the perforated diaphragm and provided on its under side with valves *c* which control the passage of the water through the openings of the diaphragm. This valve plate is movable toward and from the perforated diaphragm and is provided with an upwardly extending collar *c'* having an internal screw-thread which engages with an external screw-thread *d* formed at the lower portion of a hollow actuating stem D. This stem extends upwardly through a stuffing box E formed in the head E' of the casing and is provided at its projecting end with a hand wheel D' for turning it. The actuating stem is free to rotate, but is held from lengthwise movement by a collar *d'* formed thereon and confined between the lower end of the stuffing box E and an annular flange *e* depending from the under side of the head E'. A bushing *e'* is preferably interposed between this flange and the actuating stem. The valve disk C is capable of vertical movement on the actuating stem, but is restrained from rotary movement by lugs *f* projecting radially therefrom and arranged in upright ways or grooves *f'* formed in the adjacent portion of the injector casing. As the actuating stem is held against lengthwise movement and the valve disk is held against rotary movement, the screw-threaded connection between these parts compels the valve disk to move vertically on the stem and approach or recede from the perforated diaphragm upon turning the stem.

G is an air supply tube arranged centrally in the injector casing and opening at its lower end into the space below the perforated diaphragm, the air tube terminating adjacent to the under side of the diaphragm and being secured at its lower end in an opening formed in the diaphragm. This air tube is arranged within the hollow actuating stem D and passes upwardly through a stuffing box H arranged at the upper end of the stem. The upper end of the air tube is open to the atmosphere and may be controlled by a valve as shown, for regulating the supply of air thereto. This valve preferably consists of an open case or cage I having at its lower end an internally screw-threaded ring *i* which engages with an external thread formed at the

upper end of the air tube, and having at its upper portion an internally threaded collar i' with which the externally threaded stem i_2 of the valve i^3 engages. This valve seats against the upper end of the air pipe and its stem has a hand wheel for turning it. When the air injector is connected with an elevator plant, as hereinbefore described, and the air valve I and the water regulating valves *c* are opened, the water under pressure entering the injector casing through its inlet *a*, passes through the openings of the diaphragm *b* and thence through its discharge branch into the pipe leading from the latter. The water in passing through the injector creates a vacuum at the lower end of the air tube G, whereby air is drawn through the same and commingled with the water. The aerated water is conducted to the pump of the elevator plant by the discharge pipe of the injector and is thence delivered into the compression tank, thus increasing the volume of air in this tank and restoring any loss of air. By moving the valve disk C toward or from the perforated diaphragm *b* by means of the hand wheel D', the force of the suction produced by the water can be regulated to supply a greater or less quantity of air. The valves *c* are preferably made conical or tapering, as shown and they are tapered at such an angle that when the valves are open, the space between their surfaces and their seats is practically as wide as the space between the lower surface of the valve disk and the upper surface of the perforated diaphragm in all adjustments of the valves, whereby a uniform velocity of the water through the injector is insured and more satisfactory results are obtained. As the force of the suction and the quantity of air delivered by the injector can be regulated the injector is applicable to elevator plants of different capacities, thus avoiding the necessity of providing air injectors of various sizes for different sized plants and simplifying and cheapening the manufacture of the device. The suction regulating devices are compactly combined with the air injector and no regulating valve separate from the injector is therefore required in the water pipe leading to the injector.

I claim for my invention—

1. In an air injector, the combination with the casing having a liquid inlet and an outlet, of an air tube extending into the casing and terminating below the liquid inlet, a perforated diaphragm arranged in the casing adjacent to the outlet end of said air tube, a movable valve-plate or disk controlling the passage of the liquid through the perforations of said diaphragm, and an actuating device connected with the movable valve-plate, substantially as set forth.

2. In an air injector, the combination with the casing having a liquid inlet and an outlet, of an air supply tube extending into the casing and terminating below said inlet, a perforated diaphragm arranged adjacent to the lower end of said air tube, and an adjustable valve-plate provided with tapering valves which control the passage of the liquid through the perforations of said diaphragm, substantially as set forth.

3. In an air injector, the combination with the casing having a liquid inlet and an outlet, of a perforated diaphragm arranged in the casing below its inlet, an air supply tube extending into the casing and opening into the space below said diaphragm, a movable valve-plate or disk controlling the passage of the liquid through the openings of said diaphragm, and a hollow actuating stem surrounding said air tube and connected with said valve-plate or disk, substantially as set forth.

4. In an air injector, the combination with the casing having a liquid inlet and an outlet, of a perforated diaphragm arranged in the casing below its inlet, an air supply tube extending into the casing and opening into the space below said diaphragm, a valve plate or disk movable toward and from said diaphragm and held against rotation, and a hollow rotary actuating stem held from lengthwise movement and having a screw-threaded connection with said valve-plate or disk, substantially as set forth.

5. In an air injector, the combination with the casing having a liquid inlet and an outlet, of a perforated diaphragm arranged in the casing below its liquid inlet, an air supply tube open at both ends, extending into the casing and terminating adjacent to said diaphragm, and an air regulating valve, composed of an open cage provided at its lower end with an internally threaded ring engaging with an external screw-thread at the projecting end of the air tube, and at its upper portion with an internally screw-threaded collar, and a valve seating against the end of said air tube and having an externally screw-threaded stem which engages with said internaliy threaded collar, substantially as set forth.

Witness my hand this 20th day of January, 1894.

JOHN G. STAMP.

Witnesses:
CARL F. GEYER,
ELLA R. DEAN.