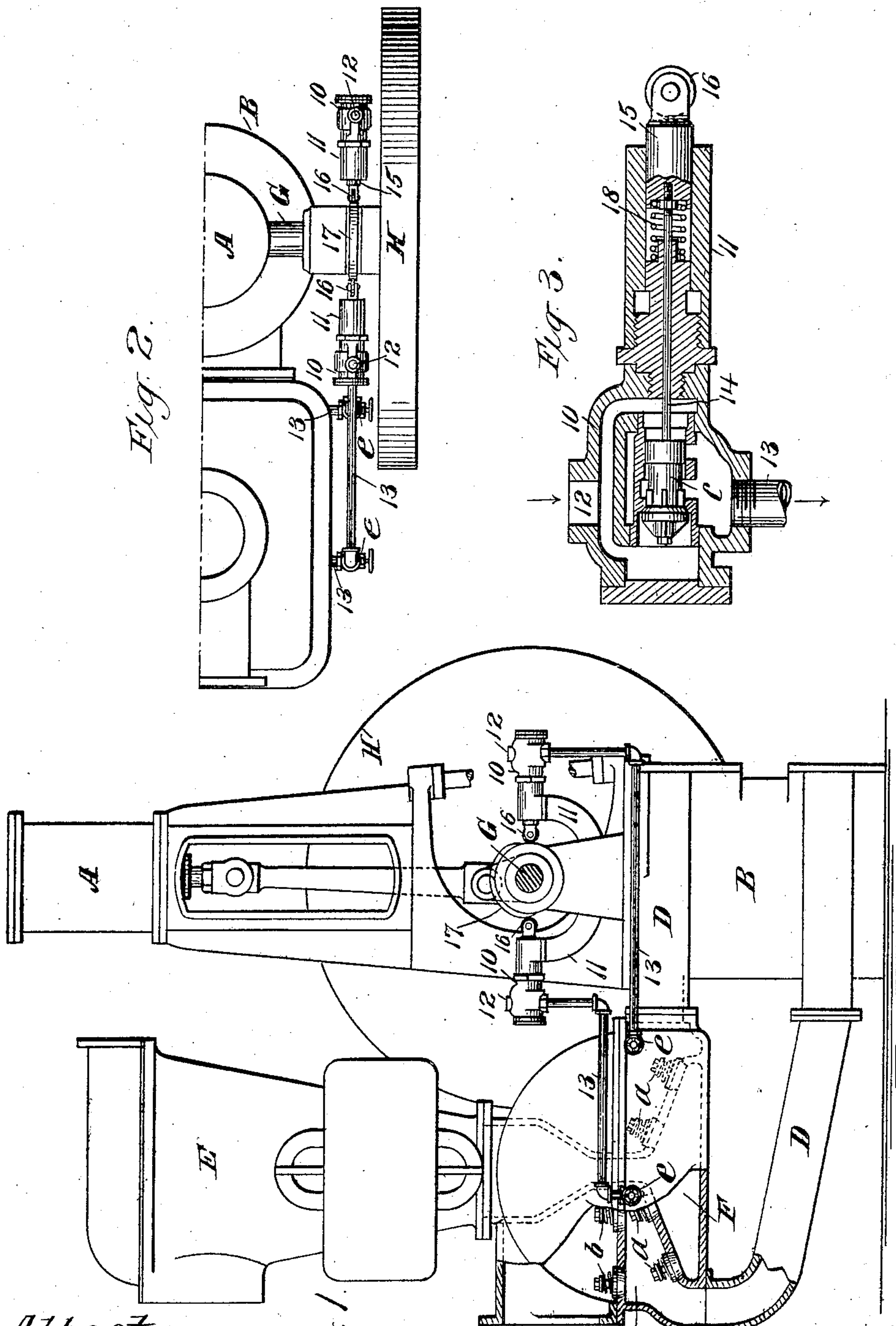


No. 881,116.

PATENTED MAR. 10, 1908.

W. M. FLEMING.
AIR OR VACUUM PUMP.
APPLICATION FILED JUNE 19, 1906.



Attest:
S. Ventral
G. Giuliani.

Fig. 1

Inventor
Wills M. Fleming
by his Attys:
Philip Lange & Kennedy

UNITED STATES PATENT OFFICE.

WILLS M. FLEMING, OF HOLYOKE, MASSACHUSETTS, ASSIGNOR TO INTERNATIONAL STEAM PUMP COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

AIR OR VACUUM PUMP.

No. 881,116.

Specification of Letters Patent.

Patented March 10, 1908

Application filed June 19, 1906. Serial No. 322,432.

To all whom it may concern:

Be it known that I, WILLS M. FLEMING, a citizen of the United States, residing at Holyoke, county of Hampden, and State of Massachusetts, have invented certain new and useful Improvements in Air or Vacuum Pumps, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to an improved air sniffling device for admitting air to the cylinder of air or vacuum pumps to cushion the piston and prevent hammering.

In the running of air or vacuum pumps on steam condensers or other apparatus in which the pump handles a cylinder only partially filled with liquid, the remainder of the cylinder being under vacuum of greater or less degree, the acceleration of the piston on the discharge stroke up to the point where it strikes the water or the water in the cylinder strikes the discharge valve deck, is liable to produce a heavy hammering. To avoid this, a small quantity of air has been admitted into the vacuum cylinder to increase the pressure and cushion the piston at this point. In such air sniffling devices, the air is frequently sniffling into the vacuum pump through valves so arranged that the air would pass into the pump on the suction stroke as well as on the discharge stroke. This vitiates the vacuum and decreases the volumetric efficiency of the pump, by permitting atmospheric air to partially fill the cylinder on the suction stroke.

The present invention provides a simple and efficient air sniffling device by which air may be sniffling into the cylinder at the beginning of each discharge stroke in such a manner as to prevent the objectionable hammering while not impairing the efficiency of the pump in maintaining a vacuum, and which may readily be arranged to admit the air through any desired part of the stroke.

In the accompanying drawings forming a part of this specification, the invention is shown as applied in its preferred form with a common type of air or vacuum pump, and this construction will now be described in detail and the features forming the invention then specifically pointed out in the claims.

In the drawings—Figure 1 is a side eleva-

tion of the pump and condenser, with the pulsation chamber and frame of the pump partly broken away to show the construction. Fig. 2 is a partial plan view of the pump end of the apparatus. Fig. 3 is a vertical section of one of the positively actuated valves.

The invention is shown as applied in connection with a Deane vertical pump and condenser, in which A is the steam cylinder, B the pump cylinder, C one of the pulsation chambers connected to the pump cylinder by the pipes D, E the condenser delivering below directly to the suction chamber F, G the crank shaft and H the fly wheel. The pump chambers are shown as provided with the ordinary automatic suction valves *a* and discharge valves *b*.

Referring now to the air sniffling device, on opposite sides of the crank shaft G are mounted two valve chambers 10 shown as carried by brackets 11, these valve chambers 10 being connected to the atmosphere through ports 12 and to the upper parts of the pulsation chambers C on opposite sides of the chamber partition by pipes 13. The connection between valve chambers 10 and pipes 13 is controlled by valves *c*, shown as balanced valves, these valves *c* being carried by stems 14 secured at their outer ends to plungers 15 carrying rollers 16 which are acted upon by cam 17 on the crank shaft so as to move the valve *c* at each rotation of the crank shaft to open successively connection between the atmosphere and the pipes 13, this connection being opened just after the suction valves *a* are closed at the beginning of the discharge stroke, to admit air to the pulsation chamber on the discharge side of the pump plunger, but close the pipes 13 against the admission of air during the suction stroke. The valves *c* are closed by springs 18 acting against plungers 15, when the cam 17 passes off the rollers 16. The plungers 15 and springs 18 move in the top portions of brackets 11 to the outer ends of which are attached the valve chambers 10. The pipes 13 are normally closed by check valves *e* opening inwardly toward the pulsation chambers, these valves preventing the outflow of air and water from the pulsation chambers during the latter part of the discharge stroke.

The operation will be understood from a

brief statement in connection with the drawings and above description. As previously stated, the cylinder and pulsation chamber at the commencement of the discharge stroke contains a certain amount of water and the remainder of the cylinder and pulsation chamber is under vacuum which, in modern condenser practice, may be very high. As the pump plunger starts on its stroke, the cam 17 operates the valve *c* controlling the pipe 13 leading to the cylinder or pulsation chamber on the discharge side of the plunger so as to admit air from the atmosphere to the pipe 13, which air rushes into the pulsation chamber through the check valve *e* and increases the pressure quickly to atmospheric pressure, this air being then compressed as the pump plunger continues its movement and acting to open the discharge valves without hammering. As shown in the drawings, the pump plunger is just starting its down stroke, and the cam 17 is just opening the valve *c* controlling pipe 13 that leads to the pulsation chamber connected with the lower end of the pump cylinder.

It will be understood that the invention is applicable generally in air or vacuum pumps where air sniffling is desired, both horizontal and vertical pumps, and that the invention is not limited to the particular type of pump shown which is selected only for purpose of illustration. It will be understood, also, that while the air sniffling devices are preferably arranged to admit air only during the discharge stroke, these devices may readily be applied to the admission of air during any desired portion of the stroke.

What is claimed is:—

1. The combination with an air or vacuum pump cylinder and its admission and discharge valve mechanism, said cylinder having a port for the admission of cushioning air independently of the admission and discharge valves, of an air sniffling valve controlling said port, and operating devices including a cam engaging the sniffling valve stem for operating the valve to admit air in front of the pump plunger during one part of

each stroke and to prevent admission of air during another part of the stroke.

2. The combination with a double acting air pump and its pulsation chambers, of connections between the pulsation chambers and the atmosphere, check valves controlling said connections and opening toward the cylinder, and mechanically actuated valve devices outside the check valves controlling said connections and actuated to open said connections to the atmosphere during one part of the stroke and close said connections to the atmosphere during another part of the stroke.

3. The combination with a double acting air pump and its pulsation chambers, of pipes connecting the pulsation chambers for opposite ends of the pump with the atmosphere, valves controlling connection between the atmosphere and pipes, and mechanical connections between said valves and a moving part of the pump for operating said valves to open the pipes to the atmosphere during one part of the stroke and to close the pipes during another part of the stroke.

4. The combination with a double acting air pump and its pulsation chambers, of pipes 13 connecting the pulsation chambers for opposite ends of the pump with the atmosphere, check valves *e* in said pipes opening toward the pulsation chambers, valves *c* outside said check valves *e* and controlling connection between the atmosphere and pipes 13, and mechanical connections between said valves *c* and a moving part of the pump for operating said valves *c* to open pipes 13 to the atmosphere at the beginning of the discharge stroke in the chambers with which they respectively connect and to close the pipes during the suction strokes in said chambers.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

WILLS M. FLEMING.

Witnesses:

WILLIAM C. McLEOD,
CHAS. H. JENNESS.