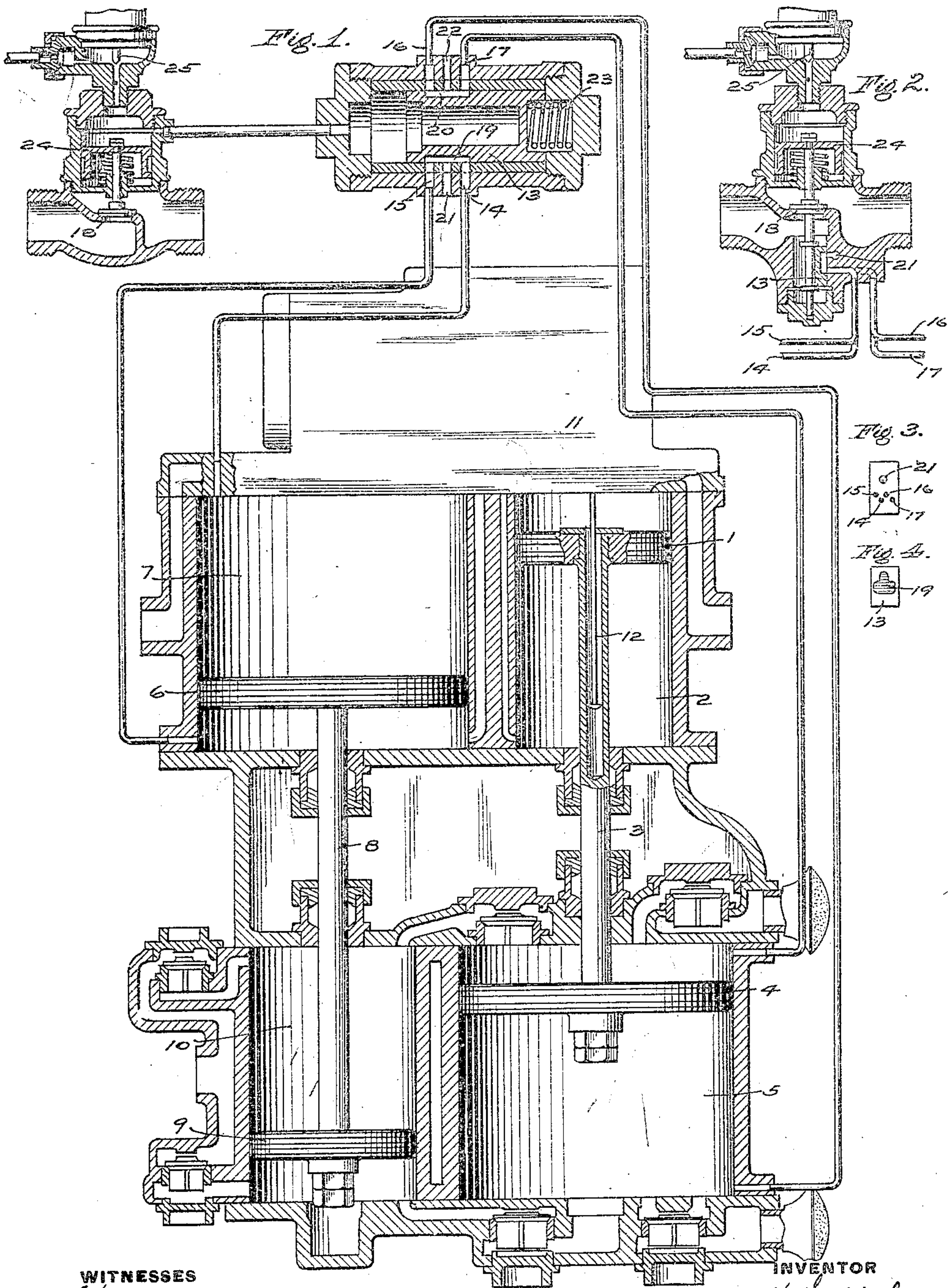


H. H. WESTINGHOUSE.
RELIEF MECHANISM FOR COMPOUND PUMPS.
APPLICATION FILED SEPT. 16, 1907.

917,216.

Patented Apr. 6, 1909.



WITNESSES

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UNITED STATES PATENT OFFICE.

HENRY H. WESTINGHOUSE, OF NEW YORK, N. Y., ASSIGNOR TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

RELIEF MECHANISM FOR COMPOUND PUMPS.

No. 917,216.

Specification of Letters Patent.

Patented April 6, 1909.

Application filed September 16, 1907. Serial No. 393,189.

To all whom it may concern:

Be it known that I, HENRY H. WESTINGHOUSE, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Relief Mechanism for Compound Pumps, of which the following is a specification.

This invention relates to compound steam pumps, and more particularly to that class in which the steam pistons are directly connected to the pistons in the compressor cylinders. Where pumps of this character are employed for compressing fluid such as air for any desired purpose, a pressure governor is ordinarily used for controlling the pump according to the fluid pressure produced in the reservoir or system supplied by the pump, which governor usually operates to shut off the steam supply to the pump when the fluid pressure in the reservoir or system rises to a predetermined maximum and to again open the steam supply and start the pump when said fluid pressure is diminished to a certain minimum degree for which the governor is adjusted. When the governor operates to shut off the steam supply and stop the pump there is usually a small opening left for furnishing just sufficient steam to the pump to keep the piston moving very slowly and thereby keep the cylinders warm and prevent freezing. During the period that the pump is cut out or moving but very slowly, it may happen that, due to excessive leakage in the pump, an abnormal or high pressure may accumulate in certain parts to oppose the usual action of the piston when the live steam supply is again opened to the pump. This may cause the pump to continue to operate slowly and prevent the pistons from promptly attaining and maintaining the desired rate of speed necessary to produce efficient pump action in compressing the air or other fluid for the system.

The principal object of my present invention is to overcome this difficulty, and to this end, it comprises broadly, means to relieve such part or parts of the pump and prevent the accumulation of an abnormal pressure during the time that the main supply of steam is shut off and the pump stopped, or nearly so.

Another feature of my improvement comprises means controlled by or operated auto-

matically with the pressure governor for relieving the pump of an abnormal pressure.

In the accompanying drawing, Figure 1 illustrates in vertical section a design of compound steam pump with one form of my improvement applied thereto; Fig. 2, a vertical section of a portion of pressure governor device illustrating a modification of my improvement; Fig. 3, a view of the ports in the slide valve seat of the modification shown in Fig. 2; and Fig. 4 a face view of the slide valve.

My improvement is not limited to any particular form of compound steam pump, but is applicable generally to any suitable or preferred construction of pump and valve mechanism. It is illustrated, however, in connection with a type of compound pump in which the high pressure piston 1 in steam cylinder 2 is directly connected by rod 3 with the low pressure piston 4 of compressor cylinder 5, and the low pressure piston 6 in steam cylinder 7 is connected by rod 8 with piston 9 of the high pressure air cylinder 10. The valve mechanism in a casing 11 carried by the heads of the steam cylinders may be controlled by a reversing rod 12 actuated by the movement of the high pressure steam piston.

When the supply of steam to the pump is shut off and the pump is stopped, or nearly so, there may be sufficient leakage of fluid under pressure into certain parts of the pump, such as into one end or the other of the low pressure steam cylinder which for the moment communicates with the exhaust side of the high pressure steam piston, or in the compressor parts, as from the reservoir through the pump discharge valves, back to the face of the piston of the low pressure cylinder. In the event of such leakage occurring at any one or more of such parts of the pump when the main supply of steam is shut off, my improvement contemplates the release of the same to the atmosphere or elsewhere to prevent the accumulation of a back pressure which will prevent the pump from starting or speeding up promptly when the live steam is again supplied to the pump; and as shown in the drawing, a release valve device may be provided having a valve seat containing one or more ports or passages, such as 14, 15, 16 and 17, communicating with the parts of the steam pump or its cyl-

inders which may need to be relieved of pressure due to leakage. The release valve 13 may be provided with one or more cavities such as 19 and 20 for opening communication from the ports 14, 15, 16 and 17 to the outlet or discharge port or ports 21 and 22. A spring 23 normally holds the valve in a position with the ports closed during the time that the pump is working in the usual manner, but when the main steam supply is shut off the release valve moves to the position shown in the drawing, in which any leakage of fluid to the corresponding parts of the steam pump may escape through the discharge port or ports.

Any desired means may be employed for controlling the movement of the release valve, but I prefer to control the same by the movement of a pressure governor where the same is used for governing the supply of steam to the pump.

As shown in Fig. 1 of the drawing, the governor valve 18 is operated by the piston 24, controlled by diaphragm valve 25 in the usual manner to open and close the supply of steam to the pump. A connection may also be made from the chamber of the governor piston 24 to the chamber of the piston release valve 13, so that whenever the diaphragm valve 25 is opened by the pump pressure to supply fluid to the piston 24 to close the main steam supply valve 18, the fluid also acts upon the release valve 13 and moves the same against the spring 23 to the position shown, in which the release passages are open to the discharge port and any leakage to the cylinders of the steam pump may escape to the atmosphere when the main steam supply valve is closed.

In the modification shown in Figs. 2, 3 and 4, the release valve 13 is attached directly to the stem of the piston 24 of the governor so that it is actuated to open the release port or ports whenever the governor operates to close the supply valve 18, and to close these ports when the governor piston moves to open the supply valve, as will be readily understood.

It is not deemed necessary to show the top of the spring box of the governor above the diaphragm valve, as this is an ordinary construction of pressure governor which is well known in the art.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The combination with a compound

steam pump of means for releasing fluid and preventing the accumulation of pressure from leakage when the supply of steam to the pump is shut off.

2. The combination with a compound steam pump, of a release valve device for opening a discharge port from a cylinder when the steam supply is shut off from the pump.

3. The combination with a compound steam pump having high and low pressure steam cylinders, of means operating when the supply of steam to the pump is shut off to release fluid from the low pressure cylinder and prevent the accumulation of pressure therein from leakage.

4. The combination with a compound steam pump having high and low pressure steam cylinders, of a release valve device for opening a discharge port from the low pressure cylinder when the supply of steam to the pump is shut off.

5. The combination with a compound steam pump, and a shut off valve for controlling the supply of steam thereto, of means operating when the shut off valve is closed, to open a discharge port from a cylinder and prevent the accumulation of pressure therein from leakage.

6. The combination with a compound steam pump, and a pressure governor for controlling the supply of steam thereto, of means controlled by the governor for releasing fluid and preventing an accumulation of pressure from leakage when the supply of steam to the pump is shut off.

7. The combination with a compound steam pump, and a pressure governor for controlling the supply of steam thereto, of a release valve device controlled by the governor for opening a discharge port from a cylinder and preventing the accumulation of pressure from leakage when the governor is shut off.

8. The combination with a compound steam pump having high and low pressure cylinders and pistons, of a relief valve operating when the supply of live steam to the pump is shut off for opening a discharge port from either side of the low pressure piston.

In testimony whereof I have hereunto set my hand.

HENRY H. WESTINGHOUSE.

Witnesses:

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E. A. WRIGHT.