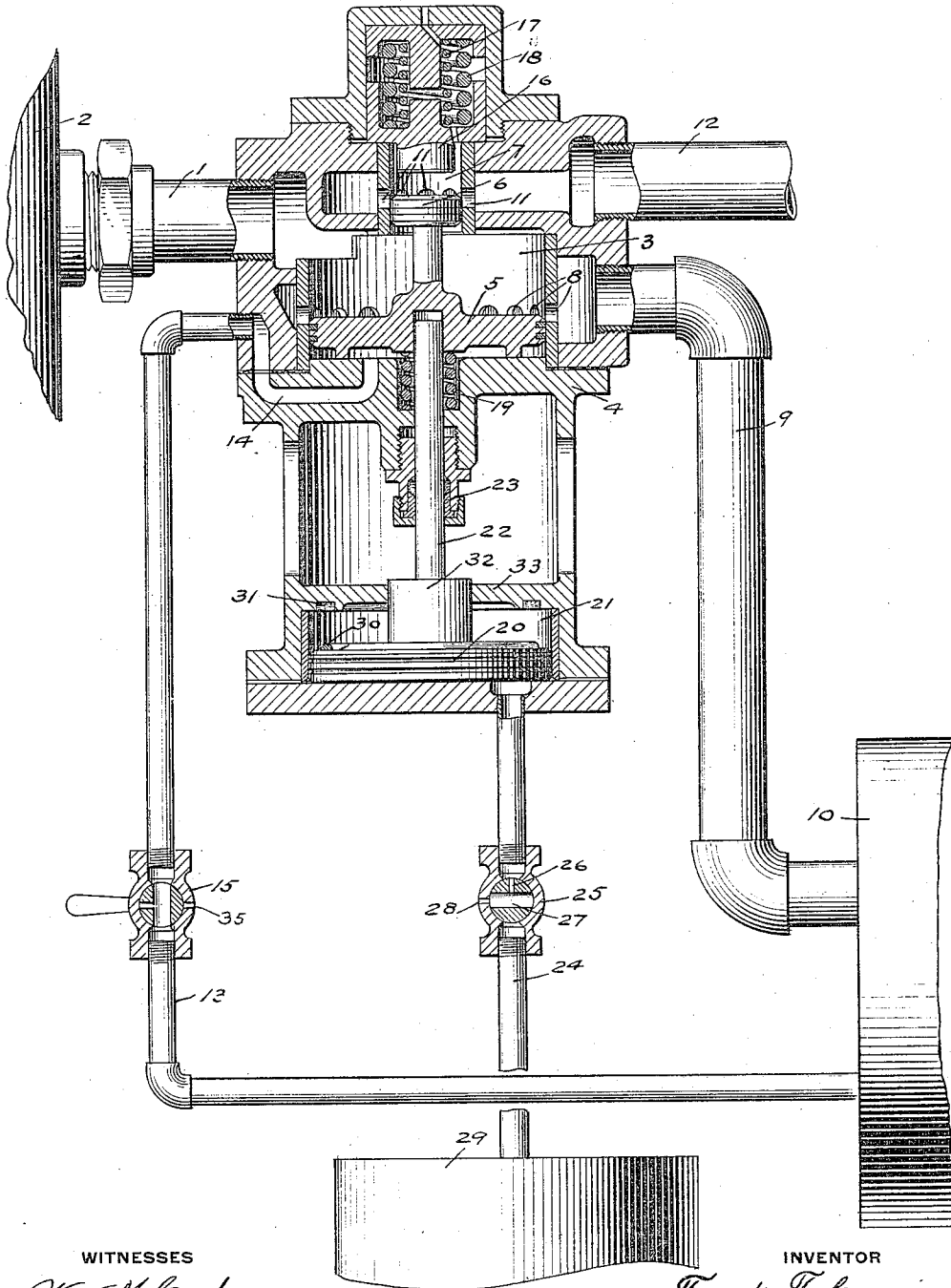


F. F. COGGIN,
 APPARATUS FOR DIVERTING EXHAUST STEAM.
 APPLICATION FILED DEC. 15, 1909.

1,042,398.

Patented Oct. 29, 1912.



WITNESSES

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UNITED STATES PATENT OFFICE.

FRANK F. COGGIN, OF MATAWAN, NEW JERSEY, ASSIGNOR TO THE ECONOMY CAR HEATING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF MAINE.

APPARATUS FOR DIVERTING EXHAUST-STEAM.

1,042,398.

Specification of Letters Patent.

Patented Oct. 29, 1912.

Application filed December 15, 1909. Serial No. 533,167.

To all whom it may concern:

Be it known that I, FRANK F. COGGIN, a citizen of the United States, residing at Matawan, in the county of Monmouth and State of New Jersey, have invented new and useful Improvements in Apparatus for Diverting Exhaust-Steam, of which the following is a specification.

This invention relates to devices for diverting and storing exhaust or waste steam from steam engines, so that the same may be utilized for heating or various other purposes, and more particularly to an apparatus of this character adapted to be applied in connection with a steam pumping engine, such as the steam pump on a locomotive, which is employed to supply air for the fluid pressure brake system.

Various schemes have heretofore been proposed for the purpose of diverting and storing the exhaust steam from a steam engine, such as the provision of a by-pass from the usual atmospheric exhaust pipe, through which the exhaust steam may be diverted, the by-pass containing a check valve to prevent back flow. With such a construction only a small percentage of the exhaust steam can be diverted, as the major portion will necessarily take the easier path to the free atmospheric exhaust.

Another construction comprises a by-pass in constant open communication with the engine exhaust pipe and a loaded check valve interposed in the atmospheric exhaust outlet. As it is necessary to lift the check valve in order to permit the exhaust steam to flow to the atmosphere, it will be seen that the steam engine piston is subject throughout its stroke to a back pressure corresponding with the load on the check valve, which of course reduces the efficiency of the engine.

Still another apparatus employs a valve mechanism adapted to control communication from the steam engine exhaust to the atmosphere and to the outlet through which the exhaust steam is diverted, said valve mechanism being operatively connected to a moving part of the engine. A construction of the last mentioned character can only be employed where the engine has some accessible moving part to which the valve mechanism can be connected.

One object of my invention is to provide an improved apparatus adapted for diverting and storing exhaust steam in which the

above mentioned deficiencies of prior devices are avoided and with this end in view I propose to employ a valve device adapted to be operated according to variations in the exhaust steam pressure for controlling the flow of exhaust steam both to the passage through which the exhaust steam is diverted for storing and to the normal exhaust outlet. By this means the exhaust steam may be diverted into a storage receptacle during the early part of the engine stroke when the exhaust steam pressure is normally high while at the final portion of the stroke the exhaust steam may be vented freely to the normal exhaust outlet or atmosphere, so as to relieve the engine piston of back pressure. The operation of the device being due entirely to variations in fluid pressure, mechanical connection to a moving part of the engine is avoided and the device may therefore be applied to various types of steam engines and pumps in which there is no moving part accessible for actuating the device.

Another object of my improvement is to provide an apparatus of the above character which is simple in construction, of few parts, and which may be manufactured at a low cost.

In the accompanying drawing, the single figure is a diagrammatic view of a steam pump equipment with a valve mechanism embodying my improvement applied thereto, the valve mechanism being shown in section.

The reference numeral 1 indicates the exhaust pipe of a steam pumping engine 2, which pipe communicates with a piston chamber 3 in casing 4 of the valve mechanism which controls the flow of exhaust steam from the engine. Within the chamber 3 is the piston head 5 of a differential piston, the other and smaller piston head 6 of which is contained in a piston chamber 7. Ports 8 in the casing of the chamber 3 adapted to be controlled by the piston head 5, lead to a pipe 9 through which the exhaust steam is diverted for use, in the present instance, said pipe being shown as connected to a heating reservoir 10 from which exhaust steam is supplied for heating the cars of a train or the like. In the casing of the small piston 6 are ports 11, controlled by the piston head 6, and leading to the usual exhaust outlet 12 communicating with the atmosphere, condenser or other low pressure outlet. In one position, when the large piston head is at the

extreme end of its stroke, as shown in the drawing, the ports 8 establish communication from the piston chamber 3 to the diverting pipe 9, while the ports 11 are closed by the small piston 6. A pipe 13 connected to the heating reservoir 10 communicates with a passage 14 leading to the space at the outer face of the piston head 5, said pipe being provided with a cock 15 for controlling communication through the pipe, and having a vent port, 35, for opening the space beneath the piston to the atmosphere, in the cut out position of the cock.

In order to prevent excessive pounding of the differential piston, a buffer block 16, subject to the pressure of springs 17 and 18, may be arranged in the path of movement of the small piston head 6, and for a similar purpose a spring 19 may be interposed between the large piston head 5 and the casing 4.

The outer face of the small piston head 6 is constantly subject to atmospheric or other low pressure, so that a pressure on the outer face of the large piston head 5 equal to or greater than the pressure in chamber 3 on the opposite side of the head tends to shift the differential piston to the position in which the ports 8 are closed and the ports 11 are open.

In operation, the exhaust steam from the engine 2 passes through pipe 1 to the piston chamber 3 and acts on piston head 5 to shift the differential piston to the position shown in the drawing, in which the ports 11 are closed and the ports 8 are open. Exhaust steam thereupon flows through the pipe 9 to the heating reservoir 10. The flow of exhaust steam continues until the pressure of the exhaust steam in piston chamber 3 has diminished to such a point during the latter part of the engine stroke that the heating reservoir pressure on the outer face of the piston head 5 together with the exhaust steam pressure acting on the lower face of the piston 6, is capable of shifting the differential piston to its opposite position, in which the ports 8 are closed and the ports 11 are open. The remaining exhaust steam from the engine is then vented directly to the atmospheric or other low pressure outlet 12 through the ports 11, so that the back pressure of the exhaust steam on the engine is fully relieved before the end of the stroke of the engine piston.

On the next stroke of the engine piston, the high initial pressure of the exhaust steam from the opposite side of the engine piston acts on the piston head 5 to shift the differential piston so as to again open the ports 8 and close ports 11, and when the exhaust steam pressure diminishes sufficiently, the differential piston is shifted to close the exhaust steam diverting ports 8 and open the ports 11.

It will now be apparent that a large proportion of the exhaust steam may be saved with the present construction, while the relief of back pressure on the engine piston before the end of the stroke permits the engine to be operated with substantially the same amount of live steam as where the exhaust steam is vented to the usual atmospheric exhaust or other low pressure outlet.

It may sometimes be desirable to cut the control valve mechanism out of action, and for this purpose an additional piston 20 may be employed, a piston chamber 21 for the piston being provided in an extended portion of the casing 4. The piston 20 carries a stem 22 adapted to extend through the wall of the casing 4 and engage with the piston head 5, the stem being preferably provided with a suitable stuffing box 23 in order to prevent possible leakage of exhaust steam from the space at the outer face of the piston head 5. The outer face of the piston 20 is connected by a pipe 24 to a source of fluid pressure, such as the main reservoir 29 of a locomotive, and a cock 25 is provided in said pipe which is adapted in one position to connect the portion of pipe 24 adjacent the piston 20 with the atmosphere through ports 26 and 27 and exhaust port 28, this being the position to which the cock is turned when the controlling valve mechanism is in action. If it is desired to cut said valve mechanism out of operation, the cock 25 is turned so as to cause the port 27 to establish communication through pipe 24, thereby permitting fluid under pressure from the reservoir 29 to flow to the piston 20. The piston 20 is then actuated by the fluid pressure and through the stem 22 operates to shift the differential piston to the position closing the ports 8 and opening the normal exhaust ports 11. The differential piston is maintained in this position by the fluid pressure on the piston 20 and the engine is permitted to exhaust freely to the atmosphere or other low pressure outlet in the usual manner. A rib 30 is preferably provided on the piston 20, for engagement with a seat 31, so that leakage of fluid around piston 20 from pipe 24 and the reservoir 29 will be prevented. The enlarged stem portion 32 of the piston 20 fits loosely in the head wall 33 of the piston chamber, so that chamber 21 is normally maintained at atmospheric pressure.

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

1. In an apparatus for controlling exhaust steam, the combination with an exhaust steam pipe from the engine, a normal exhaust outlet, and a storage receptacle, of means of communication from the exhaust steam pipe to said receptacle, and a device governed by the variations in the exhaust steam pressure during each stroke of the en-

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gine for controlling the normal exhaust outlet, and arranged to substantially close the normal exhaust outlet during the first part of the stroke and to freely open said outlet during the latter part of the stroke.

2. In an apparatus for controlling exhaust steam, the combination with an exhaust steam pipe from the engine, a normal exhaust outlet, and a storage receptacle, of means governed by the variations in the exhaust steam pressure during each stroke of the engine for controlling communication from the exhaust steam pipe to the normal exhaust outlet and to said receptacle, and arranged to substantially close the normal exhaust outlet and open communication to the receptacle during the first part of the stroke and to close communication to the receptacle and freely open said exhaust outlet during the latter part of the stroke.

3. In an apparatus for controlling exhaust steam, the combination with an exhaust steam pipe from the engine, a normal exhaust outlet, and a storage receptacle communicating with said exhaust steam pipe, of means subject to the opposing pressures of the exhaust steam and of the receptacle for controlling communication through the normal exhaust outlet, and arranged to substantially close the normal exhaust outlet during the first part of the stroke and to freely open said outlet during the latter part of the stroke.

4. In an apparatus for controlling exhaust steam, the combination with an exhaust steam pipe from the engine, a normal exhaust outlet, and a storage receptacle, of a valve device subject to the opposing pressures of the exhaust steam and of the receptacle for controlling communication from the exhaust steam pipe to said normal exhaust outlet and to said receptacle, and arranged to substantially close the normal exhaust outlet and to open communication to the receptacle during the first part of the stroke and to close the communication to the

receptacle and to freely open said exhaust outlet during the latter part of the stroke.

5. In an apparatus for controlling exhaust steam from a steam engine, the combination with an exhaust steam pipe connected to the engine and a normal exhaust outlet, of a receptacle for receiving exhaust steam from said exhaust pipe and a differential piston subject on one side of its larger head to pressure of the steam in said receptacle and in the opposite direction to the exhaust steam pressure and atmospheric pressure for controlling the flow of exhaust steam to the exhaust outlet and to said receptacle.

6. In an apparatus for controlling exhaust steam from a steam engine, the combination with an exhaust steam pipe connected to the engine, and a normal exhaust outlet, of a receptacle for receiving exhaust steam from said exhaust pipe and a differential piston having one head subject to the opposing pressures of the exhaust steam and the pressure in said receptacle and the other head to atmospheric pressure on one side, for controlling the flow of exhaust steam, at one time to the exhaust outlet and at another time to said receptacle.

7. In an apparatus for controlling exhaust steam from a steam engine, the combination with an exhaust pipe for the engine, and a normal exhaust outlet, and a receptacle for exhaust steam, of a valve device for controlling the flow of exhaust steam from said pipe to the exhaust outlet and to said receptacle, a movable abutment operated by fluid under pressure for cutting said valve device out of action, and a cock for controlling the fluid pressure on said abutment.

In testimony whereof I have hereunto set my hand.

FRANK F. COGGIN.

Witnesses:

WM. M. CADY,
A. M. CLEMENTS.