(No Model.) 2 Sheets—Sheet 1.

W. WATKINS.

STEAM PUMP.

No. 492,950. Patented Mar. 7, 1893.

Fig. 4

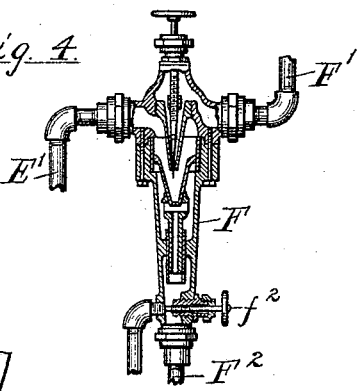

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

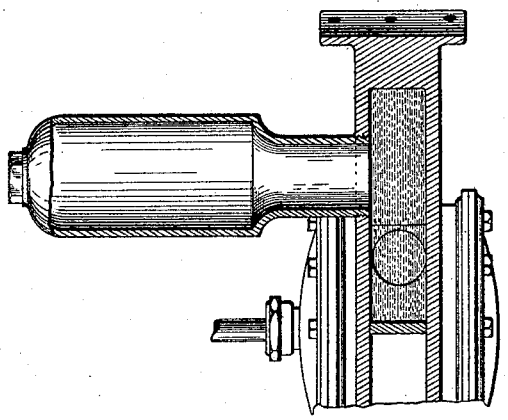
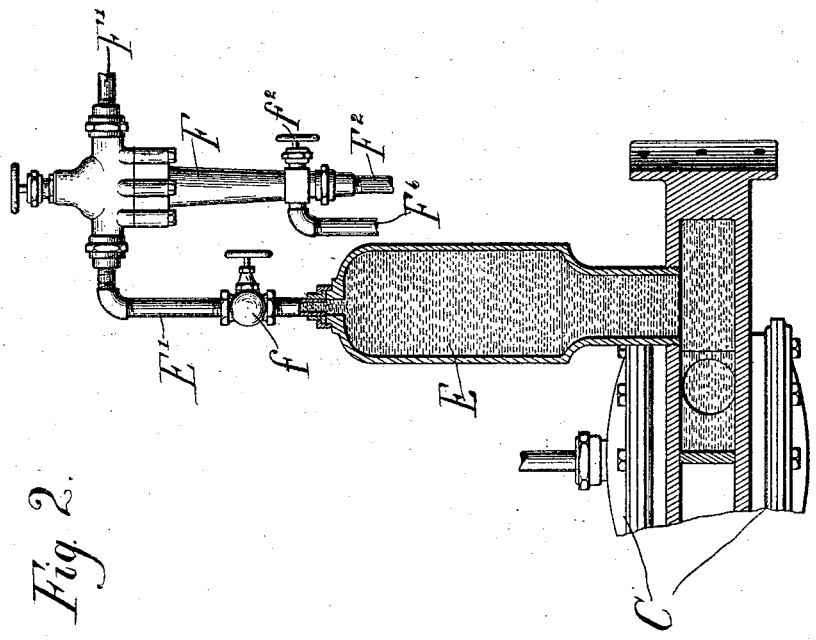


Fig. 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

WILLIAM WATKINS, OF CHICAGO, ILLINOIS.

STEAM-PUMP.

SPECIFICATION forming part of Letters Patent No. 492,950, dated March 7, 1893.

Application filed March 11, 1892. Serial No. 424,509. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WATKINS, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-Pumps; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

It is a matter of common knowledge that, when a pump piston is driven at a high rate of speed, particularly when the stroke is short and the water is raised to the pump from a considerable distance, the piston is retracted more rapidly than the water can follow. The result is that a vacuum will be formed behind said piston, which will cause the pump to pound as the piston, advancing on its return stroke, strikes the water. Thus, not only is the efficiency of the pump impaired, but the machinery is racked and its connections loosened and injured by the pounding. These objectionable effects are especially noticeable in steam fire engines, for which this improvement is more particularly intended. It has heretofore been proposed to remedy the defects due to the cause mentioned by providing a closed chamber or reservoir in communication with the suction side of the pump. In that construction the operation of the pump tends to create a vacuum in the reservoir as well as in the suction pipe and after the water has once been raised to the admission ports of the pump cylinder it will usually be maintained at that height independently of the pump. It is possible, also, that the water will rise in said chamber or reservoir a short distance above its connection with the pump cylinder and thus provide a limited supply from which the pumps may draw without the necessity of raising all the water supplied thereto at each stroke, directly through the suction pipe. This will occur when the vacuum is created so quickly that its strength is sufficient to raise the water higher than the suction ports of the cylinder. This prior construction has only partially remedied the defects above referred to, for the reason that the quantity of water in the reservoir is often too small to afford the needed supply.

It is a primary object of the present invention to provide a construction whereby a sufficient quantity of water shall at all times be delivered to the pumps, insuring the filling of its cylinders at each stroke of the pistons and thereby increasing the efficiency of the pump and preventing pounding and consequent injury thereto.

Another object of the invention is to provide a construction by which the feed water for the boiler will be drawn from the suction instead of, as heretofore, from the discharge side of the pump, and still another object is to provide for delivering the surplus water from the injector into the discharge pipe of the pump instead of into the atmosphere when the water has reached the proper level in the boiler, and thus permit the continuous operation of the injector as well as increasing the volume of water delivered from the said discharge pipe.

In the accompanying drawings is shown a steam fire pumping engine embodying my improvements and comprising a reservoir in communication with and extending above the admission passages of the pump; a pipe attached to the top of this reservoir; an injector connected with this pipe and a suitable connection of the injector with the boiler whereby the water drawn from the reservoir may be injected into the boiler.

Figure 1 is a side elevation of so much of a steam fire engine as will illustrate the invention. Fig. 2 is a vertical longitudinal section through the vacuum chamber, midway between the pump pistons, the connection with the injector being shown in projection. Only those parts of an engine are shown which are necessary to illustrate the scope and nature of the invention. Fig. 3 is a similar view of a steam fire engine not embodying my improvements. Said view is shown for the purpose of more clearly defining the difference between the present and my proposed form of construction. Fig. 4 is a detail sectional view of the injector F.

A represents the main side frames of the engine; B the boiler; C the pump cylinders; C′ the admission or suction connection; D the air chamber on the discharge side of the pump, and D′ the discharge connections.

E is a reservoir corresponding to what is commonly known as the vacuum chamber of

steam fire engines. It is connected with the suction side of the pump and is of such size that when filled with water, it will form a reservoir from which the pumps may draw, thus obviating the necessity of drawing all the water delivered to the pumps directly through the suction pipe. To insure the filling of this reservoir and to keep it full, the pipe E′ leads from the upper end thereof into connection with the inlet of an injector F of any approved construction which takes its steam from the boiler A through a pipe F′. A pipe F^2 is attached to the lower end of the injector casing and communicates with the boiler below its water line. A check valve F^3, or an equivalent device, is provided in said pipe, which operates in the usual manner to prevent the escape of water from the boiler. Connecting the pipe F^2 with the discharge side of the pump is a pipe F^4 which is likewise provided with a check valve F^5. Through this pipe any water which is carried over by the injector in excess of what is needed for the boiler will be forced into the discharge passage of the pump, thus preventing loss. The overflow pipe F^6 is however also provided, through which the water carried over by the injector may be permitted to escape, if desired.

The passage of water and of steam through the several pipes is controlled and may be regulated by means of valves f, f', f^2, f^3 and f^4. The valve f being turned so as to open the pipe E′ and steam being admitted to the injector from the boiler, the obvious effect will be to draw water into the reservoir and suction pipe, and, the distance not being too great, said reservoir and suction passages will be filled with water without work on the part of the pump. It is also obvious that with an injector of proper construction the admission of steam thereto can be so regulated that its strength will be just enough to draw and hold the column of water up to the top of the reservoir, the weight of the column of water being equal to the lifting power of the injector. Thus the pumps can draw water from both the suction pipe and the reservoir E and an adequate supply of water will therefore always be provided. Moreover, as the piston is not required to raise all of such supply, the water will follow the piston more closely and will thus prevent the formation of a vacuum behind it, and obviating the disadvantages incident to such a vacuum.

The injector, operating continuously, and therefore during those times when the piston is practically stationary and ineffective, will keep the reservoir E full of water and thus provide a constant supply from which the pumps may draw.

In connection with the boiler feed, as above described, I have represented connections whereby the boiler may be supplied with water from the discharge side of the pump in the usual manner. These connections consist of a pipe G leading from the air chamber D; a check valve G′, and a pump G^2 for forcing the water from the valve to the boiler. A valve g is provided whereby communication may be established between the valve G′ and the pipe F^2 when desired. This last mentioned feed apparatus will be employed when the other is out of order or when for any other reason it is deemed desirable.

The reservoir E and the pipe E′ connecting the latter with the injector, are kept full of water by the continuous action of the injector, thus affording a greatly increased head of water for the use of the pumps. It is not desirable therefore to discontinue the action of the injector, and when the water in the boiler has reached its proper water level and is not being used as fast as it can be supplied by the injector, I turn the valve f^3 and thus direct the water from the injector into the discharge part D′ of the pump through the pipe F^4, and thus increase the volume of water delivered through the discharge part D′.

I claim as my invention—

1. In combination with a reservoir connected with the inlet of the pump cylinder, and also with the suction pipe, of a steam pump, a steam injector connected with the reservoir above the connection of the latter with the pump cylinder and arranged to draw from said reservoir.

2. In a steam pumping engine, the combination, with the pump cylinder and the boiler, of a reservoir connected with the suction side of the said cylinder and with the suction pipe, and an injector suitably connected with the reservoir and the boiler to take water from the reservoir and to deliver it to the boiler.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

WILLIAM WATKINS.

Witnesses:
TAYLOR E. BROWN,
GEORGE W. HIGGINS, Jr.