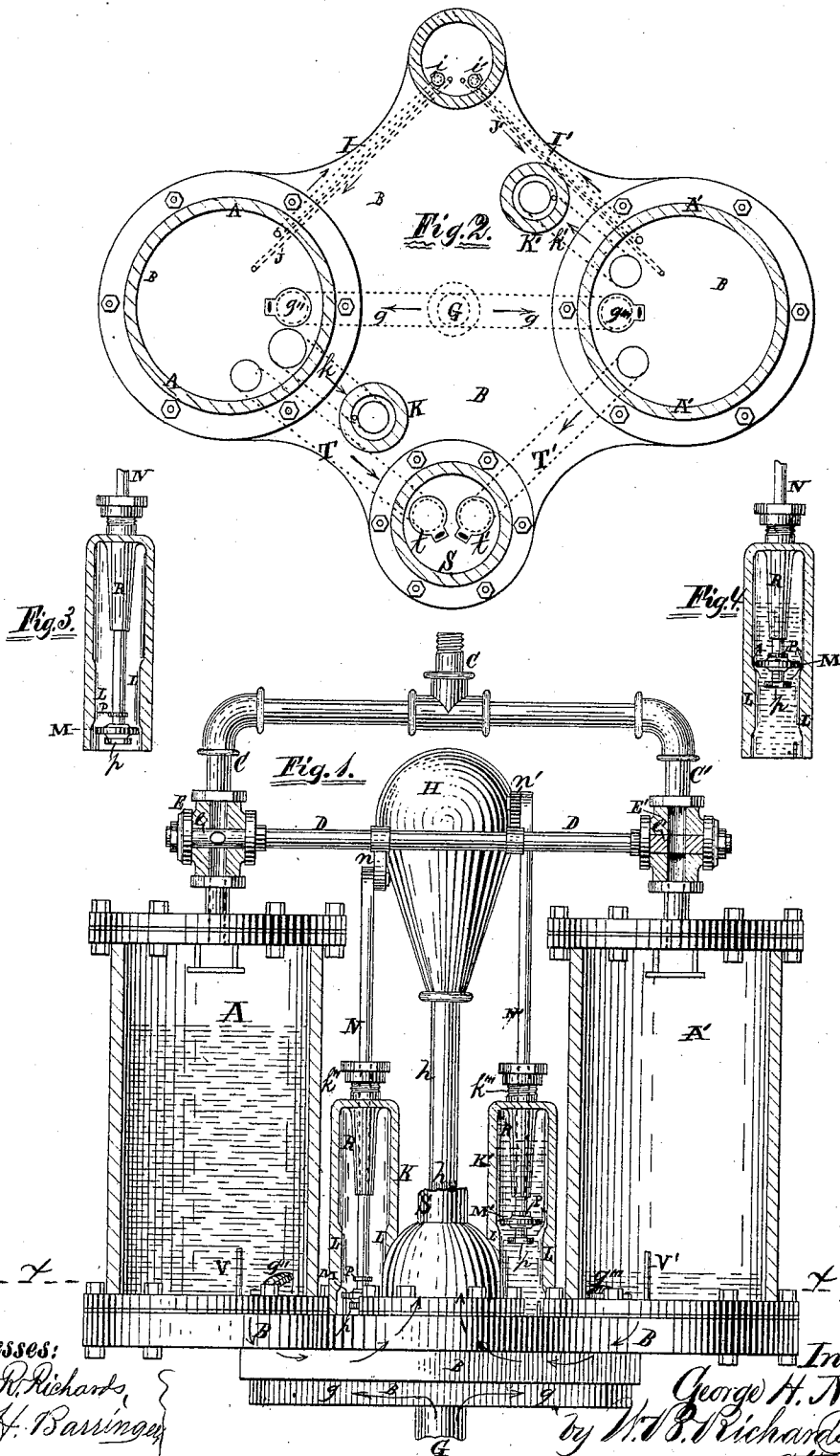


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Improvement in Steam-Vacuum Pumps.

No. 132,732.

Patented Nov. 5, 1872.



Witnesses:
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UNITED STATES PATENT OFFICE

GEORGE H. NYE, OF MONMOUTH, ILLINOIS.

IMPROVEMENT IN STEAM-VACUUM PUMPS.

Specification forming part of Letters Patent No. 132,732, dated November 5, 1872.

To all whom it may concern:

Be it known that I, GEORGE H. NYE, of Monmouth, county of Warren, and State of Illinois, have invented certain Improvements in Steam-Vacuum Pumps, of which the following is a specification:

The object of this invention is to produce a simple device for operating the valves which control the delivery of steam to automatic steam-vacuum pumps—a device which may render the operation of the valves more certain at the proper time, especially in closing to cut off the admission of steam as soon as condensation commences of the steam in the pump-cylinder, thereby utilizing the force of the steam and preventing the loss of steam occurring by a continuation of flow into the pump-cylinder after condensation commences; and the invention consists in the arrangement of air-cylinders with the pump-cylinders, in which pistons are reciprocated which transmit motion to the valves in the induction steam-pipes, their reciprocating motion being received in one direction from the pressure of the water while being discharged from the pump-cylinder, and in the other direction from compressed air, all as hereinafter fully described.

Figure 1 is a side elevation of a machine embodying my invention, shown partly in vertical section. Fig. 2 is a horizontal sectional view of Fig. 1 on the plane of the line *x x*. Figs. 3 and 4 are detached views of the valve-cylinders in vertical section.

Referring to the letters on the drawing, A A' represent the pump-cylinders, shown in central vertical section at Fig. 1, and resting on a base, B, which carries all the operating devices, and is provided with ducts or passages in its body for the passage of the water, as hereinafter described. C is the steam-inlet pipe, bifurcated as shown, one branch leading to cylinder A, and one to the cylinder A'. D is a rock-shaft. E E' are stop-cocks in the vertical part of the branches of the pipe C, the keys *e e'* of which are attached to the ends of the rock-shaft D, the openings through the keys *e e'* being so arranged relatively to the shaft D that when it is turned to admit steam through the cock E the pipe C' will be closed, and vice versa. G is the water-inlet pipe, leading, by ducts *g g'*, to the bottom of and into the pump-cylinders A A', respectively, and pro-

vided with valves *g'' g'''* on their inner ends. (See dotted lines, Fig. 2.) H is an air-dome, supported on a pipe, *h*. I I' are ducts in the bottom B, leading, respectively, from the cylinders A A', and provided with valves *i i'* on their openings into the enlarged bottom of the pipe *h*. J J' are ducts, also leading from the bottom of the cylinders A A' to the enlarged lower end of the pipe *h*. They are much smaller than the ducts I I', and have no valves. K K' are the valve cylinders with valveless-ducts *k k'* leading from their lower ends to the bottoms of the cylinders A A', respectively. (See dotted lines *k k'* at Fig. 2.) The interior of the cylinders K K' are constructed, as shown by the central vertical sectional views thereof at Figs. 1, 3, and 4, with a portion of their interior or bore contracted, as shown by letters L. M M' are valves, fitting accurately the contracted parts of the cylinders K K'. N N' are rods, attached at their upper ends to cranks *n n'*, radially opposite each other on the shaft D, and passing through stuffing-boxes *k'' k'''* into the cylinders K K'. The valves M M' are fitted loosely on the rods N N', and can slide freely up and down thereon between the collars P P' and nuts *p p'*. R R' are tubular projections downward from the interior of the top of the cylinders K K', through which the rods N N' reciprocate. S is the water-discharge pipe with ducts T T' leading from the cylinders A A', and provided with valves *t t'* on their ends within the discharge-pipe S. V V' are small pipes extending upward a short distance from the entrance of the ducts J J' to the cylinders A A'.

The operation of my invention is as follows: The pump-cylinders A A' being primed and started in any of the different ways common with this class of pumps, we will suppose the shaft D turned so as to have opened the passage for steam through the cock *e'* and closed the passage through the cock *e*, as shown at Fig. 1; at the same time the cranks *n n'* will have turned the rods N N' to the relative position with the cylinders A A', shown at the same figure and at Figs. 3 and 4, the pressure of the steam on the water in the cylinder A' forcing it therefrom through the duct T', valve *t'*, and pipe S, and at the same time forcing a small portion of the water through the duct *k'* into the cylinder K' where, pressing

against the valve M, it will raise it on the rod N to the collar P' and within the enlarged upper portion of the said cylinder, as shown at Figs. 1 and 4. While in this position it will be plainly seen that the water will be pressed upward above it and around the lower part of the tubular projection R, thereby compressing the air in the now air-tight annular space surrounding the upper part of the projection R with a compression equal to the pressure of the steam in the cylinder A'. As soon as the water has been all forced from the cylinder A' in this class of pumps there is a slight condensation of steam takes place within the cylinder, and to close the passage through the cock e', and to cut off the further admission of steam at the instant of this condensation, is the object of my invention. This is accomplished by the compressed air above the water in the cylinder K' forcing downward the water therein instantly when the pressure below is reduced by said partial condensation. The first movement of the water in the cylinder K' downward will press the valve M downward on the rod N' to the nut p and within the contracted portion L of the cylinder K', and from thence downward through said contracted portion, carrying the rod N' and crank n' with it, thereby rotating the shaft D, closing the cock e', and cutting off steam from the cylinder A', at the same time opening the cock e and admitting steam to the cylinder A, which is now full

of water. The same operation also raises the valve M in cylinder K to the position, shown at Figs. 1 and 4, of the valve M' in the cylinder K', and the valve M', passing down to the lower and enlarged portion of the cylinder K', will allow the water therein to pass back into the cylinder A', as the vacuum therein is perfected and draws it. The same operation described is now repeated at the cylinders A and K. Water being forced at the same time, by the pressure of the steam, through the ducts I I' when the pressure is in the cylinders A A', respectively, will compress the air in the dome H, which will in turn force the water back through the pipes j j' on the ducts J J' for condensation purposes.

Claims.

1. The air-compressing cylinders K, when arranged to operate with the valves M and cylinders A, substantially as described, and for the purpose specified.
2. The valves M, collars P, and nuts p, when combined and arranged to operate with the cylinders K and A, rods N, shaft D, and cocks e, substantially as described, and for the purpose specified.

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Witnesses:

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