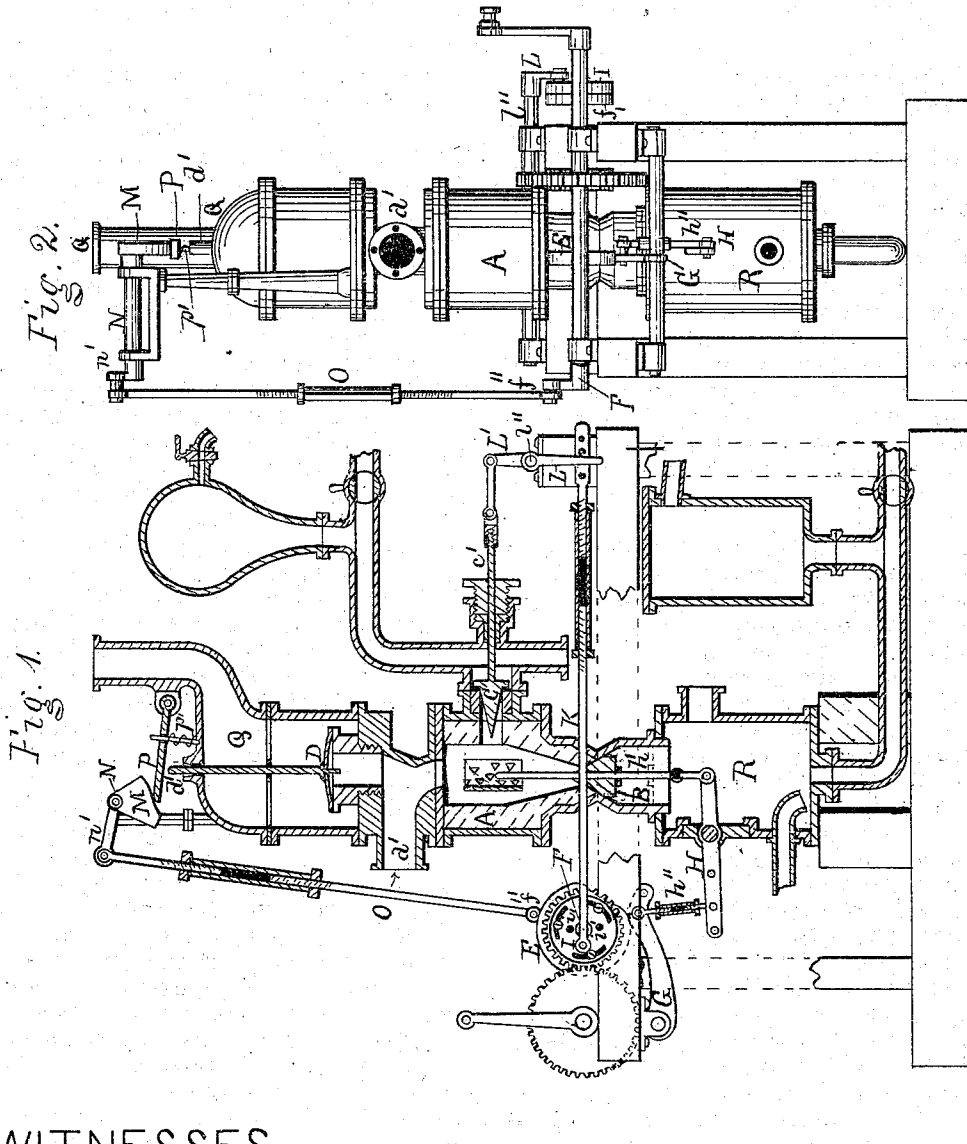


J. HOUPt.

Jet Condensers for Steam-Engines.

No. 136,918.

Patented March 18, 1873.



WITNESSES:

Benz Morison.
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UNITED STATES PATENT OFFICE.

JOHN HOUP, OF SPRINGTOWN, PENNSYLVANIA.

IMPROVEMENT IN JET-CONDENSERS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 136,918, dated March 18, 1873.

To all whom it may concern:

Be it known that I, JOHN HOUP, of Springtown, in the county of Bucks and State of Pennsylvania, have invented certain further Improvements in the Self-Clearing Jet-Condenser for Steam-Engines, of which the following is a specification:

My invention especially relates to the construction and arrangement of certain improved devices, hereinafter described and set forth, for operating the valves of the self-clearing jet-condenser for which Letters Patent No. 131,351 were granted to me, dated September 17, 1872, the object of my present invention being the production and application of more simple, inexpensive, effective, and accurately-working devices for operating the valves of said condenser.

Figure 1 is a vertical sectional side view of the self-clearing jet-condenser embodying my present invention. Fig. 2 is an end elevation of the same, presenting in front the main driving-shaft of the condenser-valves.

The bottom valve B, water-jet valve C, and top valve D are constructed and arranged to be operated periodically in relation to the condensing-chamber A, substantially as described in my said patent No. 131,351; but the devices for giving the required motions to said valves are quite different in construction, arrangement, and application from those set forth and described in said patent. The closing of valve B is effected by means of a cam, E, which is adjustably secured on a horizontally-arranged shaft, F, so that the full or convex edge of said cam will, during the rotary motion of the shaft, periodically depress the swinging end of a horizontally-arranged arm, G, which is adjustably connected to the vertical stem of said valve B, and to arm G by means of a horizontally-arranged lever, H, and connecting rods and links $h' h''$, thus closing said valve by a positive motion. The opening of said valve B is produced by its gravitation in connection with that of the water of condensation in the condensing-chamber A and the pressure or impetus of the first portion of the puff of steam entering the chamber, when, by the continual rotary motion of the shaft F, the straight or recessed edge of the cam E has passed over the depressed end of the arm G, and thus

permits the latter to rise, and consequently allow the valve B to open downward and let the water and air contained in the condensing-chamber A pass out with the first portion of the puff of steam entering the said chamber. The water-jet valve C is operated by means of a wrist-pin fixed in the adjustable disk-plate I, (which is secured to a face-plate, f'), by means of slots and set-screws $i' i''$, which face-plate is permanently fixed on the front end of shaft F in the usual well-known manner. An adjustable horizontally-arranged rod, K, and two vertically-arranged arms, L L', fixed in opposite directions (one upward and the other downward) on the respective ends of a rock-shaft, l'' , connect the said wrist-pin of the plate I with the said valve C by a joint, c' , and thus together alternately open and close the said water-jet valve by positive motions during the rotary motion of the shaft F. The top valve D is periodically held down in its closed position upon the condensing-chamber A by means of a cam, M, which is fixed upon one end of a rock-shaft, N, the crank n' of which is operated by a crank, f'' , on the shaft F, through an adjustable connecting-rod, O, the said cam M being in contact with the upper side of a lever, P, which is kept in contact with the said cam M by means of a small spiral spring, p' , pressing continually upward against said lever P. As the cam is vibrated it periodically presses the lever P downward upon the stem d' of the valve D, and thus holds the valve firmly closed upon the condensing-chamber A when the latter requires to be closed, and afterward rising allows the said valve to be opened by any excess of pressure of steam above that of the atmosphere, which may be in the condensing-chamber A, the said escaping steam passing to the furnace-chimney (not shown) through the escape-chamber and pipe Q.

Explaining the operation of my invention, I will suppose the piston of a vertical steam-cylinder to be near the top of the cylinder, and that the high-pressure exhaust steam has been discharged from beneath the piston through the outlet-valves B and D of the condensing-chamber A, together with the water of condensation and accumulated air therein, as will hereinafter be explained. The cold-water-jet valve C has just been opened, as

represented in Fig. 1, and throws a copious jet of cold water into the condensing-chamber A, and thus produces the desired vacuum beneath the piston of the steam-cylinder (not shown)—which communicates with the condensing-chamber A through the pipe *a'*—while the said piston is traveling on its way downward; but before the piston reaches the bottom of the cylinder the cold-water-jet valve C is closed, and the top valve D is held down firmly by the pressure of the cam M on the lever P; and the bottom valve B, being now relieved from the pressure of the cam E, is free to drop open as soon as the vacuum is destroyed in the condensing-chamber A by the first part of the next puff of the exhaust steam rushing from the upper end of the cylinder through the said pipe *a'* into the condensing-chamber A, and driving the water of condensation and accumulated air down through the valve B into the hot-well R below, and, immediately after the water and air have thus been discharged from the condensing-chamber A, the said valve B is again closed, as before, and the top valve D, being immediately relieved from the pressure of the cam M, is free to be raised by any excess of its pressure above that of the atmosphere, and thus allow the said steam to escape into the chamber and pipe Q, and thence into the furnace-chimney, which latter prevents any cold air from striking back into the chamber or pipe Q.

It will be seen that the devices hereinbe-

fore described and shown in the drawing for operating the several valves B C D are much more simple and inexpensive of construction and application than the respective devices for the same purposes set forth in my said Letters Patent No. 131,351, and that they will be more effective and accurate for accomplishing their respective purposes, and less liable to derangement in use.

I claim as my invention—

1. The cam E, swinging arm G, and lever H, in combination with the valve B, the said parts being constructed and arranged to operate together substantially as and for the purpose hereinbefore set forth and described.

2. The adjustable wrist-pin disk-plate I and face-plate *f'* on the shaft F, the adjustable connecting-rod K, and the rock-shaft *l'* and arms L and L', in combination with the water-jet valve C, the said parts being constructed and arranged to operate together substantially as and for the purpose hereinbefore set forth and described.

3. The crank *f''* on the shaft F, the adjustable connecting-rod O and rock-shaft N, cam M, lever P, and spring *p'*, in combination with the valve D, the said parts being constructed and arranged to operate together substantially as and for the purpose hereinbefore set forth and described.

JOHN HOUP. T.

Witnesses:

BENJ. MORISON,
WM. H. MORISON.