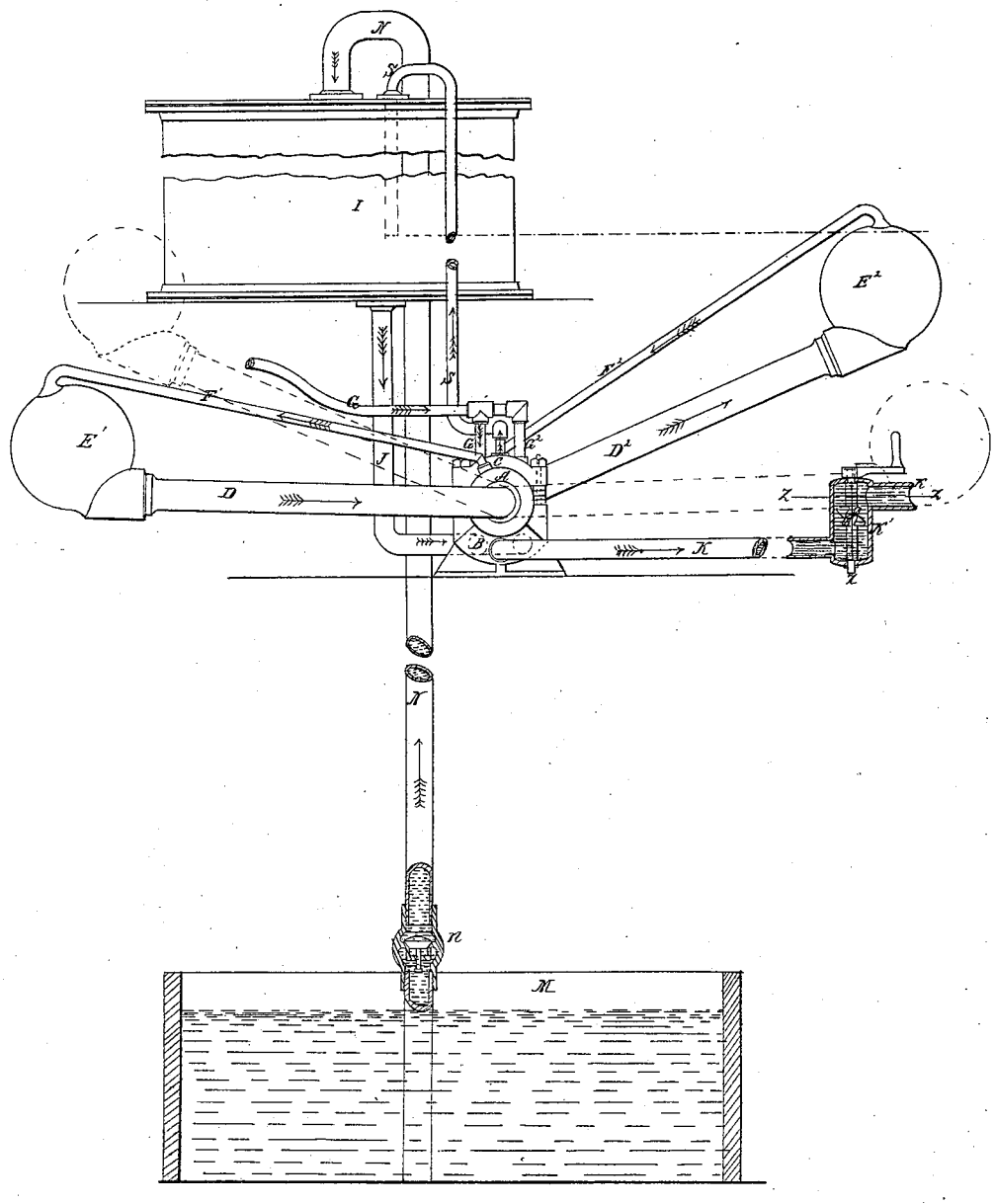
2 Sheets-Sheet 1.

G. I. Washburn,

Steam-Boiler Condenser.

No. 41,799. Patented Mar. 1, 1864.

Fig: 1



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AM. PHOTO-LITHO. CO. N.Y. (OSBORNE'S PROCESS.)

2 Sheets-Sheet 2.

G. I. Washburn,

Steam-Boiler Condenser.

No. 41,799. Patented Mar. 1, 1864.

Fig: 2

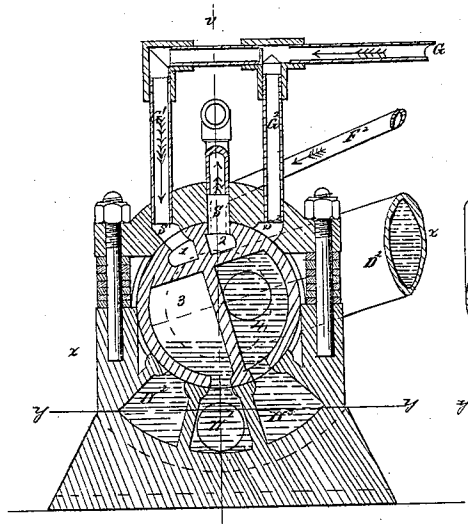


Fig: 3

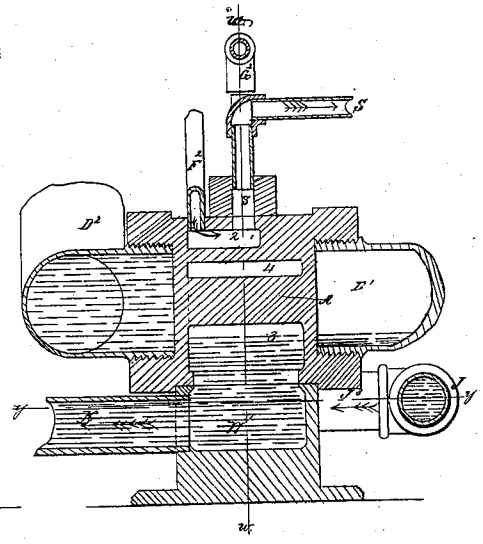


Fig: 4

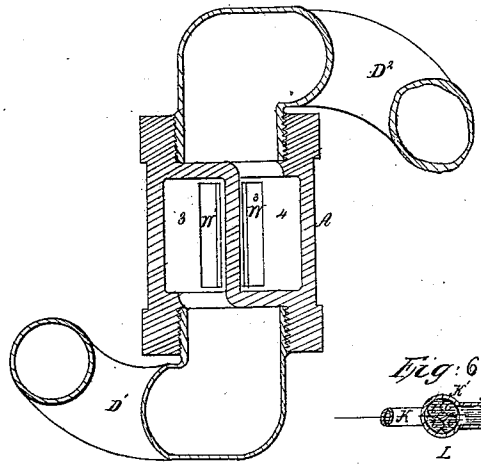


Fig: 5

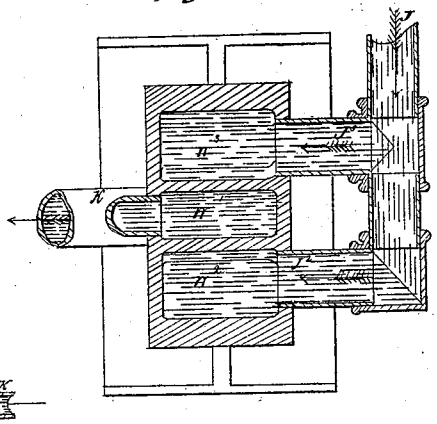


Fig: 6

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AM. PHOTO-LITHO. CO. N.Y. (OSBORNE'S PROCESS.)

UNITED STATES PATENT OFFICE.

GEORGE I. WASHBURN, OF WORCESTER, MASSACHUSETTS.

IMPROVED APPARATUS FOR PUMPING AND CONDENSING.

Specification forming part of Letters Patent No. **41,799**, dated March 1, 1864.

To all whom it may concern:

Be it known that I, GEORGE I. WASHBURN, of the city and county of Worcester, in the State of Massachusetts, have invented a new and Improved Apparatus for Pumping and Condensing; and I do hereby declare the following to be a full and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is an elevation of my improved apparatus, partly in section. Fig. 2 is a transverse section of the principal working section thereof at *w w*, Fig. 3. Fig. 3 is a vertical longitudinal section of the same at *v v*, Fig. 2. Fig. 4 is a horizontal section at *x x*, Fig. 2. Fig. 5 is a horizontal section at *y y*, Figs. 2 and 3. Fig. 6 is a horizontal section at *z z*, Fig. 1, of the screw and screw-chamber, hereinafter to be explained.

Similar letters of reference indicate corresponding parts in the several views.

The subject of this invention is an automatic apparatus which may be made to raise or force water by the intermittent condensation of steam in manner hereinafter explained.

In order that others skilled in the art to which my invention appertains may be enabled to fully understand and use the same, I will proceed to describe its construction and operation.

A represents a hollow shaft formed with four chambers, 1 2 3 4, having no internal communication, but each provided with an external port or opening, as shown in Fig. 2. The said shaft is fitted to oscillate in a bearing, B, which covers the ports of the lower chambers, 3 4, and is surmounted by a cap, C, which covers the ports of the upper chambers, 1 2. In the bearing B are three water ports or passages, W′ W^2 W^3, with which the chambers 3 and 4 are thrown into communication alternately, in manner hereinafter explained. The cap C is also formed with three steam ports or passages, S S′ S^2, with which the chambers 1 and 2 are thrown into alternate communication in similar manner.

D′ D^2 are hollow arms mounted rigidly upon the respective ends of the shaft A, and projecting obliquely upward therefrom in opposite directions. The interior of the arm D′ is in free communication with the chamber 3, and that of the arm D^2 with the chamber 4.

E′ E^2 are hollow balls or chambers, mounted on the ends of the arms D′ D^2.

F′ F^2 are steam-pipes, the former communicating from the ball E′ to the chamber 1, and the latter from the ball E^2 to the chamber 2.

G represents a steam-pipe leading from the steam-space of the boiler and terminating in two branches, G′ G^2, the first of which communicates with the port S′, and the latter with the port S^2.

H represents a steam-pipe leading from the port S to the upper part of an elevated condenser, I, which may be of considerable height, and continuing down within the said condenser to a point nearly on a level with the highest point reached by the upper parts of the balls E′ E^2 in their oscillations.

J represents a water-pipe leading from the lower part of the condenser and terminating in two branches, J^2 J^3, which communicate with the respective ports W^2 W^3 in the bearing B.

K represents a discharge-pipe leading from the port W′.

L represents a shaft properly packed to work within an enlargement or chamber, K′, in the discharge-pipe K. Upon the said shaft are mounted any desired number of spiral blades, *l l*, so that it will constitute a screw rotated by the water forced through the exit-pipe K, and adapted to drive a machine. The supply of water is taken from any suitable reservoir, M, not more than thirty-three feet below the upper part of the condensing-tank I, through a pipe, N, extending upward to the condenser I, and provided with a check-valve, *n*, closing downward, so as to prevent any reflux of water down the supply-pipe N. The said valve may be located in any part of the pipe N, but is, by preference, placed at its lower end, and under water.

Operation: The drawings represent the positions of the various parts at the instant the arm D^2 and ball E^2 have been filled with water from the condenser I through the passages J J^3 W^3 4. At the same time, the chamber 1 being in communication with the boiler and the chamber 3 in communication with the discharge-passages W′ K, the water contained in the arm D′ and ball E′ has been forced out by the pressure of steam from the boiler. These motions of the fluids are all indicated by red arrows. The ball E′ being thus depleted

and the ball E^2 filled, the weight of the water in the latter causes it to descend to the position shown by dotted lines in Fig. 1. This throws the chamber 1 into communication with the port S and pipe H, leading into the condenser I, the chamber 3 in communication with the lower part of the condenser through the water-passage J J^2 W^3, the chamber 2 in communication with the steam pipe G G^2, leading from the boiler, and the chamber 4 in communication with the discharge-passage W′ K, so that steam from the boiler rushing through the pipes G G^2, chamber 2, and pipe F^2, forces the water contained in the ball E^2 and arm D^2 out through the chamber 4 and passages W′ K. At the same time the water contained in the condensing-tank I will descend from its own gravity through the passages J J^2 and W^2, filling the chamber 3, arm D, and ball E′ with water, displacing the steam therein, and forcing the said steam through the pipe F, chamber 1, and pipe H into the condensing-tank I and beneath the surface of the water therein, causing it to be partially condensed by contact with the sides of the immersed portion of the pipe H, and the remainder to be instantaneously condensed by being discharged beneath the surface of the water; or, if preferred, the pipe may be extended to a sufficient distance below the water to effect the entire condensation by contact with the surface of the pipe. The vacuum produced by this condensation of steam causes water to be forced by atmospheric pressure from the reservoir M up through the pipe N, refilling the condensing-tank I with a fresh supply of water ready to flow down the empty arm and ball as soon as they are thrown into communication with the condensing-tank by the descent of those last filled. A constant discharge of water is thus automatically maintained, (the supply being taken from the reservoir M or any suitable source,) and as it is forced through the chamber K′ the current imparts rotation to the screw L *l*, from which motion may be transmitted to a machine for any useful purpose.

If the apparatus is to be used for supplying steam-boilers with water, it is only necessary to have the apparatus elevated to a sufficient height above the water-level therein and the pipe K in communication with the water-space of the boiler, so that the water will flow down into the boiler by its own gravity from either side of the apparatus, which may be placed in communication therewith by the oscillation of the shaft A.

I do not restrict myself to any particular form of motor in the pipe K, but propose to use any device which may be found suitable for the purpose described.

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

1. The oscillating chambered shaft A 1 2 3 4, arms D′ D^2, balls E′ E^2, and ports W′ W^2 W^3 S S′ S^2, constructed, arranged, and operating substantially as and for the purposes set forth.

2. In combination with the above-described oscillating chamber-shaft, the elevated condensing-tank I, water-pipe J, and steam-pipe H, operating in the manner described to condense steam by contact either with the water in the tank I or with the part of the pipe H immersed therein.

3. The combination of the steam-pipe G G′ G^2, oscillating chambered shaft A 1 2 3 4, and discharge-passages W′ K, substantially as and for the purposes set forth.

4. In an apparatus constructed and operating substantially as hereinbefore described, the employment of the current of water forced through the pipe K to communicate motion to machinery in any manner substantially as described.

The above specification of my improved automatic boiler-feeder and condenser signed this 21th day of November, 1863.

GEO. I. WASHBURN.

Witnesses:
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W. S. DAVIS.