H. F. L. W. de ROMILLY.

Apparatus for Exhausting and Forcing Fluids.

No. 211,347. Patented Jan. 14, 1879.

Fig. 1.

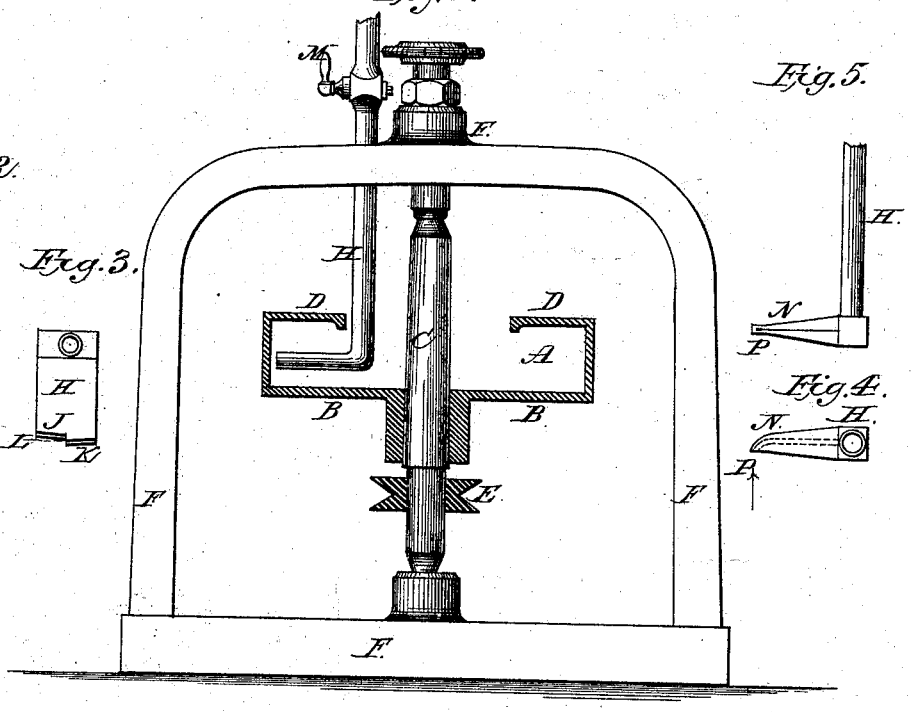

Fig. 2.

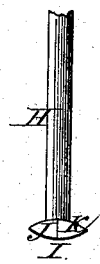

Fig. 3.

Fig. 5.

Fig. 4.

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IMPROVEMENT IN APPARATUS FOR EXHAUSTING AND FORCING FLUIDS.

Specification forming part of Letters Patent No. **211,347**, dated January 14, 1879; application filed August 15, 1878.

To all whom it may concern:

Be it known that I, HENRY FÉLIX LOUIS WORMS DE ROMILLY, of Paris, France, have invented Improvements in Apparatus for Exhausting and Forcing Fluids; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed sheet of drawings, making a part of the same.

The improved machine of this invention consists of a rotary drum containing a liquid, which is carried round by the drum in its rotation, and a stationary pipe terminating in a branch having an orifice of peculiar shape, which is immersed in the liquid in said drum near its circumference, and in which pipe a fluid is exhausted or forced, or both, according to the direction of motion of the liquid in the drum relatively to the said orifice and the construction of the pipe, as hereinafter described.

In order that the invention may be more readily understood, I will describe it in detail, with reference to the accompanying drawing, in which it is illustrated by way of example only.

A, Figure 1, is the drum, in the form of a short hollow right cylinder, closed at bottom, and mounted axially upon a spindle, C, passing through a central boss on the bottom B, turning on coned centers in a strong fixed frame, F. One opening is left around the spindle C, which forms a kind of inwardly-projecting circular flange or rim to prevent the liquid being thrown out of the drum by centrifugal action. The inside edge of this rim D is also provided with a downwardly-projecting lip to prevent splashing. The drum is driven from a suitable motor, either by a belt or spur gearing applied to a pulley, E, or a toothed wheel or cone keyed on spindle C.

H is a pipe parallel to the spindle C, and fixed to the frame F and projecting into the drum A. The tube H is bent at a right angle, and then extends radially close up to the circumference of the drum. This branch of the pipe is flattened to the lenticular form in cross-section shown at I, Fig. 2, the two opposite acute angles being in a line forming a chord to the circumference of the drum. Two partition-plates, J K, Figs. 2 and 3, extend from these opposite angles to the middle of the width of the tube, and terminate in a line parallel to a generatrix of the cylinder or drum. These two plates are curved somewhat to the circular form of the cylinder, but to a rather smaller radius than if they were concentric therewith. The meeting-line of the two divisions is thus the nearest point to the circumference of the drum, and the one plate, K, is set slightly nearer this circumference than the other, so that where the two plates meet, or rather nearly meet, a linear orifice, L, is formed, in the shape of an elongated rectangular slit parallel to the axis, and in a plane passing through said axis. As the two divisions terminate in the same median line, the linear orifice will only give passage in or out to a jet of liquid or gaseous fluid tangential to the curve of the extremity of the tube. The other end of pipe H is either connected to a receiver, in which it is required to create a vacuum, or put in communication with the fluid (liquid or gaseous) to be exhausted through the linear orifice.

The following is the action: A certain quantity of water is first placed in the drum, which is then revolved in such direction that the water carried round therewith shall first pass over the partition-plate nearest the circumference, then over the other, and thus produce a small cataract. If the pipe be in communication with an air-tight vessel provided with a vacuum-gage, a vacuum will be seen to gradually form. This vacuum is a function of the velocity of rotation of the drum.

By closing cock M, Fig. 1, the vacuum may be maintained after the machine ceases to work, or it may be maintained by keeping the machine in motion.

Instead of the machine being used to create a vacuum, it may be made in a similar manner to exhaust a gas or liquid.

By rotating the cylinder in the reverse dition, so as to cause the water to first pass over the division farthest from the circumference of the drum, the water will be made to enter the pipe H, and the gage will now indicate a pressure increasing as the square of the speed of the drum. If the receiver be provided with

an orifice, or the pipe terminates directly in the open air, the water will flow out therefrom at a velocity which is a function of the speed of rotation, and of the height to which the water is raised in the pipe before it escapes, due allowance being also made for the difference in the size of the inlet and outlet orifices, and also for friction bends in the pipes, &c.

The extremity of the branch pipe may also be made of the flattened form shown at N, Figs. 4 and 5, so as to present a minimum resistance to the circulating current of water, the orifice P being normal to the direction of the water, the form of the orifice being in this case much more simple. The part of the tube perpendicular to a generatrix of the cylinder is tapered or flattened, so as to resemble a double-edged blade; and in one of its lateral edges, near the point, a slit, P, is made, which is radial, and presented directly to the affluent water in the cylinder or drum.

The sides of the orifice, and also the immersed portion of the tube, should be as reduced in thickness as possible, so as to present little resistance to the water. This form of orifice may be used for exhausting as well as for forcing fluids. The orifice may also be placed both in the one case, and the other radially on the top or bottom side of the branch pipe.

By having two orifices on the same tube opposite one another, and separated by a longitudinal partition, the apparatus may be used both for exhausting and forcing a gaseous or liquid fluid.

In the case of a liquid the forcing is effected at that portion of the divided tube at which the liquid enters, and the exhaustion takes place at the opposite side. Thus the liquid exhausted, instead of being immediately forced, has time to acquire sufficient speed during its circular motion in the drum before it arrives at the orifice through which it is to be forced.

In the above example I have spoken of but one exhausting and forcing pipe; but it will be understood that several may be used in the same drum.

In cases also where it is desired to both lift and force by the same drum, two of these may be placed concentrically, one in the other, upon the same spindle. The two drums would communicate, and the suction would take place in the smaller turbine and the forcing in the larger one, in cases where it is desired to raise water to a great height.

The liquid employed for exhausting is usually water; but mercury, oil, brine, &c., may be used, according to circumstances.

One or more small turbines driven from spindle C may be especially employed for producing a circulation of oil for lubricating the moving parts.

I claim—

1. The combination of hollow rotary drum A with the stationary elbow-pipe H, dipped into said drum, and bent so that its open end, which enters the drum, will approach the circumference thereof, substantially as herein shown and described.

2. The combination of the unequal plates J and K, forming orifice L, with the pipe H and centrifugal drum A, substantially as herein shown and described.

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