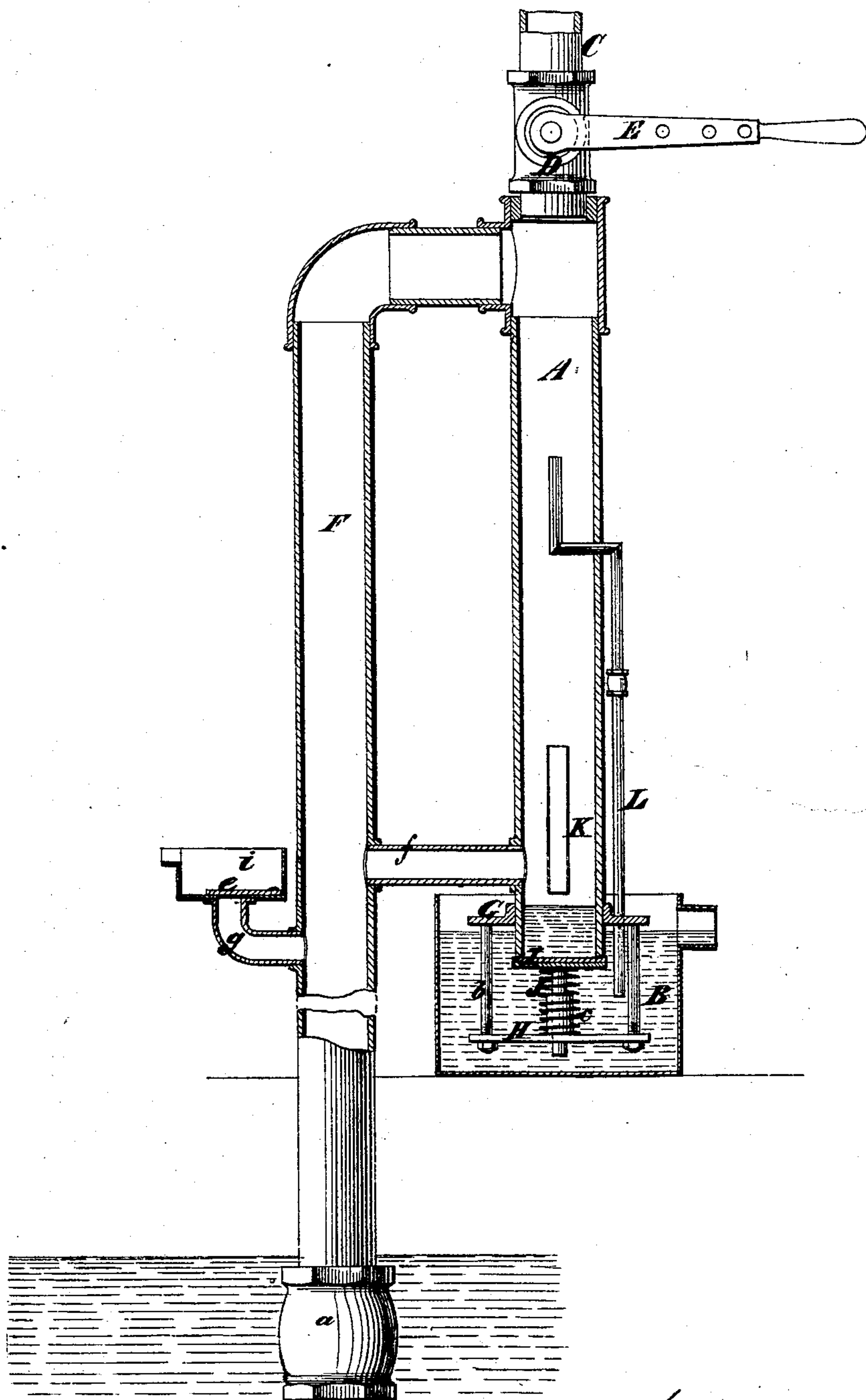


W. BURDON.
Steam Vacuum-Pumps.

No. 135,202.

Patented Jan. 28, 1873.



Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM BURDON, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. 135,202, dated January 28, 1873.

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To all whom it may concern:

Be it known that I, WILLIAM BURDON, of Brooklyn, in the county of Kings and State of New York, have invented an Improvement in Steam Vacuum-Pumps, of which the following is a specification:

This invention consists in the combination, with the vacuum-vessel of the pump, of a removable bottom, constituting a discharge-valve whereby an orifice the whole area of the transverse section of the vessel is opened, and the speedy discharge of the vessel is facilitated. It also consists in a novel manner of making the communication between the vacuum-vessel and its suction-pipe, whereby the water is introduced both into the upper and lower portions of the vessel, and the steam is more effectually condensed. Further, it consists in the combination, with the suction-pipe, of a branch pipe furnished with an outwardly-opening valve, whereby any momentum which the water in running up the pipe to fill the vacuum-vessel may attain will not be suddenly checked, but is permitted to escape from said branch pipe and add to the delivery of the pump, and, also, whereby all injurious straining of the pump-joints by the sudden checking of the flow of incoming water is obviated.

The accompanying drawing represents a central vertical section of an apparatus constructed according to my invention.

A is the vacuum-vessel. Its lower end is entirely open, and terminates in a discharge-box, B, and its upper end is connected with the exhaust-pipe of a steam-engine, or perchance with a steam-generator, by a pipe, C. The communication between this pipe and the vacuum-vessel is controlled by a rolling-plug valve, D, whose stem or shank is furnished with a lever, E, which may be either shifted by hand or suitable machinery to operate the valve. The suction-pipe F of the apparatus leads to the upper part of the vessel, and, by a branch, *f*, leads also to the lower part thereof. At its lower end it is furnished with a check-valve, *a*, which keeps the pipe always full of water. Opposite the discharge-box B there extends from the suction-pipe F a short branch, *g*, which is turned up at the outer end and furnished with an outwardly-opening check-valve, *e*. As soon as the vacuum-ves-

sel is filled and the flow of water is thereby stopped, whatever momentum the water may have attained will cause it to flow out through the branch pipe just mentioned till such momentum is expended. The water thus discharged is collected in a box, *i*, and delivered from a spout with which it is furnished. On the lower part of the vacuum-vessel there is a yoke, G, which is secured in place by shrinking or otherwise, and is provided with two arms, to which a plate, H, is secured by bolts *b b*. Projecting from the middle portion of the plate H just alluded to is an upright guide, *c*, within which the stem of the discharge-valve I works. This valve consists of a metal disk provided on its under side with a straight stem, and faced with leather or other suitable packing material. The disk of which it is formed is of slightly greater area than the area of the transverse section of the vessel A, and in reality constitutes the bottom thereof, closing against a seat formed on the lower edge thereof. Between the valve and the plate H there is a spiral spring, J, which surrounds its shank. It assists in closing the valve and gives to it a lively action. In the lower portion of the vacuum-vessel there is a receptacle, K, which abstracts water from each discharge of the vessel, and as soon as the water recedes below it showers out, through perforations in its lower portion, a spray which starts condensation of the steam in the vessel. L is a pipe which leads from the discharge-box B to the upper portion of the vacuum-vessel, for the purpose of delivering thereto a shower of water to assist in condensing the steam in the vessel. This pipe is furnished with a check-valve for the purpose of keeping it constantly filled.

A vacuum having been formed in the vessel A by the condensation of steam therein or other means, water is forced up into it through the suction-pipe by atmospheric pressure. As soon as the vessel is full the steam-valve is shifted to admit steam to it. By the admission of steam the vacuum is destroyed, and the water is caused to discharge, the whole bottom of the vessel (which is constituted, as before mentioned, by the discharge-valve) literally dropping out. When the water recedes below the condensing-receptacle K wa-

ter is showered from the latter and condenses the surrounding steam, and consequently reduces the pressure of steam in the vessel. About this time the steam-valve is again shifted to shut off the supply of steam. The pressure being reduced in the vessel, water flows from the pipe L, and, by assisting in the condensation of the steam, forms a vacuum in the vessel. Water now begins to flow up through the suction-pipe, and, flowing into the vessel both from the top and near the bottom, condenses whatever steam there may remain in the vessel, and so perfects the vacuum therein.

I think it well here to mention that in practice I find the momentum acquired by the water in flowing up to the vacuum-pump to be so great that when the flow is suddenly stopped by the filling of the vessel, the connections of the pump are injuriously strained, and consequently, this force being great, much loss is sustained unless some device for permitting the water to escape be employed. I utilize the momentum by means of the branch pipe, through which, as soon as the vacuum-vessel is filled, the water flows till the momentum is exhausted.

By the time the vessel A is full of water the steam-valve is again shifted, and steam is

thereby admitted to it, and thus the operation continues.

The discharge-valve described is exceedingly advantageous where the exhaust steam of an engine is used in the pump, as in that case the water depends for its discharge on the force of gravity, and every facility that can be obtained for expediting its discharge is of the utmost value.

Claims.

1. In combination with the vacuum-vessel A of a steam vacuum-pump the removable bottom I, constituting a discharge-valve of an area equal to the entire area of the transverse section of the aforesaid vessel, substantially as and for the purpose set forth.

2. The combination, with the suction-pipe leading to the upper part of the vacuum-vessel and with the vacuum-vessel itself, of the branch pipe *f*, essentially as and for the purpose set forth.

3. The combination, with the suction-pipe F, of the branch pipe *g*, furnished with an outwardly-opening valve, substantially as and for the purpose herein specified.

Witnesses:

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