H. B. JOHNSON.

STEAM VACUUM PUMP.

No. 188,145. Patented March 6, 1877.

Fig. 1.

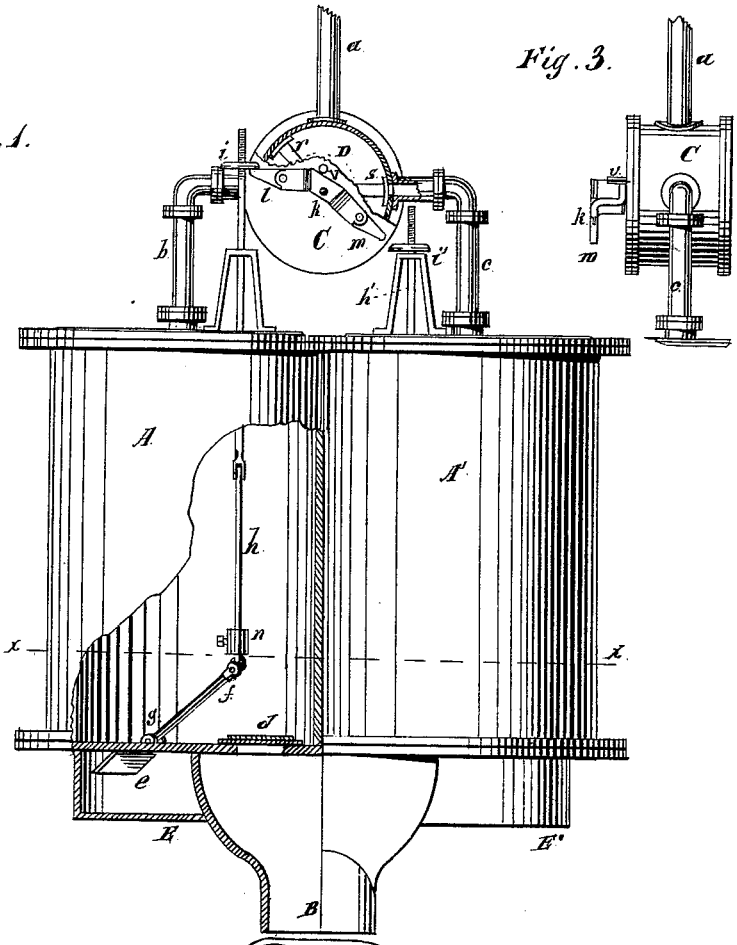
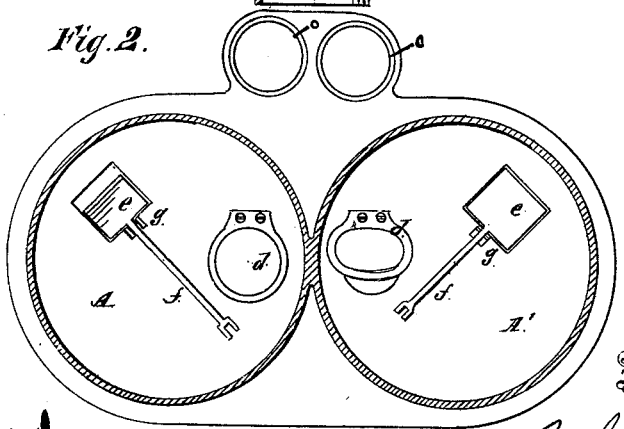


Fig. 3.

Fig. 2.



Witnesses

C. W. Bond.

H. F. Brunds.

Inventor

Henry B. Johnson

Per Wm. W. Bond Attorneys

UNITED STATES PATENT OFFICE.

HENRY B. JOHNSON, OF BELOIT, WISCONSIN, ASSIGNOR OF TWO-THIRDS OF HIS RIGHT TO JAMES R. McPHERSON AND FRANCES N. DAVIS, OF SAME PLACE.

IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. **188,145**, dated March 6, 1877; application filed May 16, 1876.

To all whom it may concern:

Be it known that I, HENRY B. JOHNSON, of Beloit, Rock county, State of Wisconsin, have invented new and useful Improvements in Steam Vacuum-Pumps, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation; Fig. 2, a section on line *x x* of Fig. 1; Fig. 3, a detail in elevation of the parts therein represented.

The object of this invention is to so construct a steam vacuum-pump that the water in its passage from the pump will control the valves which admit steam to the cylinders, which I accomplish by means of a wing or plate located in the eduction-passage and connected to a rod on which is a tappet arranged to operate the valve, the rod and tappet being elevated by the depression of the plate by the water in its passage from the pump, and the valve being operated by the descent of the rod and tappet, such descent being caused by the weight of the rod alone, or aided by means of a weight connected therewith, and raised by the depression of the plate.

In the drawings, A A′ represent pump-cylinders; B, induction-pipe, communicating with the cylinders through suitable passages; C, valve-chamber; D, valve pivoted at the center, having two arms, *r s;* E E′, eduction-passages for the water; *a*, steam-pipe communicating with the valve-chamber C; *b*, steam-passage from the valve-chamber C to the cylinder A; *c*, steam-passage from the valve-chamber C to the cylinder A′; (these passages *b c* are operated, respectively, by the arms *r s* of the valve;) *d*, valves controlling the induction of the water into the cylinders; *e*, wing or plate made of metal or other suitable material, and located in the eduction-passage E; *f*, arm or lever connected with the plate *e*, and hinged to the bottom of the cylinder A at *g; h*, rod attached to the outer end of the lever *f*, and extending up through the top of the cylinder, through a suitable stuffing-box. *o o* represent ordinary eduction-valves; *i*, tappet on the rod *h; k*, arm secured upon the rod, on which the valve D is fastened, the end of rod projecting through the valve-chamber C, the rod being located in suitable bearings and working in a stuffing-box; *l m*, pawls pivoted in the ends of *k*, and so arranged that they can be raised up, but will not fall below the position represented; *n*, weight attached to the outer end of the lever *f*, which may be used, if necessary.

The other cylinder is provided with a suitable valve to control the inlet of the water, and also with a plate and arm corresponding with the plate *e* and arm *f*. *h′* is the rod, and *i′* the tappet.

The upward movement of the arm *k* may be limited by a stop, *v*.

The operation is as follows: Suppose the cylinder A to be full of water, and the steam-passage from C into A open. The water in its passage from A will press down the plate *e*, elevating the rod *h*, and at the same time the tappet *i* will raise and pass the pawl *l*, which, after the tappet has passed it, will return by gravity to its former position, at which time the parts will be in the position shown in Fig. 1. Then, after the water has passed from A, the plate will not be held down by its momentum, the rod *h* will descend, and the tappet *i*, being in contact with the upper side of the pawl *l*, will operate the valve D, instantly closing the passage from C to A and opening that from C to A′. The descent of the rod *h*, of course, returns the plate *e* to its former position.

The same operation will be repeated in the cylinder A′.

The plate *e* is between the eduction and the induction valves, and is operated in one direction by the flow of the water, and in the other by the weight of the valve-stem, so that the water has all passed the plate and allowed it to ascend and shut off steam before the steam reaches the eduction-pipe.

By this construction steam will be given to either cylinder when needed, and will be cut off at just the right moment to economize it.

Suitable well-known arrangements for condensing the steam by injecting cold water into the cylinders will be used.

Devices which are not shown, and which are essential to the operation of pumps of this

class, may be made in the usual manner. I have not, therefore, deemed it necessary to represent them.

The valve *d* operates in the usual manner.

If the weight of the rod *h* is not sufficient to operate the plate *e*, a weight must be attached to the end of the arm *f*. It is evident that, in place of the weight, a spring might be used, the spring being compressed by the depression of the plate *e*, and released when the water has escaped from the cylinder; but I prefer the weight.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a steam vacuum-pump, the weighted plate or wing *e*, located in the eduction pipe or passage, in combination with a suitable eduction-valve and cylinder, substantially as and for the purpose set forth.

2. The plate or wing *e*, in combination with the rod *h*, tappet *i*, arm or lever *k*, pawl *l*, and valve D, all constructed and operating substantially as and for the purposes specified.

HENRY B. JOHNSON.

Witnesses:
J. M. CARPENTER,
A. C. HUTCHISON.