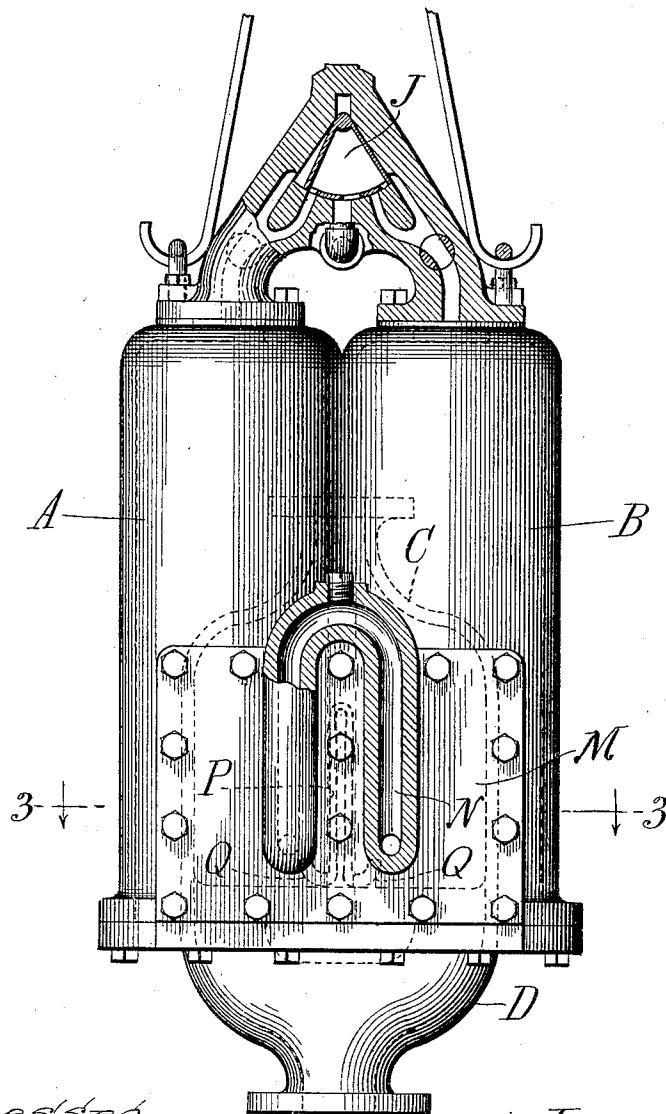


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VACUUM PUMP.
APPLICATION FILED FEB. 24, 1909.

932,166.

Patented Aug. 24, 1909.
2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

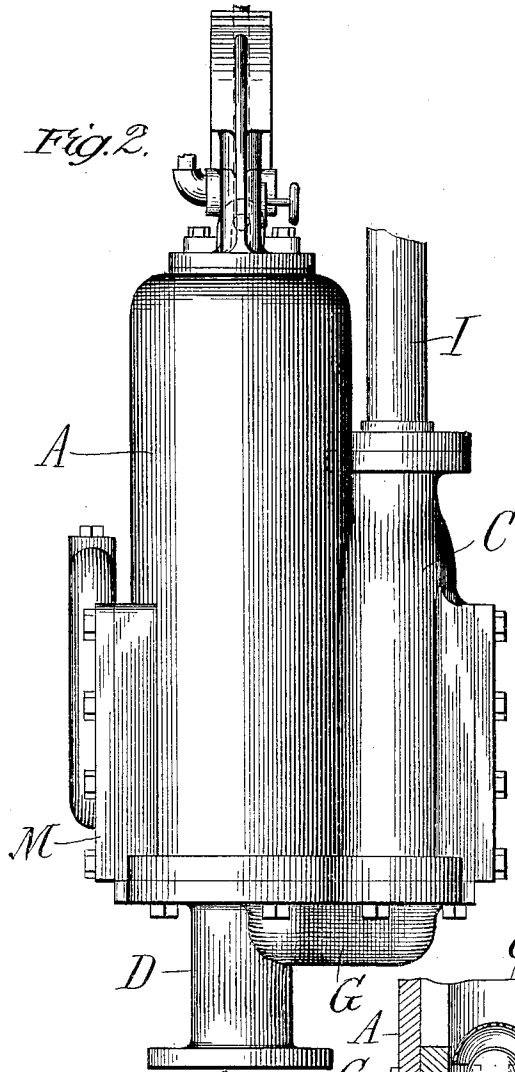


Fig. 4.

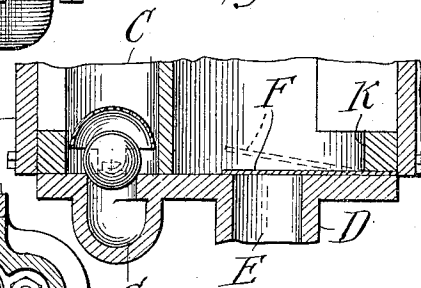
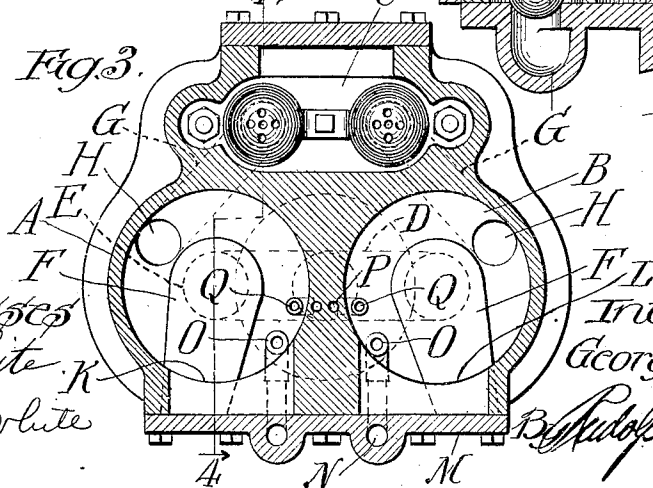


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE E. NYE, OF CHICAGO, ILLINOIS.

VACUUM-PUMP.

932,166.

Specification of Letters Patent.

Patented Aug. 24, 1909.

Application filed February 24, 1909. Serial No. 479,777.

To all whom it may concern:

Be it known that I, GEORGE E. NYE, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Vacuum-Pumps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a novel construction in a vacuum pump, the object being to provide an improved device of this character, and consists in the features of construction and combinations of parts hereinafter fully described and claimed.

My present invention relates more particularly to improvements on the pumps forming subject of Letters Patent Nos. 452080 and 454062 granted to me May 12, 1891 and June 16, 1891 respectively and consists particularly in certain details of construction as will be pointed out in the following specification.

In the accompanying drawings illustrating my invention: Figure 1 is a view in rear elevation partly in section of a pump constructed in accordance with my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a plan section of the same on the line 3—3 of Fig. 1. Fig. 4 is a fragmentary detail section on the line 4—4 of Fig. 3.

The pump embodying my present invention is constructed very similarly to the pumps of the aforesaid patents, the valve-mechanism being the same as therein shown and described and the mode of operation practically identical in every respect.

The improvement in construction over the pumps of said patents consists partly in obviating the use of the air chamber shown in said patents and in the position and contour of the passages connecting the condensing chambers with each other, said improvements in construction enabling me to produce in the pump a working vacuum of over thirty pounds as against sixteen to eighteen pounds in the old style pumps.

In order to produce a high degree of vacuum it is essential that all gaseous contents of the vacuum chamber be exhausted. Gas, particularly atmospheric air, is very elastic and so long as an appreciable volume

thereof remains in the condensing chambers 55 of a pump or in an adjacent chamber communicating with the condensing chamber, the degree of vacuum attainable in the latter will be reduced in proportion to the increase in volume of the contained air. Hence, in 60 the pumps of the aforesaid patents the air contained in the air chamber afforded (one might say) a cushion which prevented the attainment of a high degree of vacuum. The communication of the condensing cham- 65 bers with the air chambers was intended to be controlled by check-valves but as pumps of this class are used mainly where sand and silt are contained in relatively large quantities in the water, valves will not retain a 70 fluid tight fit for any length of time nor is the closure thereof reliable. The presence of the air chamber and the leakage through the valves controlling its connection with the vacuum chambers doubtless contributed 75 to some extent to loss in vacuum efficiency.

The manner of effecting connection between the vacuum chambers is, in the present pump different in several respects from the prior art. It is essential in order to pro- 80 duce and maintain a vacuum in a sealed chamber that all elastic fluids be prevented from entering the same and particularly that warm or hot water be not admitted, as, in the presence of a high degree of vacuum, 85 such water will freely evaporate and thus destroy the vacuum.

In admitting steam under pressure into one of the chambers for the purpose of ejecting the water therefrom, the upper-most portion 90 of the body of water must necessarily absorb some heat from the steam and thus become warm or hot. This warm or hot water is the last to leave the chamber and probably a part thereof lodges in the passage connecting the vacuum chambers with each 95 other, or such water is followed by steam under pressure which enters and heats the walls of said passage or passes into the adjoining chamber where it heats a small body 100 of water which immediately rises to the surface and provides a top layer sufficiently warm to be readily evaporated in the presence of partial vacuum. A very little vapor 105 will destroy vacuum. Accordingly in producing a pump of this character of high efficiency, the passage of steam or warm water from the pressure into the vacuum

chamber must be prevented and this is best effected by providing a relatively long passage, the walls of which are exposed to a heat absorbing agent such as air or water and through which any steam finding its way into the same must pass upwardly through a water column. It is well known that steam will not readily follow water upwardly through a cool or cold passage and, consequently, by reason of the length of the passage and the primary upward flow of water therethrough, the latter, is absolutely prevented from finding its way into the vacuum chamber. Furthermore, warm water will be chilled during such passage and its temperature so far reduced as to prevent possibility of the formation by it of a top stratum in the vacuum chamber of sufficiently high temperature to produce a vapor therein to reduce or destroy the vacuum.

In introducing a jet of water into the pressure chamber in order to produce a vacuum therein, it is most advisable to admit same into the lower instead of the upper end of said chamber, mainly for the reason that it will minimize the possibility of steam finding its way into the same from the pressure chamber. Where the pipe or passage for the condensing jet extends from the bottom of the pressure to the upper portion of the vacuum chamber it is easily possible for steam to find its way into the latter in the same manner as it follows the water in a coffee percolator. But where such steam encounters a large body of water the effect of its admission is minimized for the reason that it cannot possibly find its way above the level of said body of water.

In carrying out my invention I employ in particular one or more inverted U-shaped passages connecting the lower ends of the vacuum chambers, such passages being relatively long and so disposed that the walls thereof are exposed to heat absorbing mediums whereby they are maintained always cool and thus serve to chill water and steam of higher temperature passing therethrough, the latter being thus prevented from reducing or destroying vacuum in the vacuum chamber. The said U-shaped passage or passages may be cored in the wall separating the two chambers, or it may be formed in an exposed part of the pump. I prefer to employ at least two of said passages for the reason that one thereof may become clogged by solids and thus prevent the operation of the pump until cleared. It is also advisable to provide means whereby the pump may be primed, and also to provide for easy access to the aforesaid passage for the condensing jet for purposes of clearing the same of solids and to this end I have provided a passage in the hand-hole cover of the pump to which access may be had without the removal of said cover and

by means of which connection with an outside supply of cold water under pressure may be effected if desired, thereby enabling the pump to be easily maintained in efficient operating condition.

My present pump comprises two cylindrical condensing chambers A and B preferably contained in a single casting in which the water chamber C is also formed. In the base D of the pump is a Y-shaped passage constituting the water inlet, the ports E of said passage being controlled by suitable check-valves F. Passages G in said base connect the delivery ports H of the condensing chambers A—B with the water chamber C, the admission ports into the latter being likewise controlled by suitable check valves. From the said water chamber C the water is delivered into the stand pipe I.

The valve J controlling the supply of steam to the condensing chambers is identical in construction and operation with the valve described and shown in the aforesaid patents, and is too well-known to render description thereof necessary.

Hand-holes K and L permit of access to the chambers A and B and both said holes are closed by the single plate M. In the latter there is cored an inverted U-shaped passage N both legs of which open into the inner face of said plate and into said ends are tapped the L-shaped nozzles O. The chambers A and B communicate with each other through the said passage N and also through a similar passage P cored into the partition wall between the said chambers A and B and communicating at its ends with nozzles Q. All of said nozzles O and Q serve to direct condensing jets from the lower into the upper portions of said chambers A and B.

The operation of the pump is the same as usual but by reason of the greater degree of vacuum produced by the omission of the air chamber its operation is far more rapid and the volume of water received into each condensing chamber at each operation is very much larger thereby effecting great economy in cost of operation and an increase in efficiency.

By the use of a single cover common to both the hand-holes and the formation in said cover of the inverted U-shaped passage communicating with both the vacuum chamber and which is accessible between its ends from the exterior of the pump, I am enabled when so desired, to effect connection between said chambers and a source of supply of cold water under pressure for the purposes of priming or continuously supplying condensing jets to said chambers, and I am also enabled to clear said passage of any solids becoming lodged therein by inserting a wire into the same, this being done without neces-

sitating removal of said cover and thus saving considerable time in remedying trouble from this source.

I claim as my invention:

5 1. A vacuum pump comprising two condensing chambers, a valve controlling the admission of steam under pressure thereto, water inlets to said chamber, check valves
10 controlling the same and check-valve controlled water outlets from said chambers, there being a manhole in each of said chambers, a single removable plate covering both said manholes, and having formed therein
15 an inverted U-shaped passage communicating at its mouths with said respective condensing chambers, substantially as described.

2. A vacuum pump comprising two condensing chambers, a valve controlling the admission of steam under pressure thereto,
20 water inlets to said chamber, check valves controlling the same and check-valve controlled water outlets from said chambers, there being a manhole in each of said chambers,
25 said manholes, and having formed therein an inverted U-shaped passage communicating at its mouths with said respective condensing chambers, there being an opening establishing communication with said passage
30 between the ends thereof and the outer air, said opening normally closed and permitting access to said passage or connection thereof with a source of supply of water under pressure.

35 3. A vacuum pump comprising two condensing chambers, a water inlet in the bottom of each thereof, a valve controlling the same, a water discharge chamber having an outlet at its upper end and communicating
40 at its bottom with the bottoms of said condensing chambers, and check-valves controlling said connections, there being an inverted U-shaped passage establishing com-

munication between said condensing chambers, substantially as described. 45

4. A vacuum pump comprising two condensing chambers, a water inlet in the bottom of each thereof, a valve controlling the same, a water discharge chamber having an outlet at its upper end and communicating
50 at its bottom with the bottoms of said condensing chambers, and check-valves controlling said connections, said chambers being provided with man-holes at one side and a removable plate covering said man-holes,
55 there being an inverted U-shaped passage in said plate and in the wall between said condensing chambers respectively establishing communication between the latter.

5. A vacuum pump comprising two condensing chambers, a water inlet in the bottom of each thereof, a valve controlling the same, a water discharge chamber having an outlet at its upper end and communicating
60 at its bottom with the bottoms of said condensing chambers, and check-valves controlling said connections, said chambers being provided with man-holes at one side and a removable plate covering said man-holes,
65 there being an inverted U-shaped passage in said plate and in the wall between said condensing chambers respectively establishing communication between the latter and nozzles on the mouths of said passages adapted to direct entering jets of
70 water into the upper portion of the chamber receiving the same, substantially as described. 75

In testimony whereof, I have signed my name in the presence of two subscribing
80 witnesses.

GEORGE E. NYE.

Witnesses:

RUDOLPH W. M. LOTZ,
A. FRANK-PHILIPSON.