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P. H. McCABE & A. J. LAVOIE.

VACUUM MACHINE.

APPLICATION FILED JUNE 15, 1906.

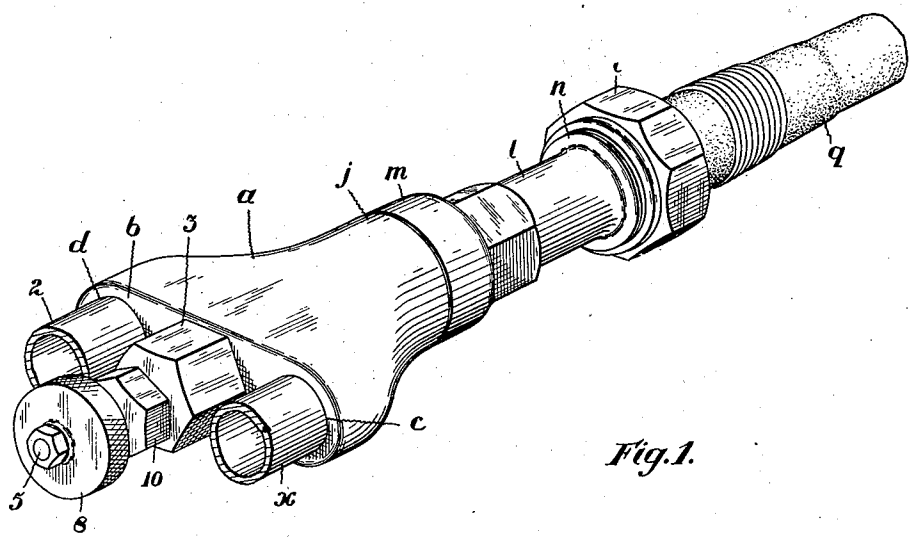


Fig. 1.

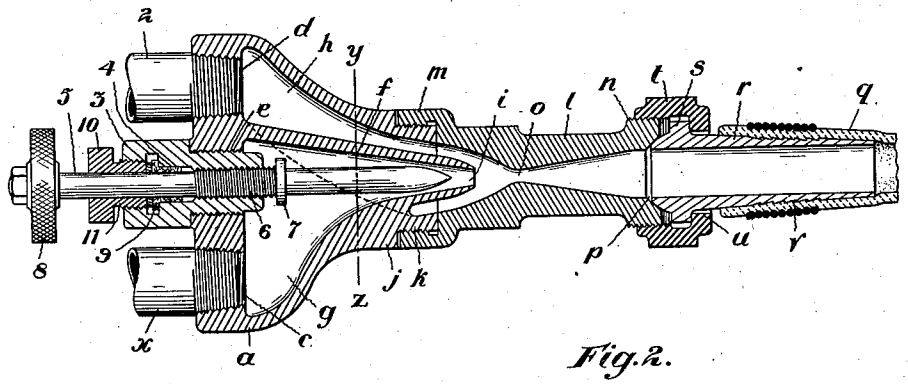


Fig. 2.

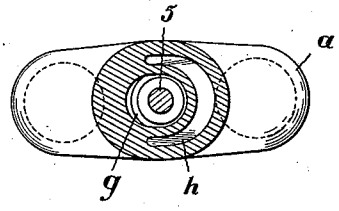


Fig. 3.

Witnesses.

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UNITED STATES PATENT OFFICE.

PHILLIP HENRY McCABE AND ALPHONSE JOSEPH LAVOIE, OF TORONTO, ONTARIO, CANADA, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-HALF TO SAID McCABE, ONE-SIXTH TO SAID LAVOIE, AND ONE-THIRD TO KING FREDERICK MACNAB, OF TORONTO, CANADA.

VACUUM-MACHINE.

No. 861,193. Specification of Letters Patent. Patented July 23, 1907.

Application filed June 15, 1906. Serial No. 321,943.

To all whom it may concern:

Be it known that we, PHILLIP HENRY McCABE, a subject of the King of Great Britain, residing at 56 Palmerston avenue, in the city of Toronto, county of York, Province of Ontario, in the Dominion of Canada, and ALPHONSE JOSEPH LAVOIE, a subject of the King of Great Britain, residing at 351 Ossington avenue, in the city of Toronto, county of York, Province of Ontario, in the Dominion of Canada, have invented certain new and useful Improvements in Vacuum-Machines, of which the following is the specification.

This invention relates to improvements in vacuum machines as described in the present specification and set forth in the accompanying drawings that form part of the same.

The invention consists essentially in having the interior contained in the nozzle casing, divided into two compartments, and an adjusting pintle regulating the size of the mouth opening in the main compartment.

The objects of the invention are to increase the facility with which cleansing may be done by such machines, to provide a flexible means which will permit the discharge of the dirt or other matter at any suitable place, to regulate the suction powers of the machine and to simplify and improve the construction of such devices, so that the cost of production and maintenance will be lessened and more effective work accomplished by the machine.

In the drawings Figure 1 is a perspective view of the nozzle showing the inlet and suction pipes and the discharge pipe broken away. Fig. 2 is a horizontal longitudinal section through Fig. 1. Fig. 3 is a cross section of the nozzle through the line *y*—*z*, Fig. 2.

Like letters of reference indicate corresponding parts in each figure.

Referring to the drawings, *a* is the nozzle casing preferably formed with a flat or oval shaped end portion *b* having the inlet openings *c* and *d* and a central opening *e* therethrough to the interior contained within said casing. The interior of the casing *a* is divided by a partition wall *f* forming a main air discharge chamber *g*, and a semi-annular chamber *h* partially surrounding the chamber *g*. The partition wall *f* terminates in the tapered mouth *i* which is preferably circular in cross section and forms the mouth or outlet of the main chamber *g*, and projects slightly beyond the main casing *a*. The chamber *h* completely surrounds the said mouth near the outer end. The main casing *a* is tapered from the base *b* to a cylindrically shaped end *j* and has a reduced threaded portion *k* extending therefrom.

l is a link section having the annular end portions *m* and *n*, the end portion *m* being internally threaded and fitting on the threaded portion *k* of the main casing *a*. The inner wall of the link section *l* is, at the inner end, of corresponding diameter to the inner surface of the wall of the chamber *h* and converges to a point *o*, following substantially the lines of the outer wall of the projecting mouth portion *i*, and from the said point of convergence flares outwardly to the outer end. The extreme outer end of the inner wall is flared outwardly forming a tapered seat *p*. The annular end portion *n* of the link section *l* is threaded externally and coupled to the discharge hose *q* by the hose coupling *r*. The hose coupling *r* has the inner end thereof rounded, and engaging the tapered seat *p*.

s is an annular flange surrounding the coupling *r* near the inner end and *t* is a coupling nut threaded to engage the threaded portion *n* of the link section *l* and having an annular shoulder *u* surrounding the hose coupling *r* and abutting the outer face of the flange *s*. It will thus be seen that the hose coupling *r* may be pressed firmly to the tapered seat *p* making a secure air tight joint and doing away with the use of a compressible packing. The inner wall of the hose coupling *r* is preferably of the same diameter as the inner wall of the link section *l* at the outer end, and leads from said link section to the discharge hose *q*. The outer surface of the hose coupling *r* is preferably slightly tapered and has a series of annular notches *v* formed therein to insure a good joint between the coupling and the hose and the said hose may be bound on the outside in any suitable manner.

x is an inlet pipe having a tapered threaded end fitting into the correspondingly threaded inner wall of the orifice *c*. The inlet pipe *x* may be of any suitable length and connected in any suitable manner to a compressed air reservoir. It will thus be seen that, when the air is turned on, it will pass through the pipe *x* and rush into the chamber *g* and on through the mouth *i* into the link section *l* and past the point of convergence *o* to the discharge hose *q*. The rush of air past the entrance to the chamber *h* causes a vacuum in that chamber and as the said chamber is connected and communicates with the suction pipe 2, which has a tapered end threaded correspondingly with the inner wall of the orifice *d*, any dust or matter picked up by said suction pipe will be drawn into the said chamber *h* and pass into the link section *l* and on with the rushing air, passing through the discharge hose *q* which deposits it where desired.

The central opening *e* into the main casing *a* is threaded on the inner wall and a correspondingly threaded plug 3 is screwed thereinto. The plug 3 has a central orifice 4 therethrough and is threaded for a portion of its length.

5 is a pintle inserted through the plug 3 having a

threaded portion 6 and a stop shoulder 7 at one end of said threaded portion. The end of the pintle 5 located within the chamber *g* is tapered to a point and projects forwardly toward the mouth *i* of said chamber.

8 is a wheel or thumb nut fixedly secured to the outer end of the pintle 5 for turning said pintle in said plug and as the said pintle is threaded it will travel inwardly or outwardly as it is turned, thereby causing the tapered end to move inwardly and outwardly in the circular tapered portion of the chamber *g*, thereby enlarging or reducing the area of the orifice around said pintle and regulating the flow of air through the mouth *i*.

9 is an annular packing encircling the pintle 5 in a suitably recessed portion of the orifice 4 through the plug 3, and 10 is a packing nut having the shank portion 11 thereof threaded externally and fitting into a correspondingly threaded portion of the orifice 3 through the plug, and pressing against said packing, thus making the opening through which the pintle passes perfectly air tight.

A device such as described may be utilized wherever a supply of compressed air is accessible it being merely necessary to connect the inlet pipe to the supply and adjust the pintle in the nozzle to suit the requirements of the work to be done. Various forms of link-sections may be used according to the pressure of the air supply, that is, when the supply is a high pressure the point of convergence of the interior wall of the link section will need to be larger than when a low pressure supply is used, in order to give the proper flow to create the vacuum, and it will be readily understood that the link sections may be easily and quickly removed and replaced as required. The use of such a device overcomes many difficulties met with in machines having working parts to create the required vacuum, as it is well known that a vacuum, to be of service, must be created close to the point of application of the suction and this is impossible in many instances, but it is quite easily overcome by this device, as air under pressure may be carried a great distance. This device is also very applicable for cleaning purposes in railway coaches as a supply of compressed air may always be quickly obtained from the air brake system of the train.

What we claim as our invention is:—

1. In a vacuum machine, a casing adjoining suction and pressure chambers and a nozzle casing securely attached to the outlet of the aforesaid casing and having its inner wall forming the continuation of the wall of the suction chamber surrounding the outlet from said pressure chamber and leading to the discharge chamber opening centrally arranged in said nozzle casing, said suction and pressure chambers having inlets at their front ends and convergently arranged walls adapted to direct the flow of the expansile fluid and the passage of dust particles obliquely from said inlets to said discharge opening, substantially as described.

2. In a vacuum machine, a casing containing a pressure chamber and a suction chamber and having a nozzle in communication with said chambers, the inner walls of said chambers and nozzle converging from the parallelly arranged inlets to said suction and pressure chambers respectively to a common outlet in said nozzle and drawing the dust particles to and through said common outlet in a direction substantially parallel with the direction of the flow of expansile fluid, substantially as described.

3. In a vacuum machine, a casing containing a pressure chamber and a suction chamber converging into the interior thereof from their respective and parallel inlets and a nozzle having its inner wall converging centrally to the discharge opening in alinement with the outlet from said pressure chamber, said nozzle being secured to the reduced end of the aforesaid casing and forming around the outer wall of said pressure chamber a continuation of the wall of said suction chamber, said suction chamber being adapted to lead the particles of dust in a substantially direct line from the inlet thereto obliquely in relation to the direction of flow of the said expansile fluid through the pressure chamber substantially as described.

4. In a vacuum machine, a casing containing a pressure chamber having its inner walls converging to an outlet and an inlet opening through the wall opposing said outlet, a suction chamber contiguous to said pressure chamber having its inner walls converging to an outlet in front of and in alinement with the aforesaid outlet and an inlet through the wall opposing the outlet, said wall forming part with the wall surrounding the aforesaid inlet and said suction chamber being adapted to draw in the dust particles in a direction substantially parallel with the inflow of expansile fluid to the pressure chamber, substantially as described.

5. A vacuum machine, comprising a casing having a longitudinal partition arranged therein dividing the interior thereof into pressure and suction chambers, said chambers having contiguous discharge openings therefrom at one end of said casing, and separate inlet openings through the opposing end, the walls of said chambers forming continuous unobstructed passages from said inlets to said discharge openings, a discharge nozzle inclosing the discharge end of said casing and having a central convergent orifice therethrough in communication with said pressure and suction chambers, and means for adjusting the discharge opening from said pressure chamber, substantially as described.

6. A vacuum machine, comprising a convergent casing containing a pressure chamber and a suction chamber divided from said pressure chamber by a longitudinal partition arranged within said casing, said partition forming a hollow cone shaped projection and having a central circular orifice therethrough at the apex thereof forming the discharge opening from said pressure chamber, said suction chamber having an annular discharge opening surrounding said partition wall at the discharge end, and said casing having inlet openings therethrough at the opposite end to said outlets, and a discharge nozzle forming a continuation of the said casing and having the inner wall thereof converging to a central circular opening, said inner wall forming an unbroken continuation of the inner wall of said suction chamber, substantially as described.

7. A vacuum machine, comprising a casing having a flattened end wall and side walls converging to a central circular open end and a partition wall longitudinally arranged therein forming within said casing a pressure chamber having a central tapered circular outlet and a semi-annular suction chamber adjoining said pressure chamber completely surrounding the wall of said pressure chamber at the outlet end, a discharge nozzle secured to the circular open end of said casing completely closing in the outlets from said pressure and suction chambers and having the interior wall thereof forming a continuation of the inner wall of said suction chamber and converging to a narrow central circular outlet, substantially as described.

8. In a vacuum machine, the combination with the discharge nozzle, of a casing converging from an end wall to a central circular opening at the opposing end and having a longitudinal partition therein dividing the interior into suction and pressure chambers having adjoining discharge openings at the said circular open end of the casing, suction and expansile fluid inlets in the opposing end wall, a circular casing having the inner wall thereof converging to a narrow opening adjacent to said discharge openings from said suction and pressure chambers and joining the aforesaid casing to said discharge nozzle, substantially as described.

9. In a vacuum machine, the combination with the discharge nozzle, of a casing converging from an end wall to a central circular opening at the opposing end and containing a suction chamber and a pressure chamber divided one from the other by a partition longitudinally arranged in said casing, said chambers having suction and expansile fluid inlets in the end wall opposing said circular opening and contiguous outlets at said circular opening, a casing

joining said discharge nozzle with the aforesaid casing and having its inner walls converging from each end thereof to form a narrow neck opening immediately in front of said contiguous openings from the suction and pressure chambers, a bushing inserted through a suitable opening in the aforesaid end wall of the casing and having a central threaded orifice and a gland formed at the upper end thereof, and a pintle having a thread thereon intermediate of its length and inserted in said bushing and suitably packed and extending into said pressure chamber to the discharge opening therefrom, substantially as described.

10. A vacuum machine, comprising a nozzle casing having a flattened end wall and tapered to a substantially cylindrical shape at the other end and inclosing a pressure chamber the extreme end thereof being threaded on the exterior and a vacuum chamber partially surrounding said pressure chamber, the wall between said pressure chamber and said vacuum chamber projecting slightly beyond the main casing and forming a central tapered orifice from said pressure chamber, an inclosing member threaded internally at its inner end correspondingly to the threaded end of the main casing and having an orifice therethrough converging to a point intermediate of its length and flaring outwardly therefrom to the outer end, a hose coupling connected to the outer end of said inclosing member, an inlet pipe leading from an expansile fluid supply into said pressure chamber, a suction pipe leading into said vacuum chamber, a plug externally threaded to engage the threaded wall of a central circular orifice in the flattened end wall of the main casing and having a central orifice therethrough threaded from the interior end for a portion of its length and from the outer end inward, a pintle having a tapered inner end extending inwardly toward the outlet from the said pressure chamber and a threaded portion intermediate of its length correspondingly threaded to the orifice in the said plug and a shoulder at the inner end of said threaded portion, a suitable packing encircling said pintle and ensconsed in a recess in the central orifice in said plug, a suitable packing nut correspondingly threaded to the outer threaded portion of the central orifice in said plug, and a wheel or thumb nut fixedly secured to the outer end of said pintle, as and for the purpose specified.

11. A vacuum machine, comprising a nozzle casing containing a main chamber and a vacuum chamber open at one end and threaded on the exterior at said open end, an inlet pipe leading from an expansile fluid supply into said pressure chamber, adjustable means for enlarging and reducing the outlet from said pressure chamber, a suction pipe leading into said vacuum chamber, an inclosing member internally threaded correspondingly to the threaded portion of said nozzle casing at the inner end and externally threaded at the outer end and having a convergent orifice through the center thereof and flaring outwardly at the outer end and forming a seat, a hose coupling having a rounded end engaging said seat and an annular flange from the outer periphery and a central orifice therethrough, and a coupling nut internally threaded correspondingly to the threaded outer end of the inclosing member and having an annular shoulder engaging the outer face of the annular ring on said coupling, as and for the purpose specified.

Signed at the city of Toronto, in the county of York, Province of Ontario, in the Dominion of Canada, this seventh day of June, 1906.

PHILLIP HENRY McCABE.
ALPHONSE JOSEPH LAVOIE.

Witnesses:
H. DENNISON,
E. WILKIN.