

W. H. JAKWAY.  
 VACUUM CLEANING APPARATUS.  
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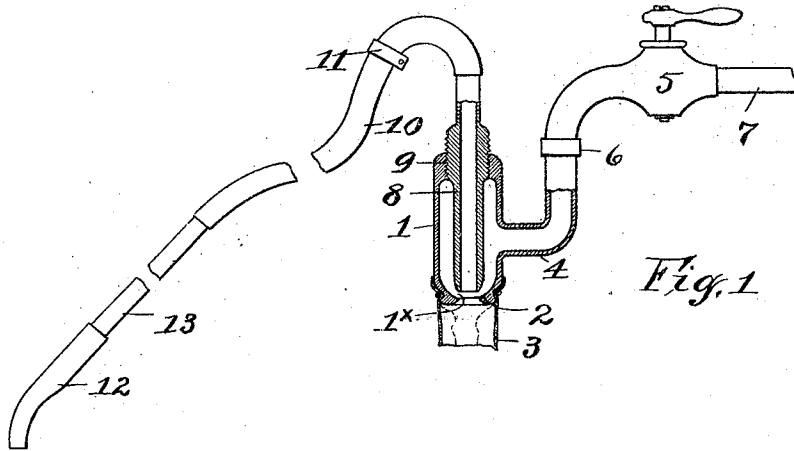


Fig. 1

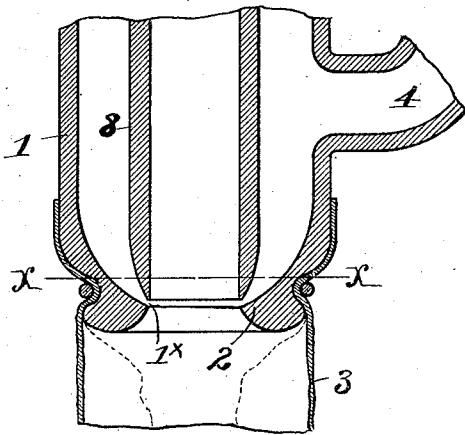


Fig. 2

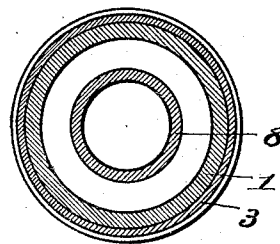


Fig. 3

WITNESSES:  
*Chas. W. Froschmann*  
*H. A. Lovelace*

INVENTOR.  
*William H. Jakway*  
 BY *John J. Lonsdale*  
 ATTORNEY.

# UNITED STATES PATENT OFFICE.

WILLIAM H. JAKWAY, OF SYRACUSE, NEW YORK.

VACUUM CLEANING APPARATUS.

970,232.

Specification of Letters Patent. Patented Sept. 13, 1910.

Application filed October 1, 1909. Serial No. 520,525. **REISSUED.**

To all whom it may concern:

Be it known that I, WILLIAM H. JAKWAY, a citizen of the United States, and resident of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Vacuum Cleaning Apparatus, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to apparatus which is particularly designed for cleaning carpets, rugs and other floor-coverings, and it has reference to the class of apparatus comprising a suction-nozzle which is designed to be drawn firmly over the article to be cleaned and is attached to a flexible air-tube communicating with suitable devices operative for producing a vacuum, whereby the in-rush of air through the tube and resultant suction at the nozzle causes the dirt and dust etc. to be drawn through the tube to a suitable receiver.

The present invention resides in a cleaning-apparatus embodying essentially an air-passage, means for conducting a stream of water under pressure into communication with the passage to produce a partial vacuum therein, and a flexible air-tube connected at one end to the passage and provided at its opposite end with a nozzle, whereby the suction created at the nozzle incident to the in-rush of air through the tube, causes the particles of dirt etc. to be withdrawn from the carpet or other article and carried with the air through the tube to the passage, whereupon the particles are caught in the stream of water and discharged therewith into suitable means for receiving waste-water.

The main object of this invention is to produce a simple and reliable apparatus wherein a very rapid and continuous exhaustion will be effected for the purpose stated, and at the same time provide a construction which will positively guard against spattering of the dirt-laden water incident to its discharge.

Other objects of the invention will be apparent from the novel arrangement and combination of the component parts of the apparatus hereinafter fully described and set forth in the claims.

In the accompanying drawings Figure 1 is a longitudinal sectional view of the apparatus embodying my invention; Fig. 2 is

an enlarged detail sectional view of a portion of the water-chamber and the tube which conducts the dirt-laden air there-through to the water discharge; Fig. 3 is a transverse section on the line —X—X— in Fig. 2.

This chamber consists of a rigid shell —1— having its lower end portion contracted to provide a throat —2— preferably of circular form and constituting the outlet. Extending downwardly from the throat is a vertically arranged collapsible discharge-tube —3— which may be secured to said throat portion by any well known clamping means.

To one side of the water-chamber is suitably connected an upwardly extending feed-tube —4— which may be connected at its upper end to any pipe for supplying water under pressure. In the present instance the tube —4— is shown attached to a well known faucet —5— by means of a suitable coupling —6—, said faucet being connected to a service-pipe —7—.

The upper end of the chamber —1— is provided with an opening in which is secured a metal air-conducting tube —8— which extends vertically and centrally through the chamber and has its lower end disposed adjacent to and concentric with the throat —2— of the chamber so as to provide a ring-shaped orifice —1<sup>x</sup>—, surrounding the end of the air-tube. The external diameter of this air-tube slightly exceeds the diameter of the throat, whereby the water directed through the throat into the discharge-tube assumes the form of an inverted cone. The said tube —8— is supported vertically adjustable in any convenient manner but preferably by screw-threading the parts as indicated at —9—, the purpose of which adjustment is to regulate the area of the orifice 1<sup>x</sup>. The upper end portion of this tube is curved downward and is provided with a suitable coupling —11— for the connection of one end of a flexible tube —10— consisting of the well known rubber-hose, to the opposite end of which hose is attached a suction-nozzle —12— which may be of any suitable or well known form and is designed to be drawn firmly over the article to be cleaned. To conveniently manipulate the said suction-nozzle, I provide the same with a tubular handle —13— to the upper end of which the said hose —10— is suitably attached. For convenience the

hose may be applied over the upper end of the handle with tight fit.

One function of the tube —3— is to protect the inverted water-cone from being disrupted by the passage of the air through the wall of the cone in order to create a partial vacuum at the lower end of the tube —8— so as to effectually maintain a constant exhaustion of air from the latter tube.

It has been discovered by experience that a rigid metal discharge-tube will not produce the desired result, the fact being that should the atmospheric pressure exceed the pressure of the air within the tube —8—, the outside air would rush up the said tube and thereby disrupt the water-cone and thus destroy the vacuum, whereby there would be no exhaustion of air from tube —8—. I therefore use a flexible discharge-tube —3— which is composed of thin rubber, whereby it is rendered collapsible. The adaptability of this flexible tube to collapse to a greater or less degree causes this tube to act as an automatic regulator in that it compensates for any differences between the pressure of the air in the tube —8— and the atmospheric pressure, the outside air contracting the flexible tube more or less when the pressure of this air exceeds to a greater or less degree the pressure of the air within, whereby the cone of water is unimpaired.

The variation of the pressure of the air in the tube —8— results from the closing of the opening of the suction-nozzle —12— to a greater or less degree incident to drawing the said nozzle over the carpet or other article being cleaned.

In order that my invention may be more fully understood, I will now describe the operation of the apparatus provided with the flexible discharge-tube.

When the water under pressure is turned into the tube —4— it is conducted into the chamber —1—, from which chamber it escapes through the ring-shaped orifice —1\*— into the said flexible discharge-tube —3—. The shape and arrangement of the said orifice causing the water to be directed into the tube —3— in the form of an inverted cone, as before stated, maintains a partial vacuum at the lower end of the tube —8— and thus produces a very rapid and constant exhaustion of the air from the said tube, whereby a continuous in-rush of air is produced in the tube and the hose —10— connected thereto.

By drawing the nozzle firmly over the carpet or other article during the passage of the water through the chamber —1— and tube —3—, the suction produced at the nozzle will obviously cause the particles of dirt etc. to be withdrawn from the carpet and carried through the hose and tube —8— with the air which naturally rushes through

the hose and tube with a tendency to fill the vacuum created, whereupon the dirt-laden air entrapped in the tube —8— is caught by the inverted cone of water surrounding the lower end of said tube, and thus the dirt or dust is discharged with the water through the tube —3—.

Having described my invention, what I claim is:

1. An apparatus for the purpose specified comprising an upright rigid chamber formed at its lower end with a contracted throat constituting the outlet thereof, and provided in its upper end with an opening, an air-conducting tube secured in said opening and arranged centrally and vertically within the chamber and concentric with the outlet-opening, the lower end of said tube terminating slightly above the outlet-opening and having its external diameter exceeding the diameter of the opening, to provide a ring-shaped orifice around the lower end of the air-tube, means for conducting water under pressure to the chamber, and a flexible discharge-tube attached to the outlet of the chamber and disposed in line with the air-tube, whereby the orifice is caused to direct the water from the chamber into the discharge-tube in the form of an inverted cone surrounding the adjacent end of the air-tube, said discharge-tube being entirely free below its attachment and independent of the air-tube whereby it is adapted to collapse to a greater or less degree to compensate for the difference in the atmospheric pressure and the pressure within the said air-tube as and for the purpose set forth.

2. In an apparatus for the purpose specified, the combination of means for conducting water under pressure and including an upright rigid chamber having a contracted outlet-opening in its lower end, an air-tube arranged centrally and vertically within the chamber and concentric with the outlet-opening, the lower end of said tube terminating slightly above the outlet-opening and having its external diameter exceeding the diameter of said opening so as to produce a ring-shaped orifice around the air-tube for the passage of the water through the outlet, a flexible discharge-tube connected to the outlet of the chamber and suspended therefrom, whereby the water is directed through the said orifice into the said discharge-tube in the form of an inverted cone surrounding the adjacent end of the air-tube, thus maintaining a partial vacuum at the lower end of the central tube so as to cause rapid and continuous exhaustion of air; said discharge-tube being entirely free below its attachment whereby it is adapted to collapse to a greater or less degree to compensate for the difference between the atmospheric pressure and the pressure within the

air-tube so as to guard against disruption of the water-cone and the resultant destruction of the vacuum, as set forth.

3. In an apparatus for the purpose specified, the combination of an air-conducting tube, hydraulic-means including a chamber surrounding the tube and provided in its lower end with an outlet-opening disposed slightly below the tube and concentric therewith and having a smaller diameter than the external diameter of the tube, and a flexible discharge-tube attached to the chamber at the opening and arranged axially in line with the air-conducting tube, whereby the water is directed into the discharge-tube in the form of an inverted cone surrounding the adjacent end of the air-conducting tube

so as to create a partial vacuum at the lower end of said air-tube and thus produce a rapid and constant exhaustion of air therefrom, said air-conducting tube being adjustable in relation to the outlet-opening, and the said discharge-tube being entirely free below the air-conducting tube and water directing means whereby it is adapted to collapse under variations in the pressure of air so as to guard against an in-rush of the external air through the discharge-tube and thus prevent disruption of the cone of water as set forth.

WILLIAM H. JAKWAY.

Witnesses:

D. ALFRED EDDY,  
H. A. LOVELACE.