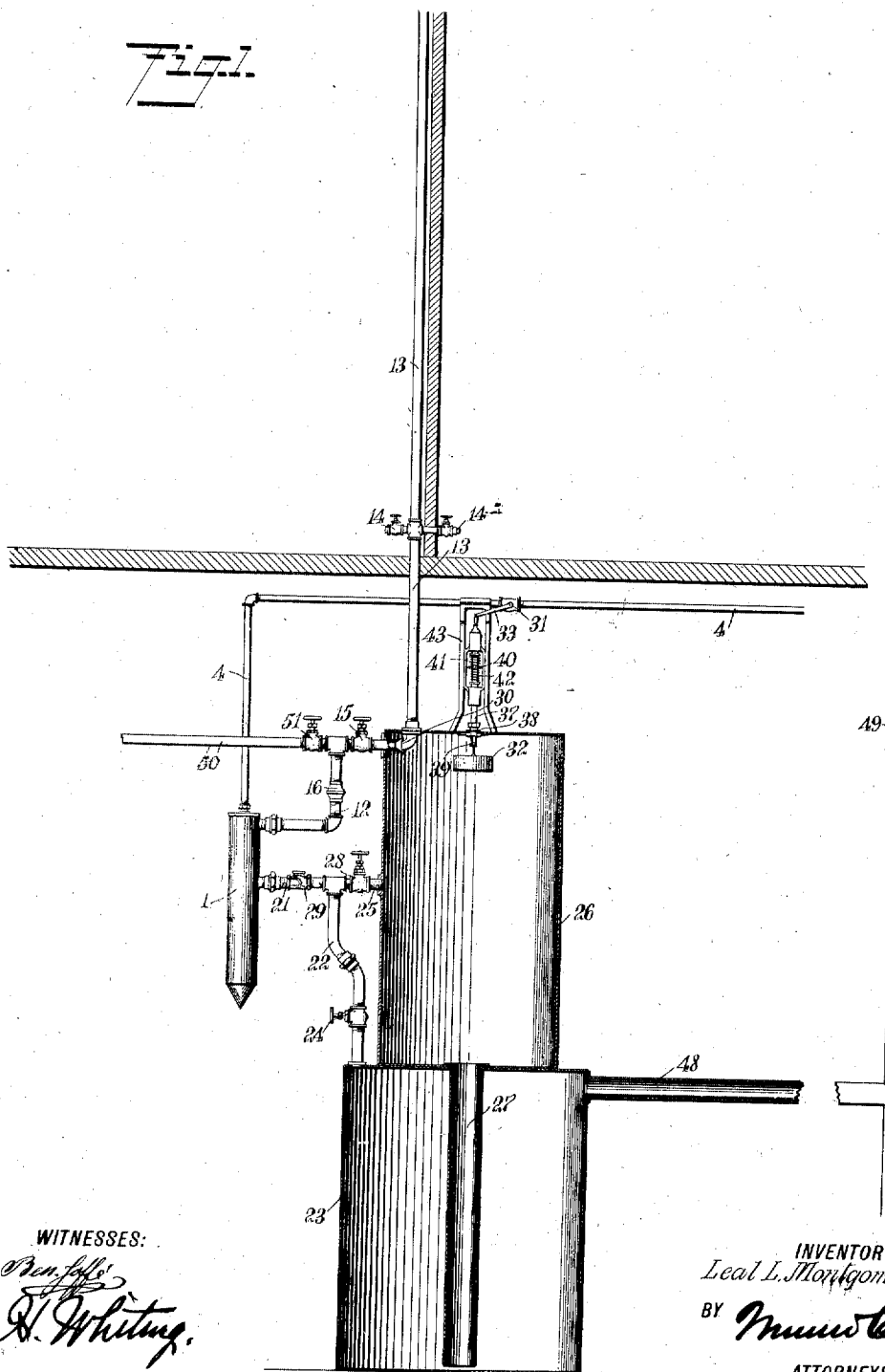


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VACUUM PUMP AND CLEANING APPARATUS.
APPLICATION FILED MAR. 23, 1910.

1,002,075.

Patented Aug. 29, 1911.

2 SHEETS—SHEET 1.



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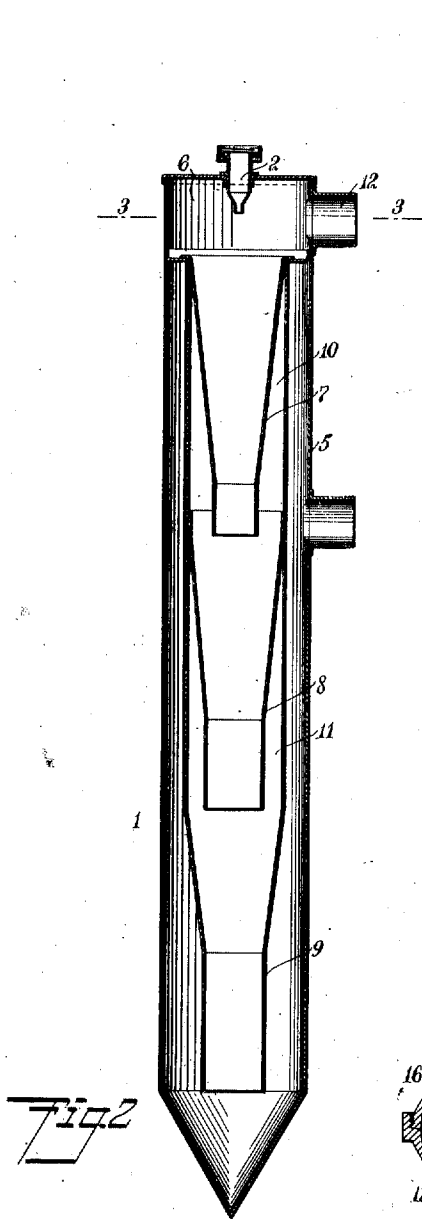


Fig. 2

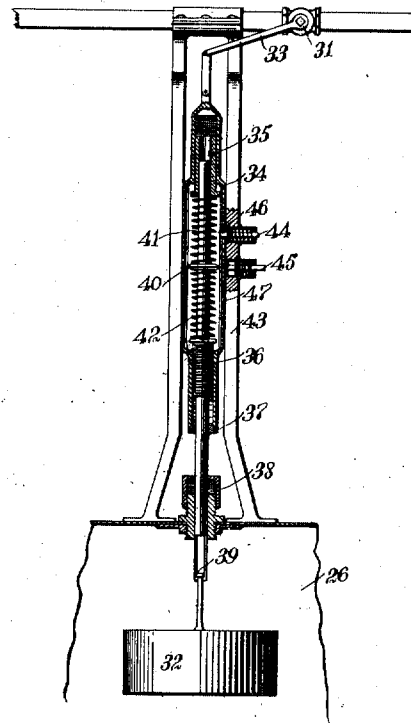


Fig. 4

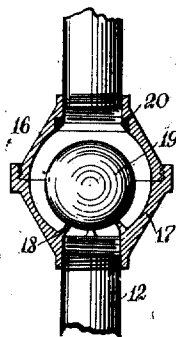


Fig. 5

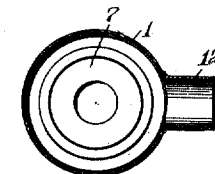


Fig. 3

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LEAL L. MONTGOMERY, OF SUPERIOR, WISCONSIN.

VACUUM-PUMP AND CLEANING APPARATUS.

1,002,075.

Specification of Letters Patent. Patented Aug. 29, 1911.

Application filed March 23, 1910. Serial No. 551,029.

To all whom it may concern:

Be it known that I, LEAL L. MONTGOMERY, a citizen of the United States, and a resident of Superior, in the county of Douglas and State of Wisconsin, have invented a new and Improved Vacuum-Pump and Cleaning Apparatus, of which the following is a full, clear, and exact description.

This invention relates to a new and improved system for obtaining a vacuum by hydraulic pressure, whereby cleaning by vacuum may be accomplished, and which may be reversed to form, to a certain extent, a hydraulic air-compressing pump.

An object of this invention is to provide a device which will be simple in construction, inexpensive to manufacture, strong, durable, and automatic in its operation.

A further object of this invention is to provide a system in which hydraulic means creates a vacuum or pressure, with means for automatically controlling said hydraulic means by the vacuum or pressure created.

These and other objects, together with the construction and combination of parts, will be more fully described hereinafter and set forth in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, and in which—

Figure 1 is a vertical section showing a fragmentary portion of my system in operation; Fig. 2 is an enlarged vertical section of the vacuum former; Fig. 3 is a horizontal section on the line 3—3 of Fig. 2; Fig. 4 is an enlarged fragmentary sectional elevation of the valve control; and Fig. 5 is an enlarged detail section of the automatic valve for preventing the water from entering the distributing system in case of derangement of the mechanism.

Referring more particularly to the separate parts of the device, 1 indicates a vacuum former, which is supplied through a nozzle 2 with water under pressure, which is supplied by means of a pipe 4, connected to a pump or any other suitable source of water under a head. The vacuum former 1, which, as will be seen later, may also be termed a dust collector and a pressure former, consists of a casing 5 formed with a vacuum chamber 6 at the upper end, and provided with a plurality of telescoping pipes or nozzles 7, 8 and 9. It will be noted that

between the pipes 7 and 8 and 8 and 9, there are provided annular chambers 10 and 11, in which a vacuum is created by the downward rush of air through the nozzles, thereby tending to regulate the operation of the device. Connected to the vacuum chamber 6, there is provided a pipe 12, which in turn is connected to a distributing system represented by a pipe 13. This distributing system is provided with a plurality of valve-controlled auxiliary pipes 14, to which may be attached suitable cleaning devices, such as vacuum cleaners or pressure dusters. The flow of fluid between the pipe 12 and the system 13, is controlled by means of a valve 15.

In order that the water in the vacuum former 1 may not back up into the system represented by the pipe 13, there is provided an automatic valve 16, the exact structure of which will be more readily seen by reference to Fig. 5. It will be seen here that the valve 16 consists of a casing 17, having upwardly-extending flanges 18 spaced apart from each other, so as to form a support for a ball valve 19, in such a manner that it will permit the flow of fluid down through the pipe 12. The upper end of the casing 17 is provided with a resilient packing 20, against which the ball 19 is adapted to impinge when raised by a back pressure in the pipe 12, so as to prevent the flow of fluid in an upward direction and thus prevent the fluid from backing up into the system 13. The fluid which is utilized in creating a pressure or vacuum in the former 1, flows out together with the air drawn thereby through pipes 21 and 22 into a tank 23. The flow of fluid through the pipe 22 is controlled by means of a valve 24. The pipe 21 is also connected by means of a stub pipe 25, to a tank 26, which is preferably superposed on the tank 23 and connected thereto by means of a pipe 27, which extends in close juxtaposition to the bottom of the tank 23. The flow of fluid through the stub pipe 25 is controlled by a valve 28. In order that the pressure in the tank 26 may not act back on the former 1, there is provided an automatic check valve 29, which is adapted to close when the pressure in the tank 26 exceeds the pressure in the former 1.

It is to be noted by reference to Fig. 1, that the system pipe 13 is provided with a break indicated at 30, located in the tank 26 adjacent the top thereof, so that when a vacuum is created by the former 1, the ef-

fect thereof will be felt in the tank 26. The purpose of having the vacuum evident in the tank 26, is to provide means for controlling the supply of water to the former 1 and cut off this supply when the vacuum being created is no longer used. For this purpose, there is provided in the pipe 4, a valve 31, which is connected in a manner to be described, to a float 32 located in the tank 26. The specific manner of connecting the valve 31 to the float 32, is more clearly illustrated in Fig. 4. Here it will be seen that the valve 31 is provided with a lever 33, which is pivotally connected in any well-known manner to a casing 34. The interior of the casing 34 is screw-threaded at each end, to provide a suitable means for securing corresponding screw-threaded thimbles or sleeves 35 and 36. Extending through the thimbles 35 and 36, there is provided a rod 37, which projects through the bottom of the casing 34 and through a suitable packing joint 38, into the interior of the tank 26, where it is connected to the float 32 in such a manner as to provide a limited relative motion thereto, as by means of the slot-and-pin connection indicated at 39. The rod 37 is provided intermediate its ends with a trip 40, in the nature of a beveled collar secured to the rod in any well-known manner. This trip forms a convenient abutting member for springs 41 and 42 arranged on opposite sides thereof and abutting at their opposite ends against the thimbles 35 and 36, respectively. It will be seen that the tension on the springs 41 and 42 can be regulated by regulating the position of the thimbles 35 and 36 with respect to the casing 34, so that the motion of the rod 37 in either direction can be controlled to respond to a given force in either direction.

Arranged alongside of the casing 34 and supported in any suitable manner as by being secured to the tank 26, there is provided a frame 43, which slidably supports in any well-known manner, spring-pressed dogs 44 and 45, which are adapted to alternately engage, respectively, openings 46 and 47 in the casing 34. When the dogs 44 and 45 engage the openings 46 and 47, respectively, they lock the casing 34 in positions corresponding, respectively, to the open and closed positions of the valve 31. The dogs 44 and 45 project into the interior of the casing 34 in such position that they will be readily engaged by the trip 40 during its motion, so as to disengage them and permit the vertical movement of the casing 34, and thus permit the manipulation of the valve 31. Inasmuch as the trip 40 can only move a sufficient distance to release the dogs 44 and 45 when its operating means has overcome the tension of the springs 41 and 42, any slight variation in the pressure or vacuum in the tank 26, will not actuate the

float 32 a sufficient amount to operate the valve 31, so that this valve will not be constantly opened and shut to respond to slight irregularities.

It will be noted by reference to Fig. 1, that there is provided an overflow pipe 48, connected to the upper end of the tank 23, which is adapted to carry off the water saturated with dust and dirt from the vacuum cleaner into a sewer pipe indicated at 49.

When it is desired to use the system as a pressure pump, it is advisable to have a direct inlet of air to the former 1, which is represented by a pipe 50, the flow of fluid through which is controlled by a valve 51.

The operation of the device will be readily understood when taken in connection with the above description. When it is desired to use the vacuum cleaning system, the valve 51 is closed and water admitted through the nozzle 2 into the former 1 by opening the valve 31. The flow of water through the converging nozzles 7, 8 and 9, carries air with it and creates a suction in the pipe 12 and thus in the tank 26 and the system pipe 13. Vacuum cleaners or other devices in other rooms may be attached to the connections 14 and utilized by opening the valves therein. The dirt and air entering the vacuum cleaner travel down through the pipe 13 into the pipe 12 and thus into the former 1, from whence they flow with the water into the tank 23. When the tank 23 becomes full, the dirt-saturated water travels off through the sewer pipe 49. If, for any reason, water should be fed too fast to the former 1, any tendency of this water to back up in the system pipe 13, will be checked by the automatic valve 16, which will automatically drop when this abnormal condition has passed. When further use of the vacuum in the system pipe 13 has ceased, and the valve in the connection 14 is closed, there will be no further necessity for the vacuum, and the excessive vacuum created will withdraw the air from the tank 26, so that the water in the tank 23 will be drawn up into the tank 26. When this water has reached the float 32, if the vacuum still continues, the rod 37 will be positively forced upwardly against the tension of the spring 41, so that the trip 40 will raise the dog 44, permitting the casing 34 to be moved upwardly by the float 32, thus closing the valve 31. Should the vacuum be used again in the system 13, the vacuum in the tank 26 will be broken, thereby permitting the water therein to flow back into the tank 23, thus allowing the weight of the float and the casing 34, to open the valve 31 when the water in the tank 26 has receded sufficiently to permit the weight of the parts to exert the force necessary. The springs 41 and 42 will permit slight changes in vacuum without operating the valve 31, and the tension thereof can be

varied by the thimbles 35 and 36. When the water fills the tank 26, the check valve 29 automatically prevents its being drawn back into the former 1.

When it is desired to use the system as a pressure system, the valves 15 and 24 are closed and the valves 28 and 51 opened. The air will then be drawn directly through the inlet 50 into the former 1, where it is compressed by the hydraulic force of the water admitted through the pipe by the valve 31. Pressure created in the former 1 is accumulated in the tank 26, which acts as a storing tank. Inasmuch as the pipe 13 is provided with the break 30, which is located interiorly of the tank 26, the pressure created in the former 1 and stored in the tank 26, can be utilized in the system pipe 13 by connecting to the extensions 14, any suitable devices, such as pneumatic pressure dusters.

There will be a water-seal on the bottom of the pipe 27, so that the pressure accumulated in the tank 26 cannot escape into the sewer pipe.

While I have shown one embodiment of my invention, I do not wish to be limited to the specific details thereof, but desire to be protected in various changes, alterations and modifications which I may make within the scope of the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a device of the class described, the combination with a hydraulic vacuum former, of a valve for controlling the flow of water to said former, a tank, a pipe for connecting said tank to the vacuum end of said former, a supply of water for said tank, and a float located in said tank and connected to said valve, whereby vacuum in said former will raise water in said tank and actuate said float to close said valve.

2. In a device of the class described, the combination with a hydraulic vacuum former, of a valve for controlling the flow of water to said former, a tank, means for connecting the inlet side of said former to said tank, means for connecting the outlet side of said former to said tank, whereby the overflow water from said former may be drawn into said tank, a float in said tank adapted to be operated by the rise of water in said tank, and connections between said valve and said float, whereby the movements of said float are transmitted to said valve.

3. In a device of the class described, the combination with a hydraulic vacuum former, of a valve for controlling the flow of water to said former, a tank, means for connecting the outlet side of said former to said tank, whereby the overflow water from said former may be drawn into said tank, a float in said tank adapted to be operated by

the rise of water in said tank, and connections between said valve and said float, whereby the movements of said float are transmitted to said valve, said connections comprising means for permitting a limited relative movement of said float in respect to said valve.

4. In a device of the class described, the combination with a vacuum former, of an air inlet to said former, an auxiliary air supply pipe connected to said air inlet, means for controlling the flow of fluid through said pipe, an operating fluid inlet for said former, an outlet for said former, a tank, connections between said tank and both said air inlet and said outlet, and means for controlling the flow of fluid through said connections.

5. In a device of the class described, the combination with a vacuum-former, of an air inlet to said former, an auxiliary air supply pipe connected to said air inlet, means for controlling the flow of fluid through said pipe, an operating fluid inlet for said former, an outlet for said former, a tank, connections between said tank and both said air inlet and said outlet, means for controlling the flow of fluid through said connections, and means in said tank controlling the flow of operating fluid through said operating-fluid inlet.

6. In a device of the class described, the combination with a hydraulic vacuum former, of a water inlet for said former, a valve controlling the flow of water through said inlet, a float, operative connections to said former, whereby the volume of fluid passing through said former is adapted to actuate said float, a rod connected to said float, a casing connected to said valve and resiliently engaging said rod, a pair of dogs adapted to lock said casing in positions corresponding to the open and closed positions of said valve, and a trip on said rod for releasing said dogs.

7. In a device of the class described, the combination with a hydraulic vacuum former, of a water inlet for said former, a valve controlling the flow of water through said inlet, a float, operative connections to said former, whereby the volume of fluid passing through said former is adapted to actuate said float, a rod connected to said float, a casing connected to said valve and resiliently engaging said rod, a pair of dogs adapted to lock said casing in positions corresponding to the open and closed positions of said valve, a trip on said rod for releasing said dogs, and resilient means for resisting the movement of said rod in both directions.

8. In a device of the class described, the combination with a hydraulic vacuum former, of a water inlet for said former, a valve controlling the flow of water through said inlet, a float, operative connections to

said former, whereby the volume of fluid passing through said former is adapted to actuate said float, a rod connected to said float, a casing connected to said valve and resiliently engaging said rod, a pair of dogs adapted to lock said casing in positions corresponding to the open and closed positions of said valve, a trip on said rod for releasing said dogs, resilient means for resisting the movement of said rod in both directions, springs for resisting the movement of said rod in either direction, and means for adjusting the tension of said springs.

9. In a device of the class described, the combination with a hydraulic former adapted to entrap air, of an inlet for said former, a tank connected to said former, an outlet for said former, connections between said tank and said outlet, a float in said tank adapted to be operated by the fluid passing through said former, a valve controlling the flow of water to said inlet, a casing operatively connected to said valve, an adjustable thimble in each end of said casing, a rod slidably mounted in said thimble and connected to said float, a pair of dogs adapted to lock said casing in positions corresponding to the open and closed positions of said

valve, a trip on said rod adapted to release said dogs, and springs located on opposite sides of said trip and abutting against said thimbles.

10. In a device of the class described, the combination with a hydraulically-operated vacuum pump, of a tank, another tank superposed on said first-mentioned tank, a pipe connecting the bottom of said second-mentioned tank to the bottom of said first-mentioned tank, air pipe connections between said pump and said second-mentioned tank, additional connections between said pump and said second-mentioned tank, water pipe connections between said pump and said first-mentioned tank, valves for controlling the flow of fluid through said connections, a float in said second-mentioned tank, and a valve for controlling the operating fluid for said pump, operatively connected to said float.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEAL L. MONTGOMERY.

Witnesses:

J. T. MILLER,

CHARLES SARENSEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."