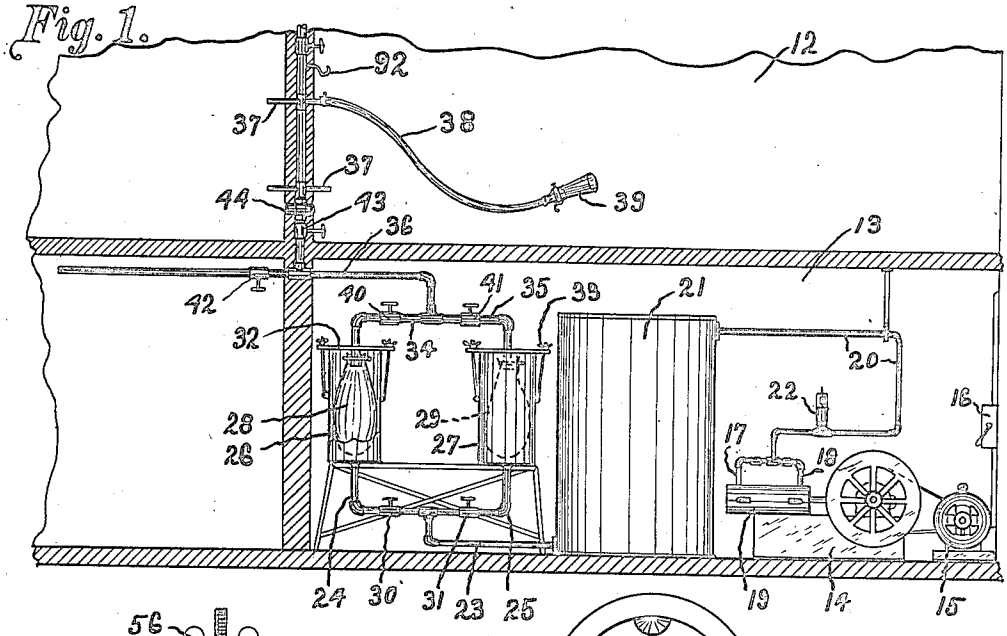
May 15, 1923. 1,455,116

F. E. LUMLEY

VACUUM CLEANING APPARATUS

Filed Aug. 18, 1921 2 Sheets-Sheet 1

Fig. 1.



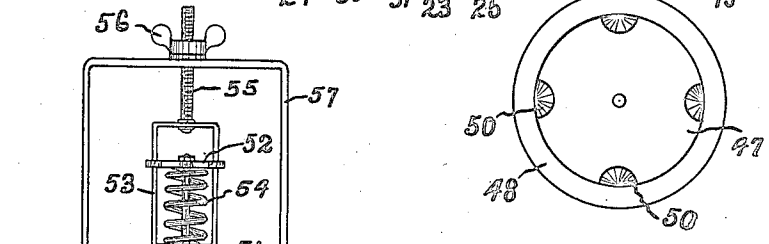


Fig. 3.

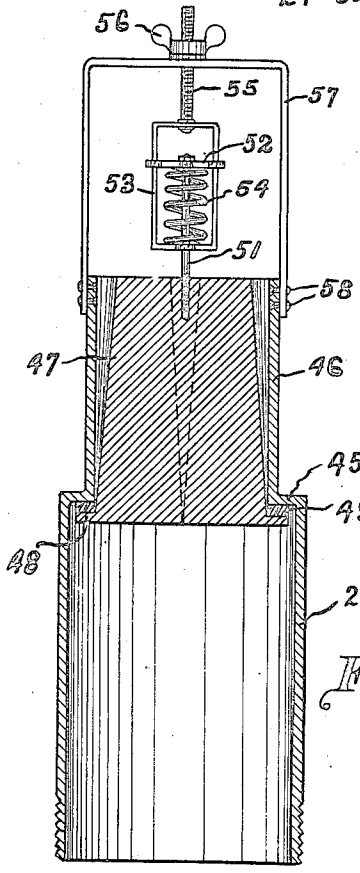


Fig. 2.

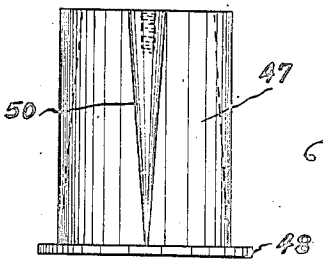


Fig. 4.

Inventor

F. E. Lumley.

By Arthur H. Sturges.

Attorney

May 15, 1923. 1,455,116

F. E. LUMLEY

VACUUM CLEANING APPARATUS

Filed Aug. 18, 1921 2 Sheets-Sheet 2

Fig. 5.

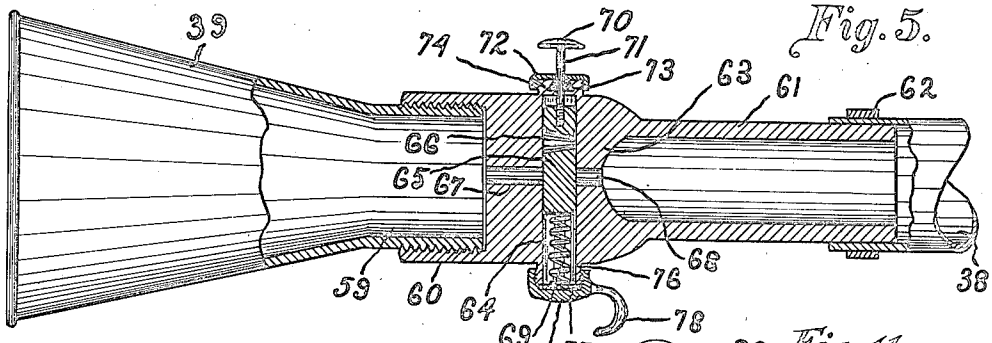


Fig. 11

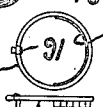


Fig. 7.

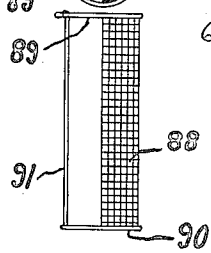
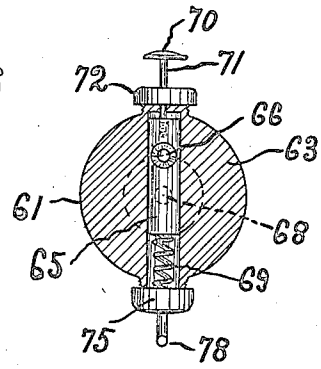


Fig 6



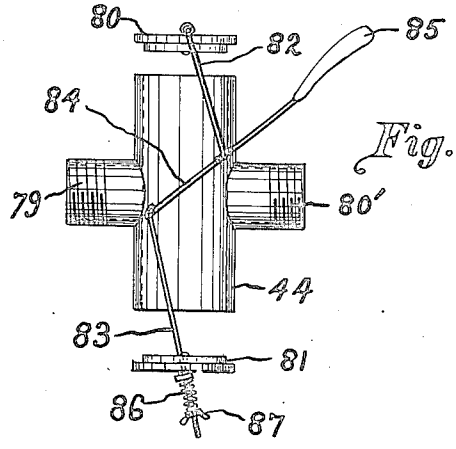


Fig. 8.

Fig. 9.

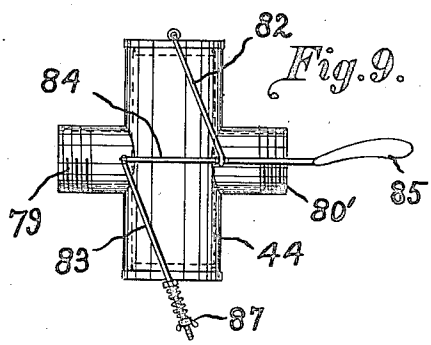
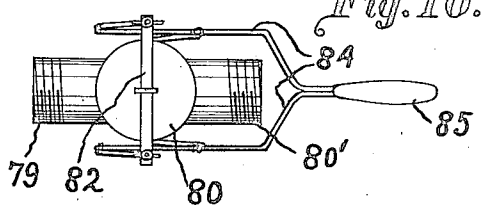


Fig. 10.



Inventor

F. E. Lumley.

By Arthur H. Sturges.

Attorney

Patented May 15, 1923. 1,455,116

UNITED STATES PATENT OFFICE.

FRANK E. LUMLEY, OF OMAHA, NEBRASKA.

VACUUM CLEANING APPARATUS.

Application filed August 18, 1921. Serial No. 493,323.

To all whom it may concern:

Be it known that I, FRANK E. LUMLEY, a citizen of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Vacuum Cleaning Apparatus, of which the following is a specification.

The present invention relates to improvements in vacuum cleaning apparatus and has for an object to provide an improved compensating release valve in conjunction with the suction producing device which is adapted to open to the atmosphere whenever the suction or pressure vacuum in the system exceeds a predetermined maximum.

Another object of the invention resides in providing an improved suction nozzle with a normally closed valve and improved means for opening and regulating the valve while the nozzle is held conveniently in the hand of the operator, and for direction about to various points wherever the action of cleaning by the device is to be performed.

A further object of the invention resides in providing an improved trap placed in the system to catch articles which are apt to do injury to the dust collecting bags or other parts, and in so arranging the traps as to provide convenient access thereto, while locating them out of sight in walls or partitions, and in furthermore providing traps with screens that are removable through the walls or partitions, but which are normally enclosed by air tight caps operable also from the exterior of the walls or partitions.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claim appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views,

Fig. 1 is a fragmentary view in vertical section of a building shown equipped with an improved apparatus, constructed according to the present invention;

Fig. 2 is an enlarged vertical section of the compensating release valve;

Fig. 3 is a top plan view of the valve plunger;

Fig. 4 is a side view of the same;

Fig. 5 is an enlarged view of the suction nozzle and appurtenant parts, illustrated on an enlarged scale, and with portions in section;

Fig. 6 is a transverse sectional view taken on the line 6—6 in Fig. 5;

Fig. 7 is a side view of a screen employed;

Fig. 8 is a side elevation of an improved trap with the caps open;

Fig. 9 is a similar view showing the caps closed;

Fig. 10 is a top plan view of the device shown in Fig. 9; and,

Fig. 11 is a plan view of the screen shown in Fig. 7.

Referring more particularly to the drawings, 12 designates the first living floor of a building, such as an apartment house, and 13 the basement in which the suction producing apparatus 14 is located, such apparatus being driven, for instance, by an electric motor 15 as controlled by a switch 16.

The suction producing apparatus 14 may be of any suitable type, such for instance as a reciprocating pump of a double acting variety having the intake pipes 17 and 18 connected at respectively opposite ends of the pump cylinder 19. A conduit 20 connects the pipes 17 and 18 with a vacuum receiver 21. A compensating release valve 22 is disposed at a convenient point in the conduit 20 for the purpose of supplying additional air from the atmosphere to the suction apparatus whenever the latter operates beyond a predetermined maximum. This device 22 is more particularly shown in Figs. 2, 3 and 4 and will be later referred to.

The vacuum receiver 21 communicated by pipe 23 and branches 24 and 25 thereof with containers 26 and 27 for the bags 28 and 29 of cheese cloth or the like porous material. Hand controlled valves 30 and 31 are located in the branches 24 and 25 to cut out either container. The tops of the containers are closed by cover plates 32 secured tightly thereon by the hinged bolts or nuts 33. The mouths of the bags 28 and 29 are received about upper branch pipes 34 and 35 which connect with the pipe 36 running through the various walls and partitions of the building and having connections 37 projecting on the exterior for the attachment thereto of flexible hose sections 38 which carry suction nozzles 39. The upper branch pipe 34 and 35 also have

manually controlled valves 40 and 41 and other valves 42 and 43 are placed at convenient points throughout the system for cutting off various sections thereof.

A trap 44 is located at approximately the base of each wall or partition in order to catch hard articles such as pins, needles and the like which would do injury to the bags 28 and 29 or to other parts of the apparatus or would be apt to clog passages.

Referring more particularly to Figs. 2, 3 and 4, the cylinder 22 of the compensating release valve is provided with threads at its lower end to screw into a suitable opening made in the conduit 20, for instance at the location shown in Fig. 1. At the upper end of the cylinder 22 an internal shoulder 45 is made and above the shoulder an extension cylinder 46 of a reduced diameter projects in axial alignment with the lower larger cylinder 22. A plunger 47 is mounted to slide vertically in the upper extension cylinder and is provided with a flange 48 operated within the lower cylinder and having a compressible gasket 49 attached in the upper portion of the plunger to seat air tightly against the shoulder 45. The upper end of the extension cylinder 46 is open to the atmosphere and a number of flutes 50 are made in the side walls of the plunger 47 to admit air downwardly into the lower cylinder 22, the flange 48 being of inferior diameter as compared to the diameter of said lower cylinder. The flutes 50 preferably taper downwardly from larger upper portions to apexes that coincide with the flange 48. Consequently as the plunger 47 descends to a greater and greater extent, the wide port areas of the flutes are exposed and as a result a greater amount of air may be drawn in.

The plunger 47 is held on a rod 51 which is screw threaded at its lower end centrally into the plunger and carries at its upper end a cross bar 52 guided for particular movement in a rectangular yoke 53 preferably made from wire. A coil spring 54 is wound about the rod 51 and engages the lower end of the yoke 53 and the under side of the sliding bar 52. A threaded supporting spindle 55 supports the yoke 53 for a vertically adjustable movement, the spindle having a winged nut 56 thereon which rests upon an U-shaped supporting bail 57 riveted or otherwise secured at its opposite ends to diametrically opposite points on the extension cylinder 46, as indicated at 58.

Referring more particularly to Figs. 5 and 6, the suction nozzle 39 is substantially bail shaped having a retracted end portion 59 threaded into a socket 60 provided upon the forward end of the handle 61 which is made hollow and attached to the hose 38 as by a clamp ring 62. In the handle is a partition wall 63 having a transverse cavity 64 in which is mounted for a vertically reciprocating movement a valve plate 65. A perforation 66 in the valve plate is adapted to register with aligned ports 67 and 68 in the opposite side portions of the partition wall. A coil spring 69 urges the valve plate 65 in one direction to hold the perforation 66 normally out of registry with the ports. A thumb button 70 is carried upon a stem 71 which connects interiorly with the valve plate in order that the latter may be shifted transversely to cause alignment of the ports and perforations 66. A cap 72 surrounds the stem 71 and houses a packing 73 to prevent leakage at this point. The cap 72 engages about lugs 74 on the handle. The spring 69 is confined by a cap piece 75 which is screw threaded upon a threaded boss 76 on the handle and an air joint is made by a rubber or other gasket 77 within the cap. A curved finger piece 78 is carried by the cap 75.

Reference is now more particularly had to Figs. 7 to 10 inclusive in which the trap 44 is shown. In Figs. 8 and 9 the trap is shown turned at right angles to its position in the wall as illustrated in Fig. 1. In other words, the branches 79 and 80′ are threaded to connect with the piping 36 and the main trunk portion 44 lies horizontally through the wall or partition and has the removable cap pieces 80 and 81 adapted to open through opposite sides of such wall. When open as indicated in Fig. 8, the cap pieces 80 and 81 may be swung out of axial alignment with the trunk portion 44 to admit the screen shown in Figs. 7 and 11. The cap piece 80 is pivotally carried by a bail 82 while the lower cap piece 81 is carried by a similar bail 83. The two bails are connected by lever 84 having a handle 85 adapted to project on the exterior of the walls. By swinging the lever down as shown in Fig. 9, the caps 80 and 81 may be closed. A coil spring 86 is associated with the lower cap piece 81 and is provided with a nut tension 87. This spring permits of the lever 84 being swung down further from the position shown in Fig. 9, until the lever extends substantially parallel with the axis of the main trunk 44. In such condition the spring 86 is under considerable tension and holds the cap pieces 80 and 81 tightly closed to avoid the entrance of air to the system. In this position of the lever 84, a toggle lock is formed which will hold the lever and the cap pieces from accidentally opening.

The screen 88 employed is preferably carried by upper and lower wings 89 and 90 held spaced apart by a standard 91. The screen is preferably only semi-circular and forms an independent unit so that it may be replaced in the main trunk 44. The screen may be removed from time to time for purposes of cleaning.

In use, the motor 15 is put in operation by

closing the switch 16. The suction apparatus 14 is thus driven by the motor and it rapidly causes a pressure vacuum to be built up in the receiver 21. This suction is felt throughout the piping 36 and whenever any of the occupants of the apartments desire to effect a cleaning of their establishments, it involves merely the simple operation of removing the suction nozzle 39 from a hook 92 on the wall of the apartment, which hook is engaged by the finger piece 68 of the handle 61, and in the direction of this nozzle about the carpet, upholstery, clothing and other objects which it is desired to clean, the buttons 70 being of course initially pressed to cause the valve in the handle to be opened. As soon as the port 66 of this valve aligns with the ports 65 and 68, the suction is felt and it draws in all dust and foreign matter from the articles cleaned. Most heavy objects and objects of a large size will be rejected in the nozzle 39 because of the small character of the ports. However pins, needles and other small hard objects if taken into the bags and pump apparatus are apt to injure the system. These objects are caught in the trap 44 by the screen 88 and may be subsequently removed when the screen is withdrawn for cleaning.

Both bags 28 and 29 may be simultaneously used if desired, but the position of the valves 30, 31 and 40, 44 enables either of the bags to be cut out of operation. This is desirable when one of the bags, having become fully charged to capacity, is removed for dumping. The operation of the system need therefore not be suspended, but may be kept continuously in working order.

Should the vacuum build up too rapidly, the increased suction will move the release valve plunger downwardly from its closed position in opposition to the spring 54 and will let a quantity of air enter the system proportionately to the suction demands. A regulation of the winged nut 56 will control the time of opening of this release valve or the conditions under which it will open.

It will be appreciated from the foregoing that I have provided an improved form of relief valve, suction nozzle and trap and that the arrangement and disposition of the various parts of the apparatus allow it to be used continuously without any suspension in operation and in a normal working condition at a uniform suction rate.

I do not wish to be restricted to the size, form, and proportions of the various parts, and obviously changes could be made in the construction herein described without departing from the spirit of the invention, it being only necessary that such changes fall within the scope of the appended claim.

What is claimed is:

A suction device comprising a tubular handle being of differential diameter, the portion being of the smaller diameter being hollow and adapted to be connected to a hose, the portion of larger diameter having a thick partition wall therein extending substantially from the adjacent end of the portion of smaller diameter and extending a major portion of the length of the portion of greater diameter, said portion of greater diameter having a socket in its outer end, a nozzle removably secured in said socket, said partition having a relatively narrow opening passing axially therethrough, the end wall of the partition adjacent the portion of smaller diameter being curved to said opening, said partition also having a transverse channel intersecting the opening centrally, a reciprocating valve plug mounted in said channel and having a tapering opening adapted to register with the opening in the two sides of the partition, the outer end of the flaring opening facing toward the nozzle, means for yieldably holding the valve plug with its opening out of registry with the partition opening, and means attached to the valve plug and projecting on the exterior of the handle for moving said valve plate to cause registry of the openings.

In testimony whereof, I have affixed my signature in presence of two witnesses.

FRANK E. LUMLEY.

Witnesses:
ARTHUR H. STURGES,
HIRAM A. STURGES.