T. WIEDEMANN & J. H. TEMPLIN.

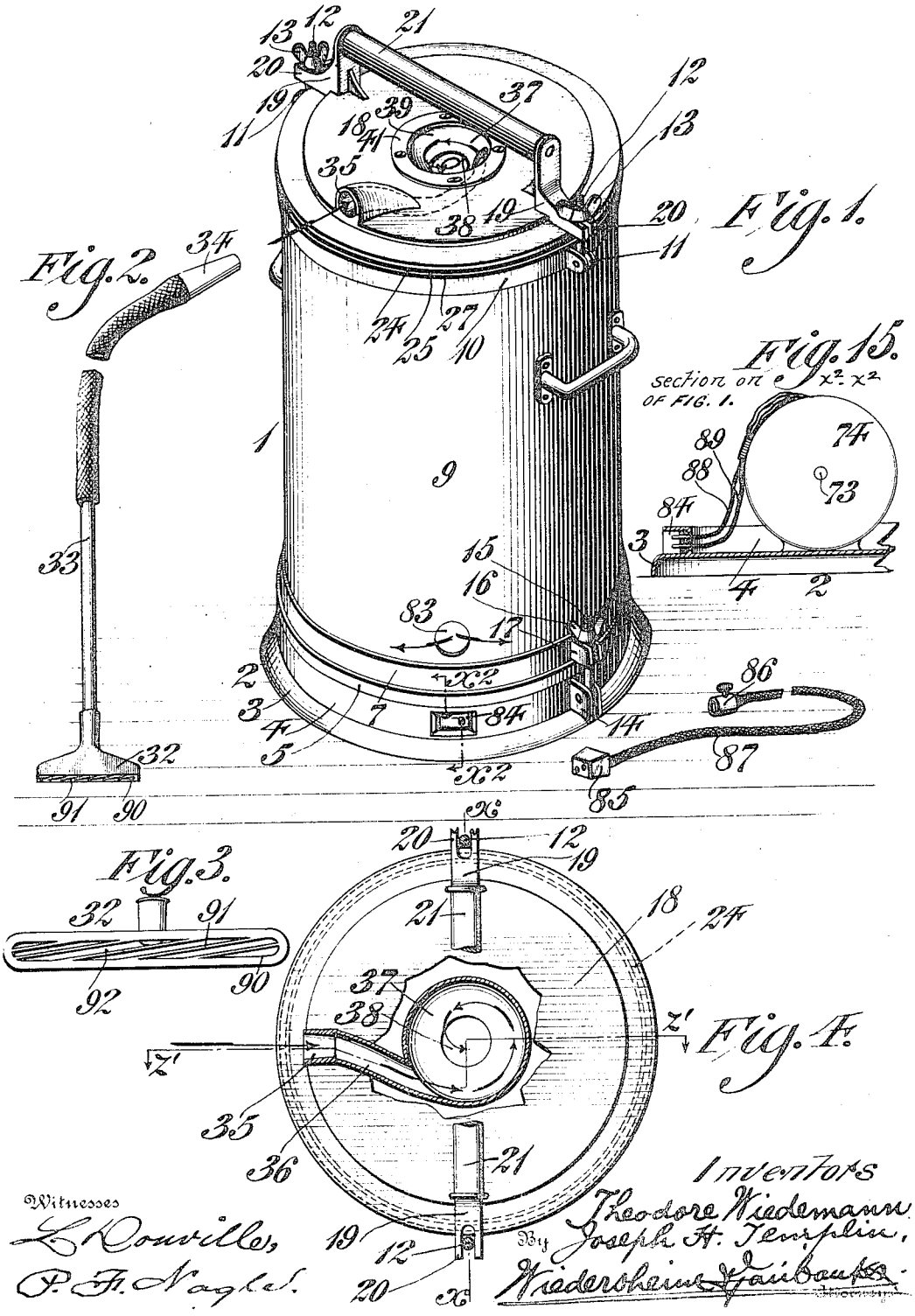
VACUUM CLEANING APPARATUS.

APPLICATION FILED MAY 3, 1909.

1,145,047.

Patented July 6, 1915.

5 SHEETS—SHEET 1.



T. WIEDEMANN & J. H. TEMPLIN.

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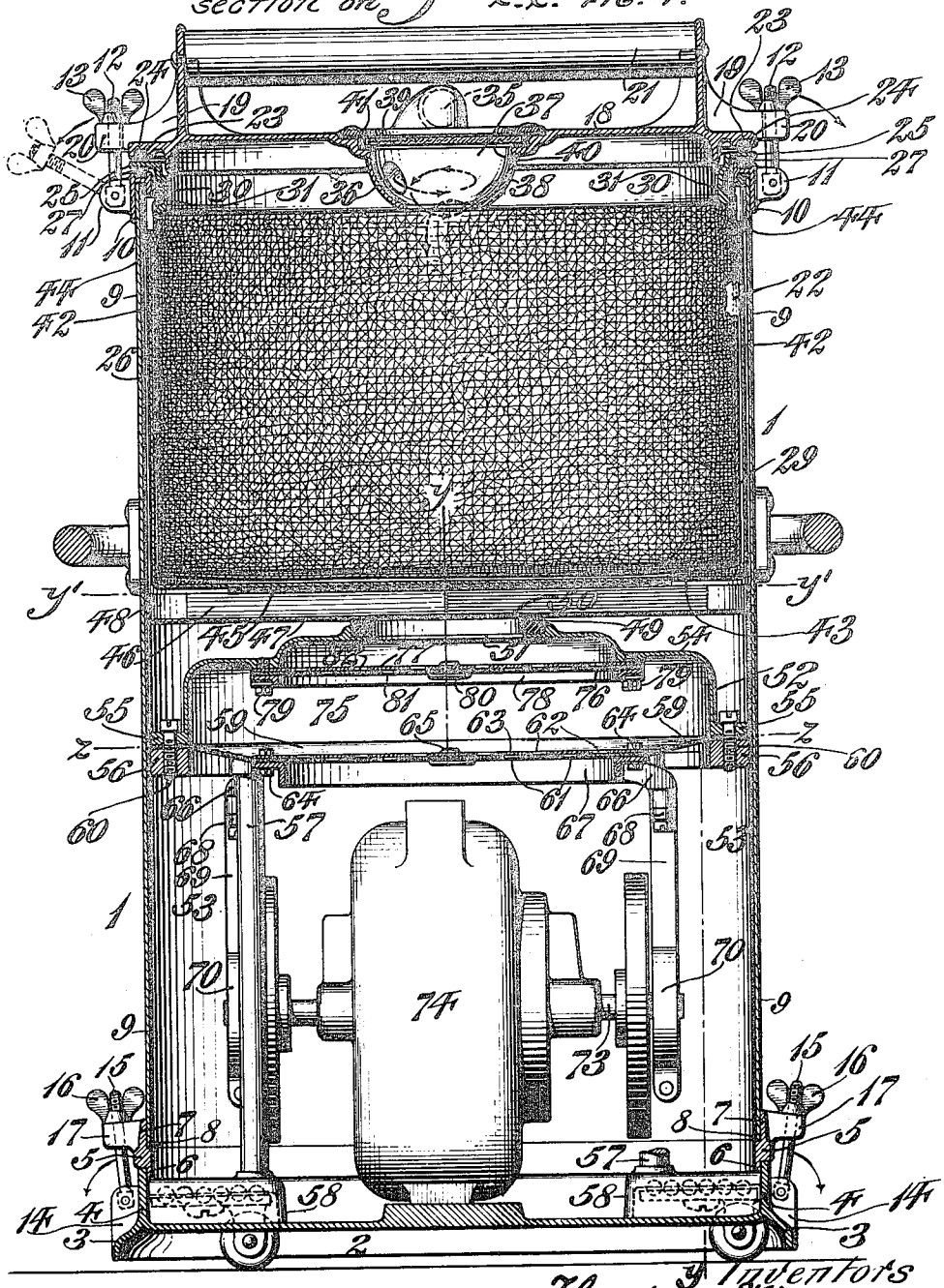
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5 SHEETS—SHEET 2.

Fig. 5.

SECTION ON X-X. FIG. 4.



Witnesses

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5 SHEETS—SHEET 3.

Fig. 6. Section on y-y Fig. 5.

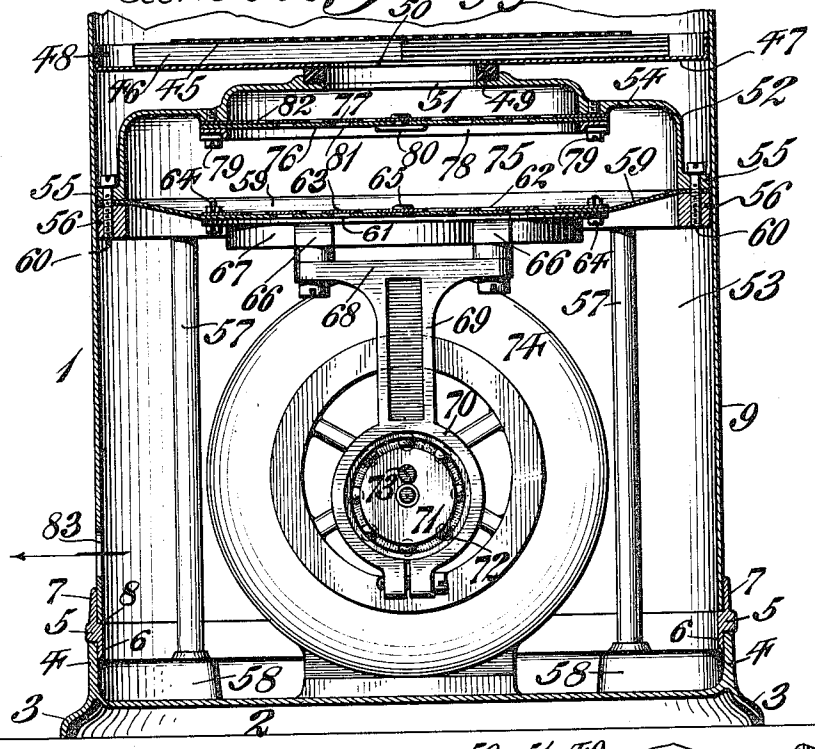


Fig. 7.

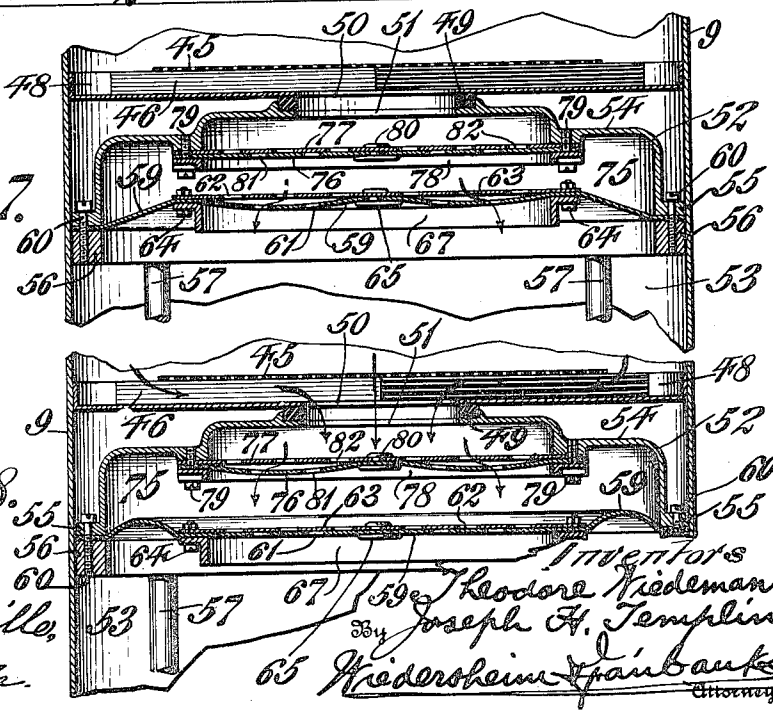


Fig. 8.

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5 SHEETS—SHEET 4.

Fig. 9. SECTION ON z-z FIG. 5.

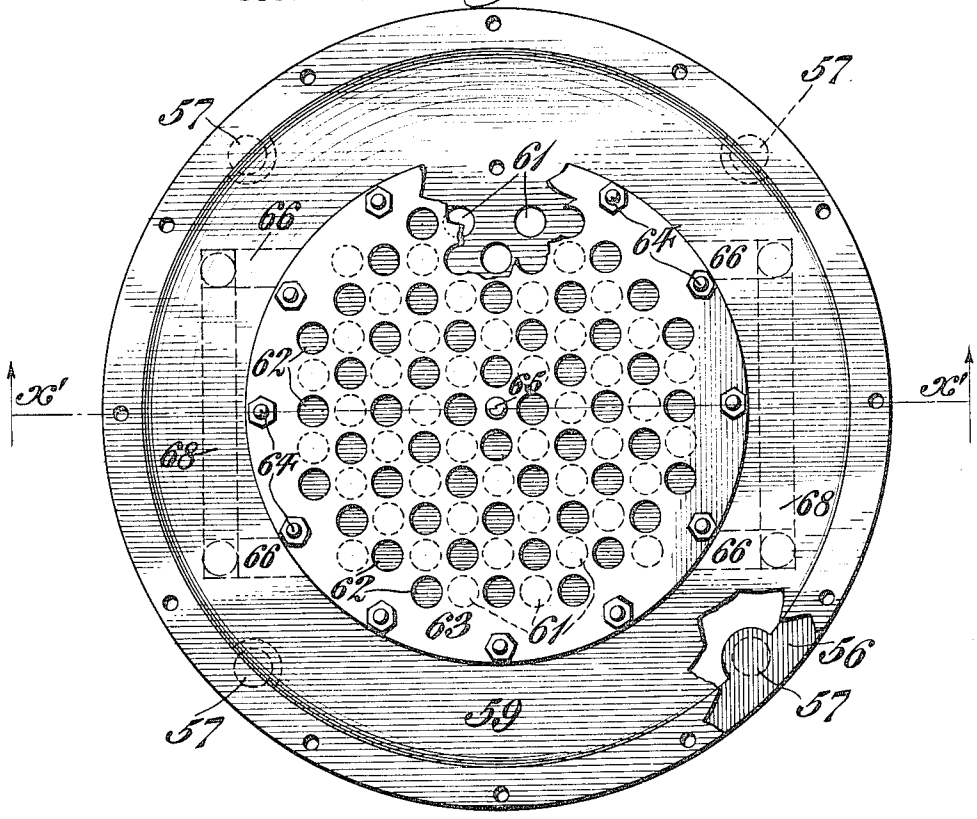
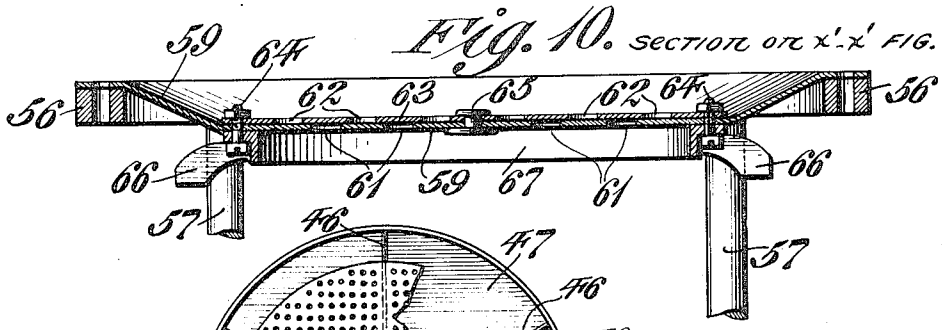


Fig. 10. SECTION ON x'-x' FIG. 9.



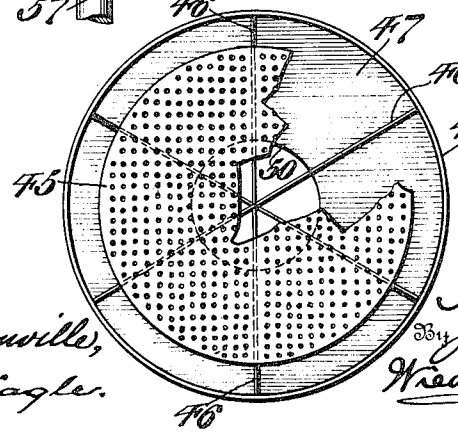


Fig. 11. SECTION ON y-y FIG. 5.

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5 SHEETS—SHEET 5.

Fig. 12.

SECTION ON 12' OF FIG. 4.

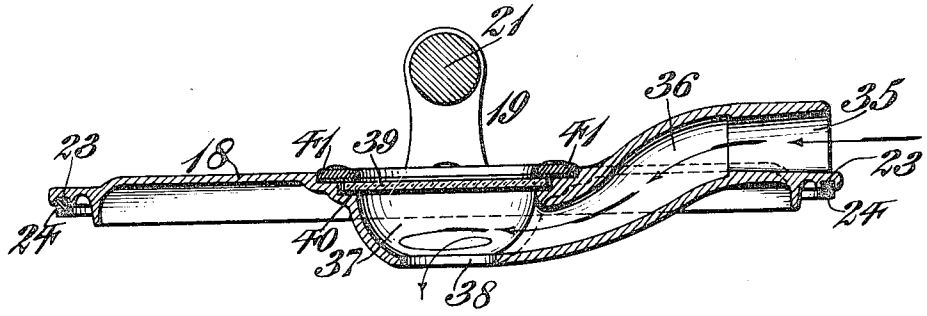


Fig. 13.

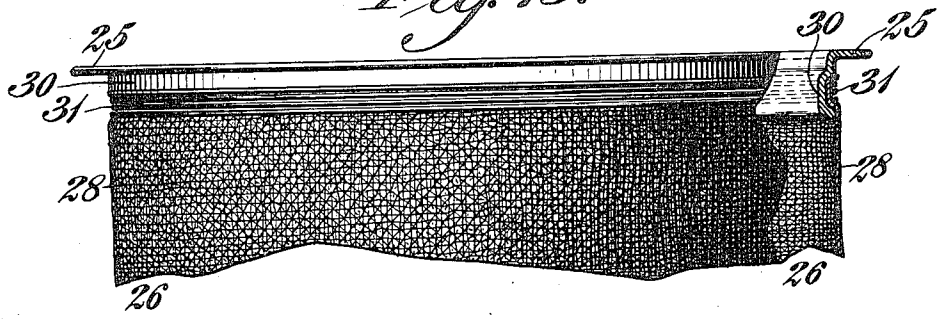
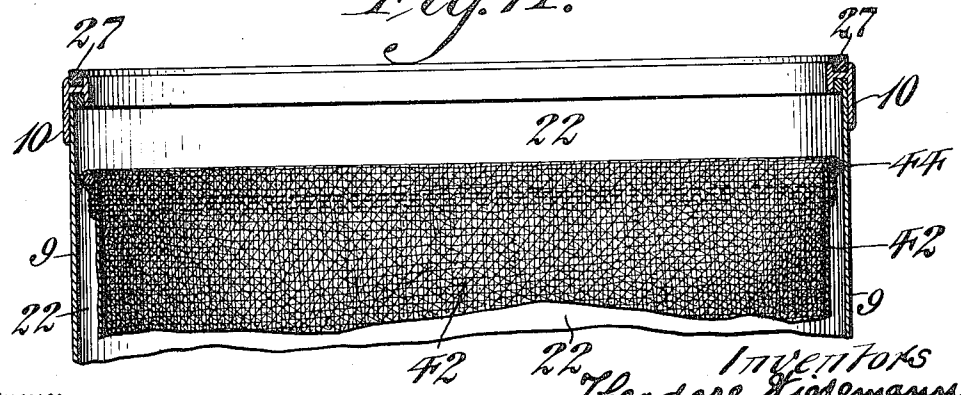


Fig. 14.



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VACUUM CLEANING APPARATUS.

1,145,047. Specification of Letters Patent. Patented July 6, 1915.

Application filed May 3, 1909. Serial No. 493,724.

To all whom it may concern:

Be it known that we, THEODORE WIEDEMANN and JOSEPH H. TEMPLIN, citizens of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Vacuum Cleaning Apparatus, of which the following is a specification.

In the construction of vacuum cleaning apparatus adapted to modern requirements for removing dust, dirt and foreign matter generally from carpets, upholstery fabrics and the like, by currents of air, it is essential that the suction nozzle be capable of being readily manipulated, that the suction devices be as small and light as possible and be capable of being readily transported and contained within the same casing as the dust separating and pumping devices are, and that the apparatus as a whole be light and portable, so as to be readily transported from one room or apartment to the other. It is also desirable that provision be made to inspect the progress of the work while the process is in operation and without stopping the apparatus, since the dust laden air passes initially through a tube, pipe, hose or suction apparatus to some destination and it is therefore desirable that the operation of the cleaning system can be observed at any time while the work is actually in progress, since it enables the operator in charge of the apparatus to know without stopping the operation, whether the removal of the dust is progressing satisfactorily and it is further a matter of satisfaction to the party whose carpets, furniture or fabrics of any kind or nature are being cleaned to observe the actual progress of the work and see the dust in process of removal.

It has heretofore been proposed to provide a projecting glass chamber into which the dust laden currents of air are diverted for inspection purposes, but such construction in practice is open to serious objection since the projecting glass chamber is unsightly and liable to be broken, thus temporarily disabling the apparatus.

In our present invention we provide a depression or bowl in the cover of the apparatus, the latter having cast or secured thereon an inlet passage which discharges into said bowl, the latter being wholly below the exterior or top surface of the cover or casing and out of the way and by providing the top of said bowl or chamber with a suitable glass or transparent cover, all liability of breakage under ordinary conditions of usage is entirely obviated.

It is furthermore a desideratum in an apparatus of this character that the dust laden current of air be immediately diverted or conducted into a suitable dust receptacle or separating apparatus, which should be located so as to be immediately and conveniently accessible for the purposes of removal, inspection or repairs and to the above ends we have located our dust separating devices preferably in the upper portion of the apparatus, so that upon the removal of the cover of the apparatus the dust separating devices will be readily accessible, novel means being provided for retaining the dust separating devices preferably in the upper portion of the apparatus and provision being made for employment of suitable packing and locking devices which can be readily manipulated so that the cover of the apparatus can be readily connected and disconnected from the casing, in accordance with requirements.

It is further desirable that provision be made for employment of a suitable pumping or suction and discharge apparatus in conjunction with a motor having a direct connection thereto, which is not liable to easily get out of order and which should be conveniently located so as to be at all times capable of convenient inspection and repairs, if necessary, there being thus formed in the upper portion of the apparatus, a vacuum reservoir, wherein the dust separating devices are located and in the lower portion a pressure reservoir, wherein the motor is located, the pumping chamber or pump proper being located above the motor in the present instance and intermediate of the vacuum reservoir or chamber and the pressure reservoir or chamber.

To the above ends we have devised a novel and simple construction of pumping apparatus, which is located intermediate of the motor and its adjuncts and the dust separating devices, whereby the power is applied directly to the suction creating device without any loss of energy and provision is further made for enabling any part of the suction or discharge apparatus or equivalent devices to be readily accessible

at all times for the purposes of inspection, repairs and renewal.

In order that the cleaner may be made as small and light as possible, so that it can be easily carried by one person from room to room so that the motive apparatus can be connected with a lead wire of an electric light current, it is desirable that the motor be placed in the lower portion of the apparatus, so as to keep the center of gravity as low as possible, whereby provision is thus made for arranging in consecutive order from the top of the apparatus down, first, the suction inlet device comprising the observation chamber, second, the vacuum reservoir or chamber containing the dust cleaning or separating devices for removing the dust and dirt from the dust laden air current, third, provision for the pumping apparatus, which for purposes of convenience of manufacture should be located preferably at or near the center of the apparatus and lastly in the lower portion of the apparatus we locate the motor from which power is derived to actuate the pumping devices by means of suitable connecting mechanism.

To the above ends our invention consists of a novel construction of observation chamber, below which is located a removable dust separating device, under which is located in consecutive order, the pumping mechanism and the actuating mechanism; the vacuum chamber, the pumping chamber and the pressure chamber and operating mechanism being arranged preferably substantially in the order named.

For the purpose of illustrating our invention we have shown in the accompanying drawings one form thereof which is at present preferred by us, since the same has been found in practice to give satisfactory and reliable results although it is to be understood that the various instrumentalities of which our invention consists can be variously arranged and organized and that our invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a perspective view of a vacuum cleaning apparatus embodying our invention, showing the electric conductor and its adjuncts disconnected therefrom. Fig. 2 represents a perspective view of the suction nozzle and its adjuncts. Fig. 3 represents a bottom plan view of the section nozzle. Fig. 4 represents a plan view of the cover, partly in section, showing the handle partly broken away in section showing the path of the dust laden air current. Fig. 5 represents a vertical sectional view, the section being taken on substantially the line x—x, Fig. 4. Fig. 6 represents a section on substantially the line y—y, Fig. 5, showing the pumping mechanism and one side of the actuating mechanism therefor. Fig. 7 represents a section through the pumping mechanism showing the position that the lower or discharge valvular elements assume through the upward movement of the lower diaphragm and its adjuncts. Fig. 8 represents a sectional view of the pumping mechanism showing the position that the upper suction or inlet valvular elements assume during the downward movement of the lower diaphragm and its adjuncts. Fig. 9 represents a section on line z—z, Fig. 5. Fig. 10 represents a section on line x'—x' of Fig. 9. Fig. 11 represents, on a reduced scale, partly broken away, a section on line y'—y' of Fig. 5. Fig. 12 represents a section on line z'—z' of Fig. 4. Fig. 13 represents a side elevation, partly in section, of the inner dust separating device seen at the upper portion of Fig. 5. Fig. 14 represents a sectional view of a portion of the outer casing and the outer dust separating device seen in the upper portion of Fig. 5. Fig. 15 represents a section on line x^2—x^2 of Fig. 1.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—1 designates our novel construction of vacuum cleaning apparatus, the same comprising the base portion 2, the latter having the outwardly projecting or flaring flange 3 and the upwardly extending flange 4, upon the top of which latter rests the ring 5, the latter having the downwardly projecting portion 6, and the upper projecting member 7, which latter is provided with the shoulder 8 upon which rests the outer wall or casing 9, which latter in the present instance is preferably round or cylindrical, although it will be apparent that the exterior shape or contour of the apparatus may be changed or varied, according to requirements.

10 designates a ring secured to the upper portion of the casing 9, said ring being provided with the slotted lugs 11, having the bolts 12 pivoted therein, the upper ends of said bolts being threaded and provided with the thumb nuts 13, as will be understood from Figs. 1 and 5, it being understood that the rings 5 and 10 are in practice secured fast to the shell or casing 9 so as to be removed in unison therewith.

14 designates slotted lugs or ears secured in the present instance to the lower portion of the base or bed member 2, said lugs or ears being arranged preferably diametrically opposite to each other and having pivoted therein the bolts 15, whose upper ends are threaded and provided with thumb nuts 16, said bolts being adapted to pass through the slotted ears 17, which are preferably located on the ring 5 so that by manipulating the thumb nuts 16 the bolts 15 can be readily engaged with or disengaged from the lugs 17, it being apparent that by the em-

ployment of the fastening devices referred to at the upper and lower portions of the apparatus, the lower portion of the casing can be readily disconnected from its base, according to requirements, while the upper portion of the casing can be readily disconnected from the top or cover 18, as is evident, the latter being provided with the angular brackets 19 which terminate in the slotted ears 20, which are adapted for the reception of the bolts 12, as will be understood from Figs. 1 and 5.

21 designates a handle which has its extremities preferably secured to the upwardly extending members of the brackets 19, as will be understood from Figs. 1, 4 and 5, said handle being preferably of sufficient length so that when it is desired to transport the apparatus from one apartment or room to another, the handle can be readily grasped by two people if necessary. In order that the upper compartment which we term the vacuum chamber or reservoir 22 may be made air and dust tight we place in the under side of the cover 18 a groove 23, in which is located an annular ring, packing or gasket 24, the latter being adapted to rest upon the top of the flange 25 of the inner dust bag 26, the under side of said flange resting upon the annular ring, packing or gasket 27 which is mounted in a recess in the upper portion of the ring 10, whereupon it will be seen that when the thumb nuts 13 are tightened, the flange 25 will be tightly held between said packing rings 24 and 27, the manner of assembling the top 18 on the flange 25 of the inner dust bag and the top of the casing 9 being apparent from Figs. 5, 12, 13 and 14.

In Fig. 13 we have shown the preferable manner of constructing and assembling the inner dust bag, the lower portion or body 26 thereof being constructed of some suitable fabric having the sides 28, as indicated and the bottom portion 29, the upper extremity of said sides 28 being secured to the annular portion 30 by means of the wires or other fastening devices 31.

Turning now to Figs. 2, 4 and 12, we will in the further description of the apparatus describe in detail the course of the dust laden air current from the time it enters the suction nozzle during its progress through the apparatus. 32 designates the suction nozzle, which is adapted to be applied to the surface of the carpet, upholstery or other fabric to be cleaned, the dust laden current of air being conducted through the pipe 33 and the fitting 34, which is adapted to be inserted in the socket or inlet opening 35 of the cover 18, the current of air passing thence through the passage 36 into the bowl or depression 37, which has an opening 38 in the bottom thereof, from which the dust laden current of air is discharged into the inner bag or separating device 26. 39 designates a plate of transparent material which is seated within the recess 40 and held in position by the ring or fastening device 41, as will be apparent from Figs. 5 and 12. The current of dust laden air after passing through the outlet 38 into the bag 26, whose construction and manner of removal has already been described, passes thence through the outer bag 42, which is composed of sides and the bottom portion 43, the upper sides of said outer bag 42 being connected to or reinforced by the ring 44, as will be understod from Fig. 14.

45 designates a perforated plate, preferably of somewhat less diameter than the casing 9, said plate being mounted above or supported on the wings 46, the latter being contained within or resting upon the pan formed by the plate 47 and the upwardly extending flange 48, said plate 47 resting upon the ring or packing 49.

50 designates an opening in the plate 47 which discharges into the ring 49 and thence through the opening 51 into what we term the pumping apparatus proper 52, it being noted that the latter is located between the vacuum reservoir 22 and what we term the pressure chamber 53, in the lower portion of the casing 9. The pumping apparatus 52 comprises a top plate 54 which terminates in the flanges 55, which rest upon the frame 56, which is supported upon the upper extremities of the four posts 57, the lower extremities of the latter being supported upon the bosses 58 or their equivalent, which may be located in proximity to the base of the apparatus.

59 designates a diaphragm which has its outer periphery secured between the flanges 55 and 56, it being apparent that the same bolts or fastening devices 60, which serve to hold the flanges 55 and 56 in juxtaposition, also hold the outer periphery of the diaphragm 59 in proper position. As will be understood from Figs. 5 to 10 inclusive, the diaphragm 59 is provided with a series of ports or openings 61 therethrough, which are arranged in staggered order with respect to the ports or openings 62 of the plate or diaphragm 63, which is located above said diaphragm 59, as will be understood from Figs. 5 to 10 and is held in position with respect thereto by means of the bolts or fastening devices 64 and the inner or central fastening device 65, as will be best understood from Figs. 9 and 10.

66 designates arms which are secured to the ring or frame 67, the latter being secured to the diaphragms 63 and 59 by means of the fastening devices 64, before described, said arms 66 being secured to the heads 68 of the connecting rods 69, which latter terminate in the eccentric strap 70, it being noted

that said eccentric strap and connecting rod and head are preferably jointless or made integral or in one piece.

71 designates an eccentric, by means of which the eccentric strap and connecting rod are actuated, suitable ball bearings 72 being located between said strap and eccentric, the latter being rotated by the shaft 73, which is actuated by the motor 74. In the present instance we preferably employ an electric motor, since the same is capable of being readily coupled to electric light fixtures of usual construction. It will be understood that we employ two eccentric straps, connecting rods and their adjuncts as will be apparent from Fig. 5, although it is evident that a single eccentric strap and connecting rod might be employed if desired. It will also be seen that we have a direct connection from each eccentric to the diaphragm 59.

Turning now to Figs. 5 to 8 inclusive, it will be seen that between the plate or member 54 and the diaphragm 59, a somewhat enlarged pumping chamber 75 is formed, such chamber extending nearly across the casing of the apparatus, the upper portion of said chamber being bounded by the upper diaphragms 76 and 77, whose outer peripheries are held in position by means of the ring or frame 78 having the fastening devices 79 passing therethrough, the center portion of said diaphragms being held in position by means of the fastening device 80, the lower diaphragm 76 being provided with the ports or perforations 81, which are arranged in staggered order with respect to the ports or perforations 82 of the upper diaphragm, as will be clearly apparent from Figs. 5 to 8 inclusive. It will be understood that the areas of the passages 50 and 51 and the staggered ports 82 and 81, the chamber 75 and the staggered ports 62 and 61, and the area of the pressure chamber 53 are so proportioned and correlated with respect to each other and particularly the area of the chamber 76 must be of such proper relative dimensions and proportions that there will always be a substantially uniform quantity of air forced into the pressure chamber 53 and discharged from the outlet port 83, seen in Fig. 1, as will be hereinafter explained, so that the speed of the motor will be at all times substantially uniform, no matter whether the nozzle 32 is placed against the carpet, upholstery or other fabric to be cleaned, or whether it is withdrawn therefrom and the motor is simply running free, so that the pumping apparatus is simply sucking in air at atmospheric pressure.

In Figs. 1 and 15, we have shown the preferred manner of enabling the operator to readily connect the apparatus up with an electric light socket, 84 designating the socket and 85 the plug attached to the connection 87, whereby when the socket 86 is connected to the usual electric light fixture, the current is conducted through said connection 87 to the plug 85 and thence through the connections 88 and 89 to the motor 74, as will be understood from Figs. 1 and 15.

In Fig. 3 we have shown on a slightly enlarged scale, the preferred form of nozzle employed by us, the same being composed of a wide opening 90 extending across the entire nozzle face and being provided with the elongated bars 91, whereby a plurality of inclined narrow openings 92 are formed so that as the nozzle is applied to the surface to be cleaned a plurality of the inclined openings 92 will always be presented to said surface, said openings being bounded by the bars 91 so as to prevent the fabric being cleaned from being sucked into the head of the nozzle proper.

The operation is as follows: The parts are first placed in operative condition by inserting the fitting 34 into the socket 35, seen in Fig. 1 and upon the insertion of the plug 85 into its socket 84, the current can be admitted to the motor, the parts in their assembled condition appearing as seen in Fig. 5. In Figs. 5 and 6 the diaphragm 59 and its adjuncts are seen in the lowest positions they may assume and upon the rotation of the eccentrics 71 it will be evident that the parts will rapidly in succession assume the appearance seen in Figs. 7 and 8, it being apparent that as the connecting rods 69 move upwardly they will raise the diaphragm 59 into the position seen in Fig. 7, whereupon the air in the chamber 75 will be compressed and will cause the diaphragms 76 and 77 and 59 to assume the positions seen in Fig. 7, whereupon the air will pass in the direction of the arrows seen in said Fig. 7 downwardly into the pressure chamber 53 and thence through the opening 83, seen in Figs. 1 and 6 to the atmosphere. A further rotation of the eccentric 71 will cause the descent of the connecting rods 69, whereupon the diaphragms 59 and 63 will assume the positions seen in Fig. 8 and the diaphragm 76 will also assume the position seen in said Fig. 8, whereupon the air will be drawn in through the staggered ports 82 and 81 from the space above them into the pumping chamber 75, it being understood that as the diaphragm 59 moves from the position seen in Fig. 7 to the position seen in Fig. 8, the parts assume the position seen in said Fig. 8 by reason of the accumulation of pressure in the pressure chamber 53, as will be apparent to those skilled in the art.

In practice, motors of the character employed in our construction run at a very rapid rate or approximately fifteen hundred to two thousand revolutions per minute, so that it can be seen that the rapid reciproca-

tions of the diaphragm 59 will, when the chambers 75 and 53 are properly proportioned with respect to each other, cause a sufficient body of air to be at all times contained or compressed in said chambers, so that the motor will not race, but will run at all times at substantially a uniform speed irrespective of whether the suction nozzle 32 is in or out of contact with the carpet, upholstery or other fabric to be cleaned. We have found in practice that the most satisfactory results are obtained from the employment of a motor actuating two cranks or eccentrics, each having a connecting rod connected at one end to or actuated by one eccentric, while the opposite end of each of said connecting rods is rigidly secured to an arm or head, as 68, attached to the diaphragm 59, the latter being secured in its outer periphery to a suitable fixed point and said diaphragm serving to actuate or co-act in conjunction with suitable vacuum creating devices. In these broad aspects the present structure, so far as the pumping mechanism *per se* is concerned, is disclosed in our application for vacuum cleaner, filed Mar. 10, 1908, Serial No. 420,174, patented Nov. 2, 1909, No. 939,117, wherein we have shown and described a structure embodying broadly the combination of a motor, a plurality of eccentrics actuated thereby and a plurality of one piece connecting rods having one of their ends attached to or actuated by said eccentrics, while their opposite ends are secured to a suitable member or frame connected to a diaphragm having its outer periphery secured to a suitable fixed point. We have found in practice that the best results are obtained from a jointless or one piece connecting rod, although it is apparent that the connecting rod or rods may be made in two pieces rigidly secured together, if desired, without departing from the spirit or scope of our invention.

It will be apparent that the reciprocation of the motor will, through the co-action of the valvular mechanism or diaphragms in the manner described, cause a current of dust laden air to be sucked into the inlet 36 and that said current will be diverted by its contact with the walls of the chamber 37 so that the progress of the cleaning process can be readily observed through the transparent plate 39, the dust laden current passing through the passage 38 into the inner dust bag 26, within which latter the dust is retained while the air freed from the dust, passes through the outer dust bag 42 and thence through the passages 50 and 51 into the pump chamber or pulsation chamber 75, and thence into the pressure chamber 53 and thence to the atmosphere through the port 83 in the manner already described.

To obtain access to the interior for the purpose of removing, cleaning or changing the inner dust bag 26, it is only necessary to loosen the nuts 13, after which the bolts 12 can be turned downwardly and the top 18 removed, whereupon the inner bag 26 can be removed and cleaned, and then replaced, all in a few moment's time The object in employing two dust bags is to insure a thorough filtering of the air before it reaches the pumping chamber, the outer dust bag 42 not requiring to be removed as frequently as the inner one, as is evident. When it is desired to have access to the lower portion of the apparatus, it is only necessary to loosen the nuts 16, whereupon the casing 9 and its adjuncts can be readily and quickly removed from the base 2, and the motor 74, diaphragm 59 and its adjuncts are readily accessible.

In practice we prefer to provide the casing 9 with side handles and rollers or casters so as to enable the apparatus to be readily removed from one room or apartment to another. The principal function of the apertured plate 45 is to form a support for the outer dust bag, said plate, the wings 48 and the plate 47 being readily removed from the ring 49.

In a co-pending application for dust separator and filtering device for vacuum cleaners, filed August 11th, 1909, Serial No. 512,283, we have described and broadly claimed the means employed for supporting the lower end of the outer filtering bag, such means comprising the apertured plate 45 and the wings 46, which prevent the lower portion of the outer filtering bag 42 from clogging the pumping inlet 50 or being drawn into contact with the valve mechanism and in this application we therefore make no claim to the means for supporting the lower end of the outer filtering device.

It will be apparent that various changes may be made by those skilled in the art in the manner of assembling the casing, the dust separating devices, and valvular devices and their adjuncts without departing from the spirit of our invention and we do not therefore desire to be limited in every instance to the exact construction herein shown and described.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. A vacuum cleaner including in combination, a casing, a cover therefor, and means for detachably securing said cover to said casing, said cover having a projecting portion on the lower face thereof and an inlet passage extending through the cover into a chamber formed in said projecting portion, said chamber also having an opening to the vacuum chamber in the casing beneath the cover.

2. A vacuum cleaner including in combination, a casing, a cover therefor, and means

for detachably securing the cover to said casing, said cover having a projecting portion on the lower face thereof and a projecting portion on the upper face thereof and an inlet passage extending through said projecting portions on the upper and lower faces of the cover into a chamber formed in the projecting portion on the lower face of the cover, said cover also having an opening leading from said chamber into the vacuum chamber beneath the cover.

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