

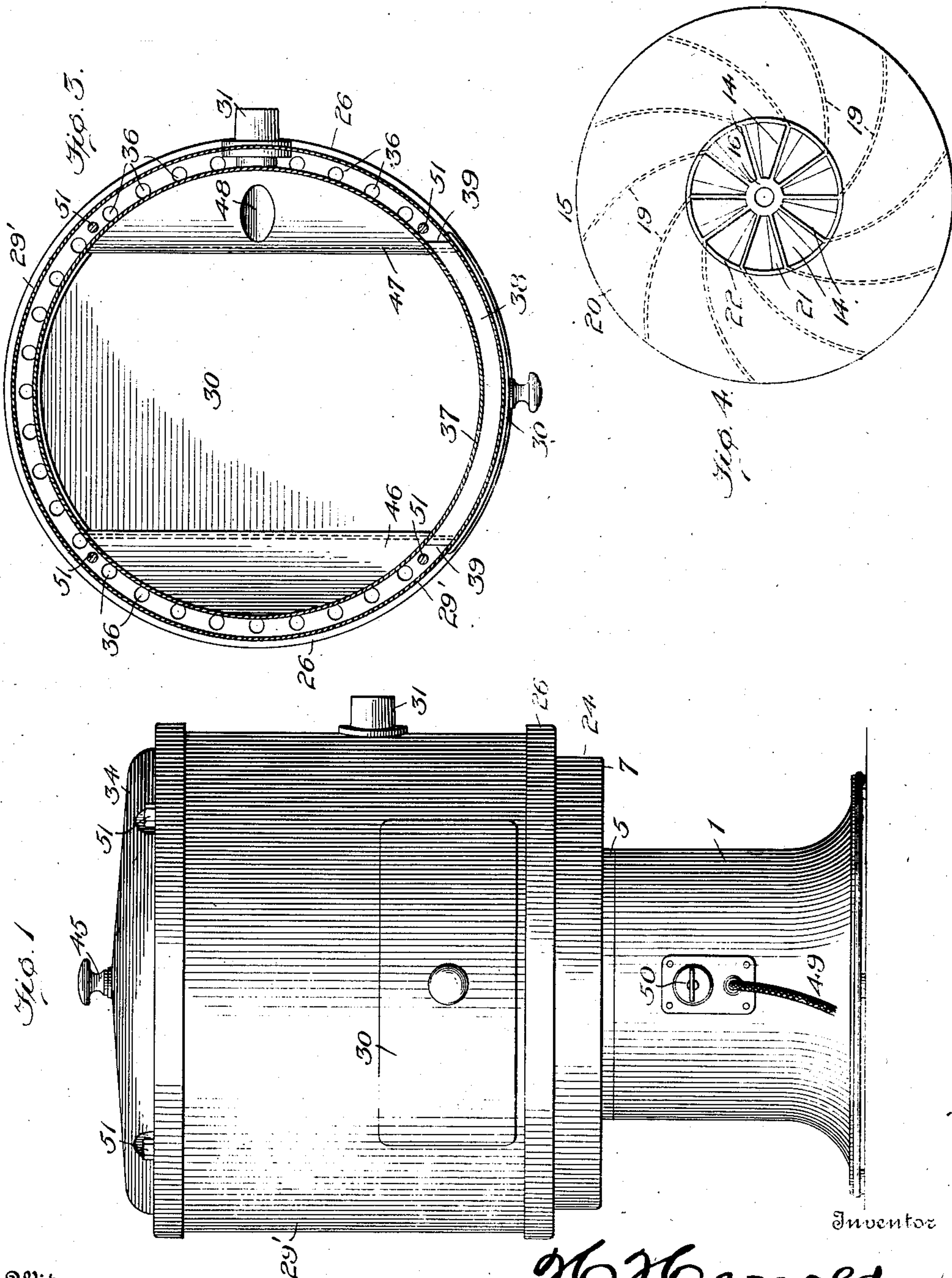
H. HARROLD.
SUCTION CLEANER.

APPLICATION FILED AUG. 19, 1910.

994,462.

Patented June 6, 1911.

2 SHEETS-SHEET 1.



Witnesses

Edwin L. Bradford
M. D. Ballouf

By

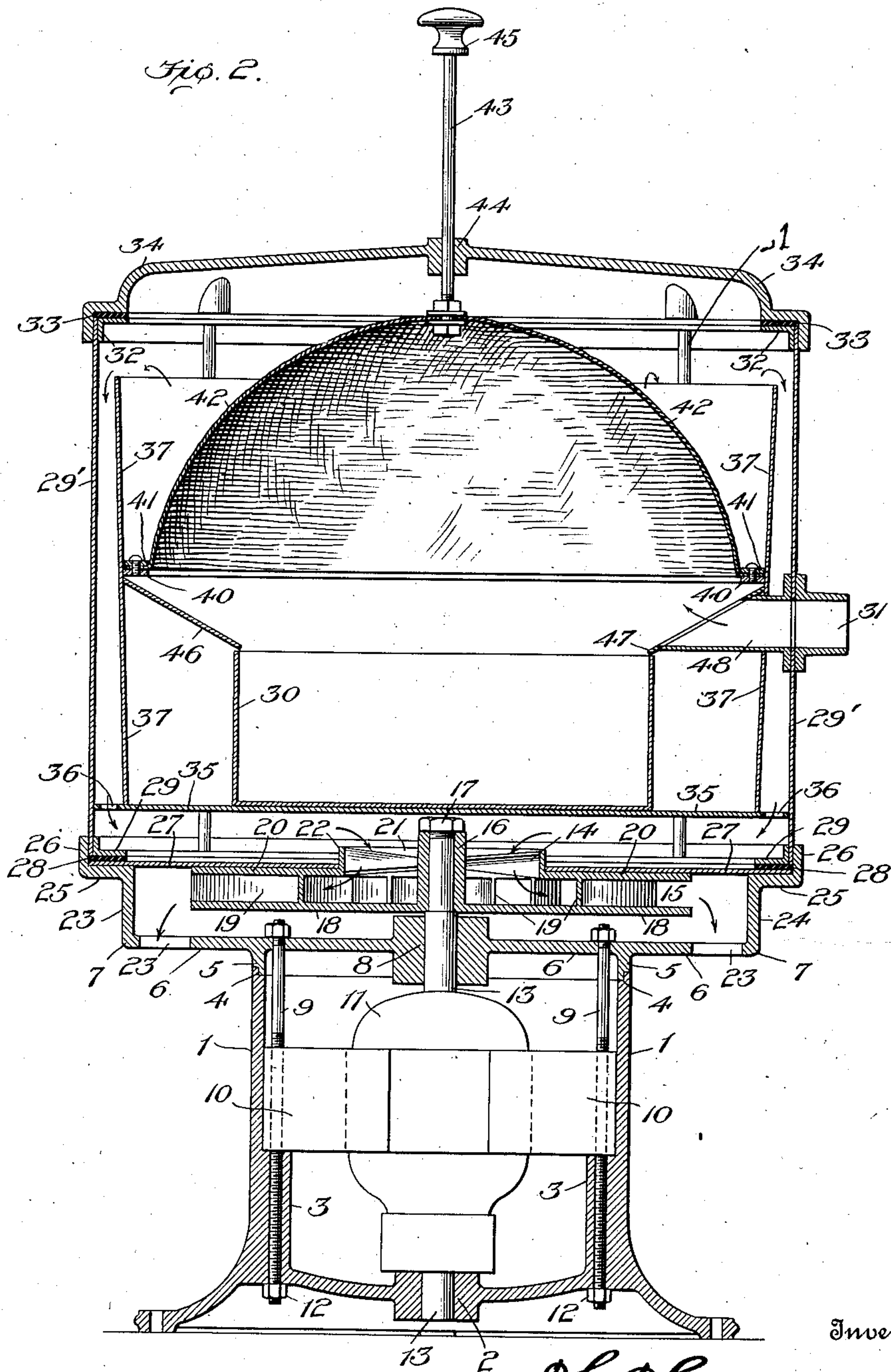
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UNITED STATES PATENT OFFICE.

HARMAN HARROLD, OF CANAL DOVER, OHIO.

SUCTION-CLEANER.

994,462.

Specification of Letters Patent.

Patented June 6, 1911.

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To all whom it may concern:

Be it known that I, HARMAN HARROLD, a citizen of the United States, residing at Canal Dover, in the county of Tuscarawas and State of Ohio, have invented certain new and useful Improvements in Suction-Cleaners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to air cleaning apparatus, and has for its object the production of a portable cleaner, electrically or otherwise operated upon a suction or exhaust principle, for speedily and effectually removing dust and dirt from carpets, curtains, rugs, and articles of household furniture and furnishings in general.

It is designed, arranged and adapted for all of the various uses to which the more common form of vacuum cleaners are applicable, in dwellings, churches, public buildings, assembly halls, and all manner of structures where the removal of dust and dirt is a constantly recurring problem.

As a further object my present invention contemplates a simplification of the said class of cleaners, the production of a cleaner which is economical both in its cost of construction and maintenance, peculiarly efficient in its operation, comparatively light in weight, easily controlled, and durable.

As a further object this invention presents a novel structural arrangement of parts including a direct and positively driven rotary exhaust fan and blower which insures at all times a uniform continuous suction action as distinguished from the intermittent action of cleaners working upon the vacuum principle.

The invention will be hereinafter particularly described and pointed out in the claims following.

In the accompanying drawings which form part of this application, and whereon like numerals indicate corresponding parts in the several views: Figure 1 is a side elevation of the invention omitting the customary suction hose but showing the hose coupling or attachment, Fig. 2 is a central vertical section through the entire structure upon a relatively enlarged scale, Fig. 3 is a horizontal sectional view of the invention taken through Fig. 2 immediately below the dust bag or separator, Fig. 4 is a plan view

of the suction or exhaust fan detached, showing in dotted lines below the centrifugal blower with which said fan coöperates.

Reference being had to the drawings and numerals thereon, 1 indicates an annular hollow motor-case preferably of cast metal, having a central motor-shaft bearing 2 in its closed bottom, integral lugs 3 upon its interior, and recessed upon its upper edge as at 4. Mating with and seated in the recess 4 is a downwardly extending flange 5 upon the bottom 6 of a fan and blower case 7, also of annular form, and by preference of cast metal. At its center the bottom 6 of case 7 is provided with a perforated boss 8 constituting a second motor-shaft bearing, and at points in alinement with the lugs 3 aforesaid this bottom 6 as well as the said lugs 3 is perforated by bolt holes for the reception of bolts 9 as a means of detachably but firmly securing cases 1 and 7 together.

Upon lugs 3 rest the fields 10 of an electric motor 11 the same being further secured by screw threaded connection with said bolts and by agency of the lowermost nuts 12 thereon, which serve the additional purpose of lock-nuts. Passing vertically through the motor 11 is the power shaft 13, suitably mounted in bearings 2 and 8 aforesaid, and connected directly to a combined suction or exhaust fan 14 and centrifugal blower 15 now to be particularly described. Shouldered upon the reduced upper end of shaft 13 is a hub 16 securely affixed by agency of a nut 17 or similar means, while at the bottom of said hub is a horizontal unbroken disk 18 constituting a base for the fan and blower structure. Upon this disk 18 are rigidly affixed a series of blower blades 19 curved as indicated by dotted lines in Fig. 4, and arranged in vertical planes at right angles to that of the said disk 18. Directly above and similarly secured to the blades 19 is a second disk member or blower cover 20, which, unlike disk 18 is broken by a central opening 21 and provided with an upstanding flange 22 surrounding said opening between which, and hub 16, opposite ends of the fan blades 14 are secured at an angle to the plane of the disks 18 and 20.

The bottom 6 of fan and blower case 7 is perforated as at 23 to furnish an outlet for the air driven off by blower 15 and is surrounded by an uprising annular wall 24 shouldered circumferentially as at 25 and flanged again in an upward direction as at

26. Upon the annular shoulder 25 rests a disk 27 having a central opening to permit passage of the fan flange or collar 22, and bearing upon its outer edge a packing gland 28 the latter being securely held in place by a rigid annulus or ring 29 of angular cross sectional shape as shown by Fig. 2. Thus it will appear that the hub 16, disks 18 and 20, the interposed blower blades 19, and fan blades 14 revolve in cluster upon motor shaft 13 and between the relatively fixed bottom 6 and top 27 of the fan and blower case 7. And while the foregoing form of blowing or exhaust apparatus has been particularly described as one means for creating the necessary suction, it will be understood that same is herein employed merely as an exemplification of various forms for accomplishing the same or similar results.

20 Securely retained between the angular ring 29 and flange 26 at the upper edge of case 7 is a sheet metal cylindrical outer casing or drum 29' constituting the body of the structure, broken only by an opening 25 for a dust collecting drawer 30, and at one side by a hose coupling or attachment 31 constituting the inlet to an inner casing hereinafter described. At its upper edge the drum or body 29' is reinforced by an annular angle iron 32 corresponding with the ring 29 below and like it serving to support a packing gland 33 upon which latter rests a flanged cap or cover 34 for the entire structure.

35 Near its bottom the outer drum or body is provided with a false bottom 35 crossing from side to side immediately above nut 17 upon motor shaft 13. This serves as a rest for the dust drawer 30, and is broken at its edge by a series of air passages 36; while rising from said floor or bottom 35, to which it is firmly secured just inside of the series of air passages 36 aforesaid, is a concentric inner drum or casing 37 which 45 diverges slightly toward its upper edge and terminates just below the cap or cover 34 thus approximating in height that of the outer casing 29'. Thus it will be noted, particular reference being had to Fig. 3, that the air discharge passages or outlets 36 are 50 located between the outer and inner casings or drums 29' and 37, respectively, and extend around their entire circumference, except where interrupted by the passage of the dust drawer 30. At this point the structure is rendered practically airtight by a horizontal partition 38 connecting the said drums 29' and 37 above the drawer 30, and vertical partitions 39, 39 performing a like 60 service at each side of said drawer. To the inner circumference of the said inner case or drum 37, at approximately its vertical center is secured, as by brazing or otherwise, a rigid ring 40 between which and a 65 corresponding loose ring 41 is fastened the

outer edge of a hemispherical flexible and collapsible dust bag 42, which crowns up when inflated or in service as shown by Fig. 2 and is provided at its center with an agitating rod 43. The said rod 43 has a reciprocal bearing in a boss 44 at the center of cap or cover 34 and terminates in a knob 45, as shown. Immediately beneath the said annular flange 40 upon opposite sides of the structure and extending from front to back thereof are inclined segmental dust-shields 46 and 47 secured rigidly to the inner wall of drum 37 and terminating above the dust drawer 30, as a means of directing dust and dirt into said drawer. 80 The shield 46 is unbroken, but as clearly shown by Figs. 2 and 3, an air inlet tube 48 extending from the coupling attachment 31, opens directly through both the outer and inner casings 29', 37 as also the shield 47 beneath the dust bag or screen 42.

As indicated by Fig. 1, an electrical supply wire 49 is introduced through the motor casing 1 to the motor under control of a switch 50, when electricity is employed as 9 the motive power, and as a means of firmly but detachably securing cap or cover 34, and drum or casing 29' to the fan and blower case 7, bolts 51 are employed provided either with heads as shown by Fig. 9 1, or wing-nuts if preferred, and extending downward at equidistant points between the walls of casings 29', 37, as best shown by Fig. 3, to be screwed into bolt holes suitably tapped through ring 29, packing 28, disk 27 and into the shoulder 25 of case 7, all as will more plainly appear in a brief statement of operation to follow:

Presuming all parts of the cleaning apparatus to have been arranged and assembled substantially as shown and described, the power of motor 11, acting directly through its shaft 13, drives fan 14 to exhaust the chamber immediately above. As a consequence a steady and continuous suction is produced through the working tools and suction hose (not shown), and through the air inlet tube 48, leading directly to the interior of casing 37, whereupon the flexible and collapsible screen or dust bag 42 is first inflated or crowned upward as indicated by Fig. 2. This screen or separator being of porous flexible material freely permits passage of the air supply, but arrests the dust and dirt carried thereby which gravitates directly into the dust drawer 30, or upon shields 46, 47 and thence to the said drawer. Continuing, the air supply screened as aforesaid, finds passage between the downwardly diverging walls of outer and inner casings 29' and 37, respectively, and thence through peripheral apertures 36 to the exhaust chamber immediately above the fan and blowing device. Exhausted thus by agency of fan 14 the air is instantly and centrifugally driven

outward by the action of blower blades 19 and thence from the apparatus via discharge outlets 23 into the room or apartment being renovated. Thus it will be noted that the suction or exhaust is continuous and peculiarly steady while motor 11 is in operation, and when stopped by agency of the switch 50 or other means, the dust screen or bag 42 assisted by the weight of rod 43 naturally gravitates to and rests partially upon the side shields 46 and 47. Moreover, it will be noted that the said rod 43 may be agitated at any time to effectually shake off or clear the screen or bag 42 of all dust or foreign matter that may have accumulated thereon, and when a cleaning operation is concluded the resulting accumulation or sweepings may be conveniently removed from the apparatus by merely withdrawing the drawer 30 as is self apparent. It will also be observed that the downwardly converging form of the inner casing 37 greatly facilitates the discharge of air from the annular chamber by which the casing 37 is surrounded; and the attachment of bag 42 to the interior of the inner casing 37 at a point intermediate of its ends positively compels the incoming air to rise to a height approximating that of outer casing 29' before it can be discharged, with the result that screen 42 is practically located within a flue. Moreover the aforesaid relative arrangement of the flexible screen 42 and inner casings 37 permits said screen to crown up into a semi-spherical form as shown by Fig. 2 when in service, so that the bulk of the dust and dirt in transit is arrested by the approximate center of said screen where the agitation due to motor vibrations is most marked; and it will be further observed that the service air is discharged in a downward direction through a diverging circumferential passage formed by and between the concentrically arranged walls of the outer and inner casings 29' and 37, respectively.

Having thus described my invention in its preferred form of construction, what I claim and desire to secure by Letters Patent is:

1. In a suction cleaning apparatus the combination with an outer casing, of an inner casing approximating in height that of the outer casing, a collapsible dust screen crossing said inner casing at an intermediate point adapted to be distended to a point approximating the height of the inner casing, an inlet to said inner casing below the screen aforesaid, and an outlet from both of said casings.

2. In a suction cleaning apparatus the combination with an outer cylindrical casing, of an inner casing approximating in height that of the outer casing and concentrically arranged, a collapsible dust screen crossing said inner casing at an intermediate point, adapted to be distended

to a point approximating the height of the inner casing, an inlet to said inner casing below the screen aforesaid, and an outlet from both of said casings.

3. In a suction cleaning apparatus the combination with an outer casing, of an inner casing approximating in height that of the outer casing and having downwardly converging sides, a collapsible dust screen crossing said inner casing at an intermediate point, adapted to be distended to a point approximating the height of the inner casing, an inlet to said inner casing below the screen aforesaid, and an outlet from both of said casings.

4. In a suction cleaning apparatus the combination with an outer casing, of an inner casing approximating in height that of the outer casing, a collapsible dust screen crossing said inner casing at an intermediate point, adapted to be distended to a point approximating the height of the inner casing, an inlet to said inner casing below the screen aforesaid, an outlet from both of said casings, and a dust drawer entering both casings below the screen aforesaid.

5. In a suction cleaning apparatus the combination with an outer casing, of an inner concentrically arranged casing approximating in height that of the outer casing, a collapsible dust screen crossing said inner casing at an intermediate point adapted to be distended to a point approximating the height of the inner casing, an inlet through both of said casings below the screen aforesaid, and a cylindrical outlet formed by the walls of said casings.

6. In a suction cleaning apparatus the combination with an outer cylindrical casing, of an inner cylindrical concentrically arranged casing approximating in height that of the outer casing, a collapsible dust screen crossing said inner casing at an intermediate point adapted to be distended to a point approximating the height of the inner casing, an inlet through both of said casings below the screen aforesaid, and a downwardly diverging cylindrical outlet formed by the walls of said casings and discharging below the inlet aforesaid.

7. In a suction cleaning apparatus the combination with an outer casing, of an inner casing approximating in height that of the outer casing, a dust screen crossing said inner casing at an intermediate point, an inlet to said inner casing below the screen aforesaid, an outlet from said outer casing, a false bottom for the outer casing upon which the inner casing rests, and air passages through said false bottom between said casings.

8. In a suction cleaning apparatus the combination with an outer casing, of an inner casing approximating in height that of the outer casing, a collapsible dust screen

secured to said inner casing at an intermediate point, adapted to be distended to a point approximating the height of the casing, an inlet to said inner casing below the
5 screen aforesaid, and a circumferential outlet between said casings.

9. In a suction cleaning apparatus the combination with an outer casing, of an inner casing approximating in height that of
10 the outer casing, a collapsible dust screen secured to said inner casing at an intermediate point adapted when inflated to

crow upward, to a point approximating the height of the inner casing, an inlet to said inner casing below the screen aforesaid, and
15 a circumferential outlet between said casings.

In testimony whereof I affix my signature, in presence of two subscribing witnesses.

HARMAN HARROLD.

Witnesses:

ALBERT P. HARKER,
LEECH A. GROVE.