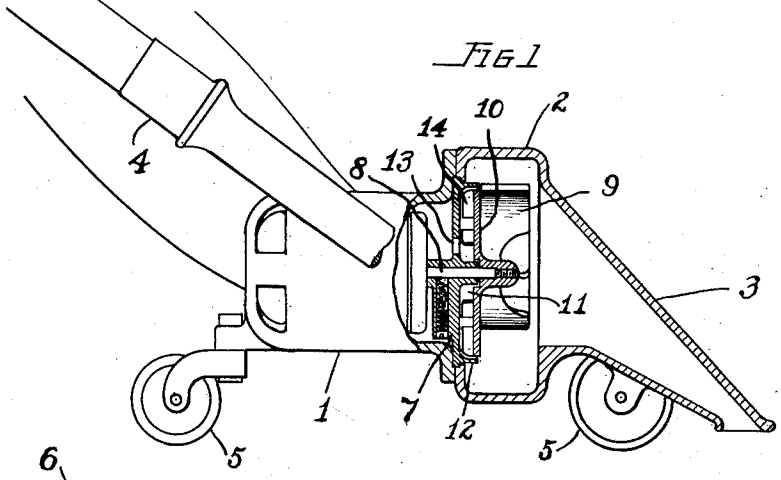
W. V. ORR.

SUCTION CLEANING DEVICE.

APPLICATION FILED APR. 12, 1917.

1,342,592. Patented June 8, 1920.

Fig 1



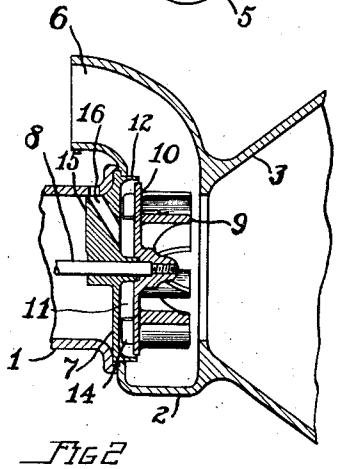


Fig 2

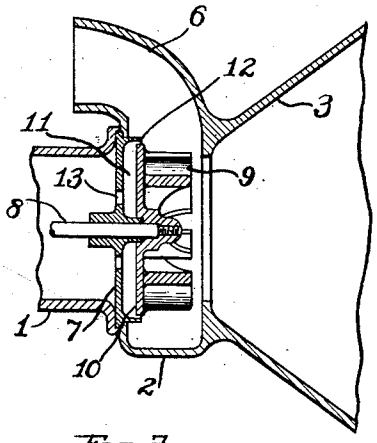


Fig 3

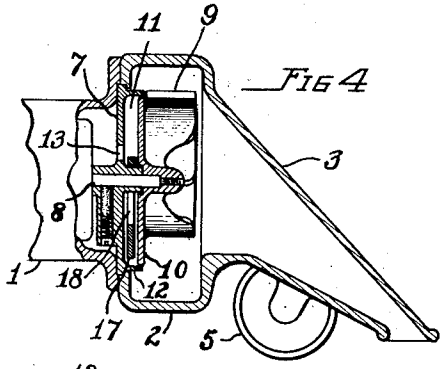


Fig 4

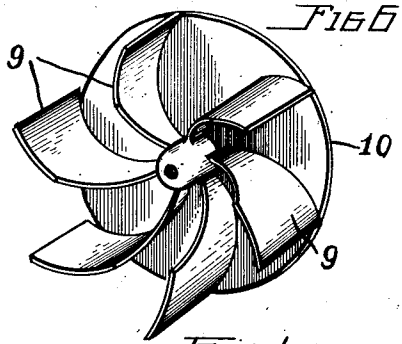


Fig 6

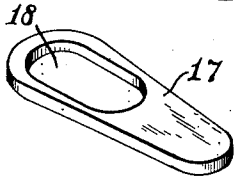


Fig 5

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WILLIAM V. ORR, OF CLEVELAND, OHIO.

SUCTION CLEANING DEVICE.

1,342,592. Specification of Letters Patent. Patented June 8, 1920.

Application filed April 12, 1917. Serial No. 161,388.

To all whom it may concern:

Be it known that I, WILLIAM V. ORR, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Suction Cleaning Devices, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to suction cleaners and particularly that type of suction cleaner employed for indoor domestic use in cleaning floors, floor coverings, draperies, upholstery and the like, and has specific reference to that type of suction cleaners embodying a rotary fan in a movable casing, an inlet mouth for the collection of dust, refuse and other foreign matter from the surface to be cleaned, and an outlet from the casing leading to a refuse collection receptacle.

In the operation of suction cleaners of the prior art the fan rotating parts often become clogged due to the collection and lodgment of refuse matter around the fan chamber. This clogging is particularly noticeable in suction cleaners of the type in which the fan comprises a disk and a plurality of fan blades on one side thereof, there being a marked tendency for the refuse to collect between the disk and adjacent wall of the casing and there serve as a brake against the fan disk. The object of my invention is a suction cleaner in which these disadvantages are obviated and the lodgment of refuse matter around the fan rotating parts is reduced to a minimum or entirely eliminated. Another object of the invention is the provision of means for maintaining the moving parts of the suction cleaner in a free and easy running condition.

For a better understanding of my invention and of the above enumerated and other advantages which will hereinafter appear, reference may be had to the drawings accompanying this application, Figure 1 of which is a side elevation of a suction cleaner illustrating one embodiment of my invention, with certain of the parts broken away and illustrated in section; Fig. 2 is a horizontal sectional view through certain parts of the cleaner embodying a slightly modified form of my invention; Fig. 3 is a horizontal sectional view similar to Fig. 2 showing another modification of my invention; Fig. 4 is a view similar to Fig. 1 of a suction cleaner embodying another modification of my invention; Fig. 5 is a detail view of an element illustrated in Fig. 4; and Fig. 6 is a front view of the fan blades and supporting disk.

Referring to the drawings a suction cleaner is illustrated which embodies a driving motor mounted in a motor casing 1, a cylindrical fan casing 2, a fan shaped nozzle 3, and an operating handle 4. The operating handle 4 may be suitably attached to the motor casing 1 in any usual manner this attachment not being illustrated or forming a part of this application. The suction cleaner as a whole is mounted on rollers or casters 5 and in operation the suction cleaner is run along the surface to be cleaned with the mouth of the nozzle 3 running along adjacent the surface, the motor and fan operating to suck the refuse matter up through the nozzle 3 into the fan chamber, and thence out through an outlet 6, the outlet 6 leading to a collection bag or other refuse receptacle in a well understood manner.

On the forward end of the motor casing 1 is mounted a circular plate 7 which serves as a partition between the motor chamber and the fan chamber in the fan casing 2. This plate also serves as a bearing for the motor shaft 8 which projects through and beyond the plate 7 and on the overhanging end thereof the fan rotating parts of the fan structure are mounted. This fan embodies a plurality of fan blades 9 which are secured to and project outwardly from a fan disk 10, this fan disk 10 having in its center an aperture for the reception of the overhanging end of the motor shaft 8 to which the fan is fixedly attached. The bearing for the motor shaft on the stationary circular plate 7 projects outwardly toward the fan structure and serves as a stop to limit the inward movement of the fan disk 10. There is therefore provided between the stationary plate 7 and the fan disk 10 an annular chamber 11 around the motor shaft bearing; and this chamber 11 is inclosed and its outlet restricted by means of an annular flange or rim 12 projecting outwardly from the stationary plate 7 and embracing the fan disk 10, sufficient play being provided between the periphery of the fan disk 10 and the flange 12 to insure unobstructed rotary movement of the fan blades and disk. Heretofore difficulties have been experienced in

suction cleaners of the prior art due to refuse and other foreign matter becoming lodged in the chamber 11 between the closing plate 7 and the fan blade plate 10. This refuse matter often caused clogging of the fan rotating parts and the clogging was aggravated in suction cleaners embodying a fan disk 10 of a thin structure, the thin fan disk due to the air pressure created by the fan blades and due to the high rotary speed becoming distorted and thereby rubbing against the refuse matter collected between the stationary and the rotating parts. I have found that by providing the annular flange or rim 12 around the periphery of the plate 7 and having it project forwardly and embrace the periphery of the disk 10 and at the same time providing ventilating openings 13 in the plate 7, the tendency for the collection of dust and other foreign matter in the chamber 11 is greatly lessened. The plate 7 should always have ventilating openings therein of sufficient capacity to freely admit air currents to the chamber 11. Apparently the lessening of the tendency for the collection of foreign matter rearward of the fan plate 10 is due to an artificial draft set up from the motor chamber through the openings 13 in the plate 7 and thence around the periphery of the disk 10 and the flange 12, or there appears to be set up in the chamber 11 an air pressure opposed to that set up by the fan blades 9, this counter pressure being sufficient to prevent the entry of foreign matter from the fan casing 2 into the chamber 11 through the restricted passage around the periphery of the disk 10.

In any event the provision of the restricted passage between the periphery of the disk 10 and flange 12 and the ventilating openings 13 seems to avoid to a great extent the collection of refuse matter in the chamber 11 and I ascribe this result to the creation of a counter current or draft as is indicated. It may be that this air pressure or draft is created by the aspiratory action of the fan rotating parts and I have found that this counter current may be substantially increased by extending the fan blades 9 radially outward on the disk 10 beyond the periphery of the flange 12. This feature of extending the fan blades 9 outwardly beyond the flange 12 is preferably embodied in all the modifications set forth herein, and is best illustrated in Fig. 6.

While the structure illustrated in Fig. 3 has been found to operate successfully, I have found it desirable in some instances to enhance the counter current set up in this structure by incorporating on the rearward side of the fan disk 10 auxiliary fan blades 14 as shown in Fig. 1. These auxiliary fan blades 14 set up an artificial draft from within the motor casing 1 through the ventilating openings 13 and out through the restricted annular opening between the rim 12 and the periphery of the fan disk 10. This artificial counter-current prevents the entry of foreign matter from the fan casing 2 into the chamber 11 through the opening between the flange 12 and the periphery of the disk 10, thus effectually avoiding the difficulties of clogging the rotating parts experienced in prior suction cleaners.

The artificial draft created in the structures illustrated in Figs. 1 and 2 through the motor casing serves also to cool the driving motor, as for instance the electric motor shown, and this is an additional advantage when the suction cleaner is to be operated by power devices instead of by gearing connected up with the floor rollers. In Fig. 2 the partition plate between the motor and the fan chambers is provided with a thickened portion 15 on one side thereof and through this thickened portion is provided a passage 16 registering with an opening in the motor casing 1 for admitting air currents into the chamber 11. In this case the air currents employed for maintaining the chamber 11 clear of refuse and other foreign matter are taken directly from the atmosphere without circulating around the motor. The auxiliary fan blades 14 in Fig. 2 are identical with the fan blades 14 illustrated in Fig. 1.

In Fig. 4 is illustrated another modification of my invention and according to this method of avoiding clogging of the rotating parts by refuse matter collected from the surfaces to be cleaned I position in the chamber 11 around the motor shaft bearing and between the stationary plate 7 and the fan disk 10 a fly member 17. This fly member 17 is provided with an elongated slot 18 therein and this slot 18 is sufficiently large to provide for a free and easy play around and about the motor shaft bearing. The fly member is preferably of a light, tough and wear-resisting material and I have found fiber to be very satisfactory. Apparently the structure illustrated in this figure operates in a similar manner to that set forth in connection with Fig. 3, and in addition thereto the fly member 17 being loosely mounted around the motor shaft bearing is drawn around by friction due to contact with the rotating disk 10 so that in addition to the air currents induced as set forth in connection with Fig. 3, the member 17 acts as a sort of renovating and polishing device which effectually maintains the rotating parts of the fan and particularly the chamber 11 free from dust and other refuse matter. The fly member may also tend to create a draft through the chamber 11.

While I have set forth my invention in the specific manner required by the patent

statutes, it is understood that the claims hereto attached are not to be limited to the specific devices shown in the drawings, except as is specifically set forth therein, but are to be given an interpretation commensurate with the scope of the invention.

Having thus described my invention, what I claim is:—

1. In a suction cleaner, the combination of a fan casing and a rotatable fan therein, said fan comprising a supporting disk, and a plurality of fan blades carried thereby and projecting therebeyond, said casing having a recess in which said disk is movably fitted, and the tips of said blades overhanging the mouth of said recess.

2. In a suction cleaner, the combination of a fan casing and a rotatable fan therein, said fan comprising a supporting disk and a plurality of fan blades projecting from and extending radially beyond said disk, and an annular flange embracing said disk and terminating immediately beneath said blades whereby is prevented the lodgment of refuse matter in the space rearward of said disk.

3. In a suction cleaner, the combination of a fan casing, a rotatable fan therein, said fan comprising a supporting disk spaced from an adjacent wall of the casing to form an annular chamber therebetween, and a movable member between said disk and the casing wall adjacent thereto, said fan casing having an axial inlet and a peripheral outlet, said adjacent wall having ventilating openings and an annular flange projecting axially therefrom and embracing said fan disk, said fan blades extending radially outward from the disk beyond said annular flange.

4. In a suction cleaner, the combination of a fan casing, a rotatable fan therein, said fan comprising a supporting disk spaced from an adjacent wall to form an annular chamber therebetween, said adjacent wall also having an annular flange embracing said fan disk, and the ends of said blades projecting radially beyond said flange.

5. In a suction cleaner, the combination of a fan casing, a rotatable fan therein, said fan comprising a supporting disk spaced from an adjacent wall to form therebetween a restricted annular chamber, and a plurality of fan blades on the opposite side of said disk, said fan casing having an axial inlet and a peripheral outlet, said adjacent wall having ventilating openings therein and an annular flange embracing said fan disk but not embracing the fan blades, said fan blades extending radially beyond said flange, and rotatable means in the annular chamber for the purpose described.

6. In a suction cleaner, the combination of a fan casing, a rotatable fan therein, said fan comprising a supporting disk spaced from an adjacent wall to form therebetween a restricted annular chamber, and a plurality of fan blades on the opposite side of said disk, said fan casing having an axial inlet and a peripheral outlet, said adjacent wall having ventilating openings and an annular flange embracing said fan disk, and a loosely mounted fly member encircling the fan shaft and located in the annular chamber, for the purpose described.

7. In a suction cleaner, the combination of a fan casing, a rotatable fan therein, said fan comprising a supporting disk spaced from an adjacent wall of the casing to form therebetween an annular chamber, and a plurality of fan blades on the opposite side of said disk, said casing having an axial inlet and a peripheral outlet, said adjacent wall having ventilating openings therein and an annular flange embracing said fan disk but not embracing the fan blades, said fan blades extending radially beyond said flange, and a loosely mounted fly member located in the fan casing and adapted to be rotated by frictional contact with the rotatable fan disk for the purpose described.

8. In a suction cleaner, the combination of a motor casing, a fan casing, said casings being separated from each other by means of a ventilated partition wall, a rotatable fan in said fan casing comprising a supporting disk spaced from said partition wall to form therebetween an annular chamber, and a plurality of fan blades on the opposite side of said disk, and a fly member loosely mounted around the fan shaft and within the annular chamber for the purpose described.

9. In a suction cleaner, the combination of a motor casing, a fan casing, a ventilated partition wall between said casing chambers, a rotatable fan in said fan casing comprising a supporting disk spaced from said partition wall to form therebetween an annular chamber, and a plurality of fan blades on the opposite side of said disk, said partition wall having an annular flange embracing said fan disk, and a loosely mounted fly member encircling the fan shaft and located within said annular chamber for the purpose described.

10. In a suction cleaner, the combination of a motor casing, a fan casing, a partition wall separating the two casing chambers, a rotatable fan in said fan casing comprising a supporting disk spaced from said partition wall to form therebetween an annular chamber, and a plurality of fan blades on the opposite side of said disk, said partition wall having ventilating openings therein and having also an annular flange embracing said fan disk but not embracing the fan blades, said fan blades extending radially beyond said flange, and a loosely mounted fibrous fly member encircling the

fan shaft and located within said annular chamber for the purpose described.

11. In a suction cleaner, the combination of a motor casing, a fan casing, said fan casing having a central axial inlet and a peripheral outlet, a ventilated partition wall between the casing chambers, a rotatable fan in said fan casing comprising a supporting disk spaced from said partition wall to form therebetween an annular chamber, and a plurality of fan blades on the opposite side of said disk, said partition wall having projecting therefrom an annular flange embracing said disk, and a loosely mounted fly member encircling the fan shaft and located within the annular chamber adapted to be driven by frictional contact with the fan disk for the purpose described.

12. In a suction cleaner, the combination of a fan casing and a rotatable fan therein, said fan comprising a supporting disk and a plurality of fan blades on one side thereof, said disk being spaced from the adjacent wall of the casing to form therebetween an annular space, said wall having ventilating openings therein and an annular flange for restricting the passage around the periphery of the disk, said fan blades extending radially out beyond said flange whereby a counter current is set up through said annular chamber out through the restricted passage into the fan chamber.

In testimony whereof, I hereunto affix my signature.

WILLIAM V. ORR.