Jan. 31, 1933. F. M. CASE 1,895,507

SUCTION CLEANER

Filed Jan. 2, 1929 2 Sheets-Sheet 1

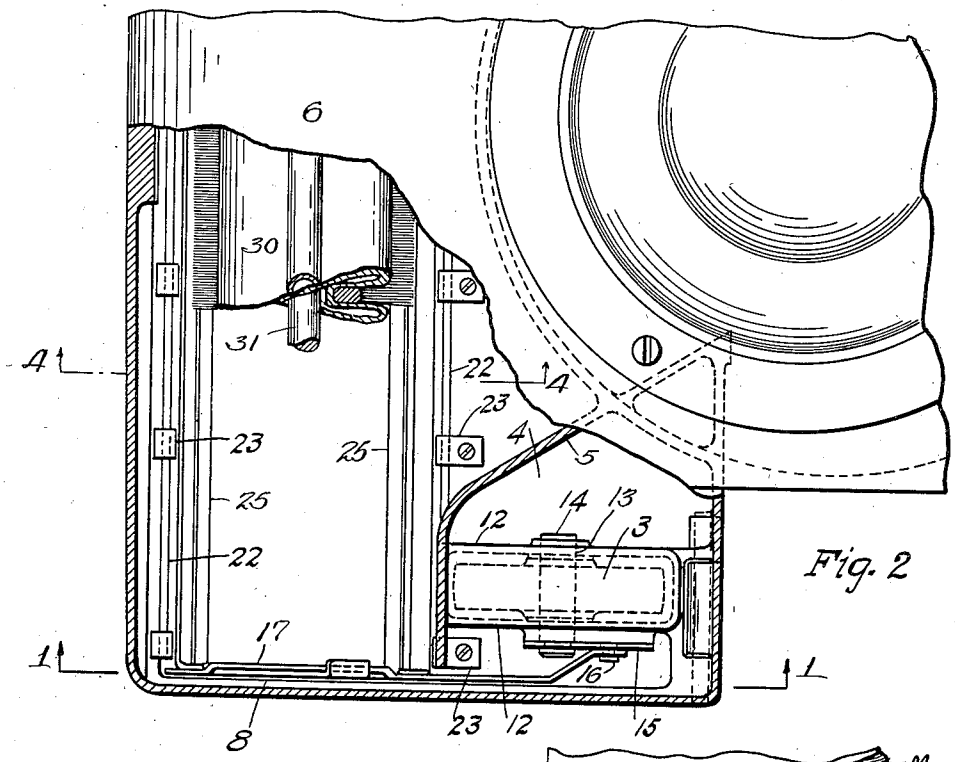
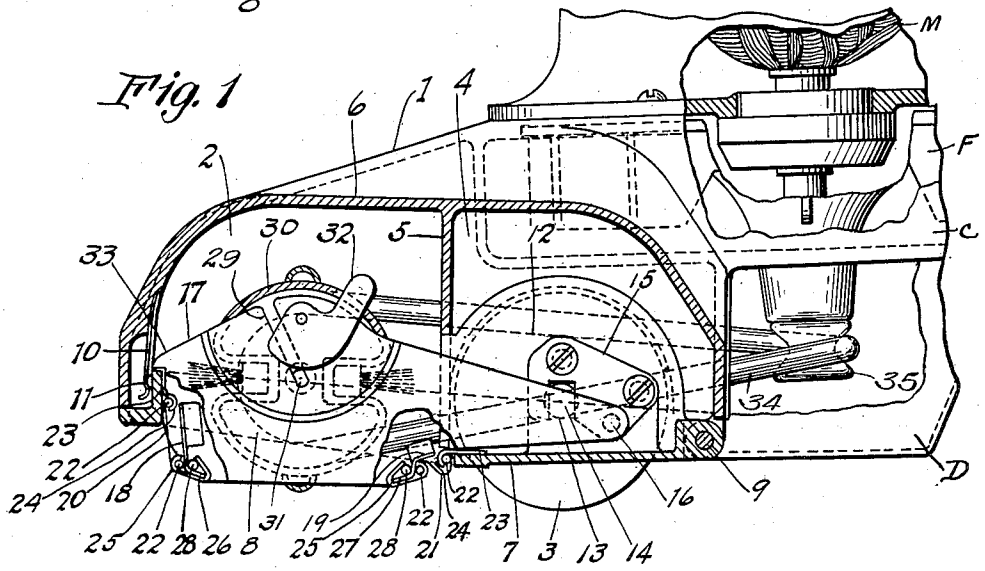


Fig. 2

Fig. 1



INVENTOR
Francis M. Case
BY H. S. Dinaree
ATTORNEY

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SUCTION CLEANER

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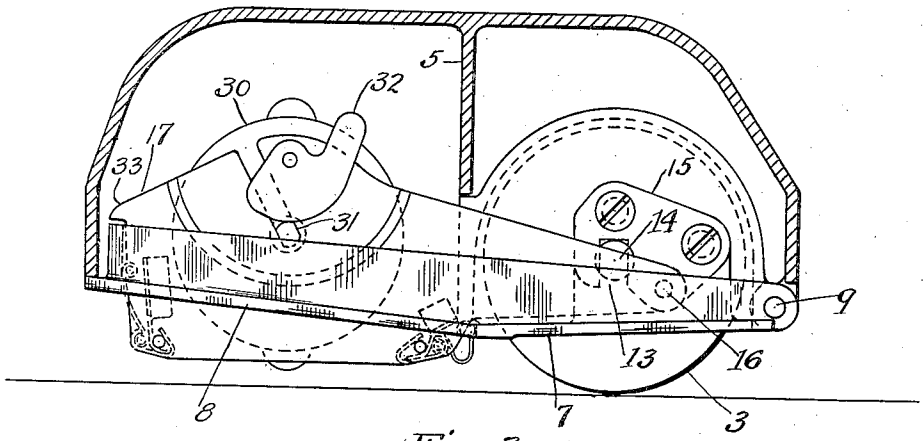


Fig. 3

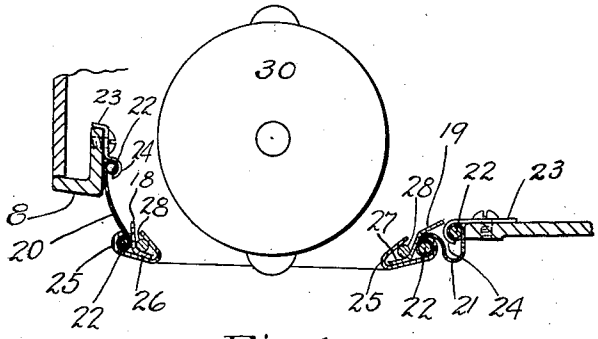


Fig. 4

INVENTOR.
Francis M. Case.
BY
Harry S. Demarest
ATTORNEY.

Patented Jan. 31, 1933 1,895,507

UNITED STATES PATENT OFFICE

FRANCIS M. CASE, OF CLEVELAND, OHIO, ASSIGNOR TO THE HOOVER COMPANY, A CORPORATION OF OHIO

SUCTION CLEANER

Application filed January 2, 1929. Serial No. 329,763.

This invention relates to improvements in suction cleaners and has for its object the provision of a superior suction nozzle therefor. A further object is the provision of a cleaner nozzle of simple and novel construction adapted to so function that greatest cleaning efficiency is obtained through the use of high vacuums. Still another object is the provision of a nozzle adapted to be at all times in working contact with the surface undergoing cleaning through its automatic height adjusting features. A still further object is to provide a nozzle construction for a suction cleaner in which the nozzle lips as well as the agitator positioned in the nozzle are movable relative thereto and are positioned by the variations in nozzle vacuum in the operation of the cleaner.

Other and more specific objects of the invention will become apparent from a consideration of the following description and the drawings attached in which a preferred embodiment of the invention has been disclosed.

In the drawings in which like reference characters refer to like parts throughout, Figure 1 is a cross sectional view on the line 1—1 of Figure 2 with certain parts broken away and illustrates a suction cleaner embodying the present invention.

Figure 2 is a top view of a suction cleaner embodying the invention with certain parts broken away.

Fig. 3 is also a view upon the line 1—1 of Figure 2 but shows the parts unbroken.

Fig. 4 is a cross section upon the line 4—4 of Figure 2.

In the efficient suction cleaner it is necessary that the nozzle lips be at all times in sealing relation with the surface covering being cleaned in order that the inrushing air to the nozzle will be drawn through the pile or nap of the covering and also that the covering may be lifted from the surface proper that the agitating means may perform their work thereon. The difficulty of maintaining the nozzle lips in sealed relation with the covering when surface variations have raised and lowered the supporting wheels and consequently the nozzle has heretofore not been overcome successfully. The incorporation of this invention in the suction cleaner construction insures at all times a sealing contact with the surface covering as hereinafter described.

Referring again to the drawings reference character 1 indicates generally a suction cleaner in which the invention is embodied and comprises a common motor driven cleaner encompassing among other parts a motor M, a fan F and fan chamber C which is connected to the cleaner nozzle by a housing D. Reference character 2 indicates the nozzle which extends transversely across the main casing 6 of the machine. Also formed into the main casing 6 and directly in the rear of the nozzle 2 at each side thereof and separated therefrom only by walls 5—5 are pockets 4—4, of which only one is shown in the drawings which are adapted to house the supporting wheels for the forward end of the cleaner.

Pivotally connected at 9 to the rear edge of the casing 6, which forms the nozzle 2 and the pockets 4—4, is a bottom plate 7 having side arms 8—8 which extend forward from the pivot point 9, closely adjacent and underlying the sides of casing 6, through the walls 5, 5 into the nozzle 2 where they conform to the shape of the forward edge of casing 6 and extend across the nozzle forming a continuous member. Securing means 10 and 11, comprising a spring member having a shoulder carried by casing 6 and a projection on the connecting portion of the arms 8—8 coact to hold the arms 8—8 in the raised position within the nozzle in which position the plate 7 and the arms 8—8 define the nozzle mouth.

The bottom plate 7 extends transversely between the arms 8—8 and completely closes the bottoms of the pockets 4—4 and that part of the nozzle 2 lying between the spaced walls 5—5. Upstanding housings 12—12 in each wheel pocket are formed on the plate 7 which serve to enclose the nozzle supporting wheels. A bore 13 is formed in each of the side walls of the wheel housing which receives and seats the axle 14 of the supporting wheel positioned therein. The forward portion of each wheel housing 12 is formed as a vertical wall which,

when the plate 7 is in its uppermost or operative position, fits within a cutout section of the wall 5 and so serves as a part of that wall thereby permitting the plate 7 and housings 12—12 to be swung down from the nozzle without interference from the walls 5—5.

Secured to the outer side wall of each housing 12 is a plate 15 which functions as a retaining means for the pin 14 and also as a seat for the pivot pin 16 upon which a lip-carrying arm 17 is pivoted.

The arms 17—17 on opposite sides of the nozzle extend forward from their pivot points 16—16 into the nozzle where they are connected by a forward transverse member 18 having a lower edge 26 which extends downwardly therefrom and which functions as a nozzle lip. Connecting the member 18 in substantially air tight or sealed relation to the transverse connecting portion of arms 8—8 is a flexible sealing strip 20, which, while performing the function related, permits relative movement between the two parts. A similar strip 21 performs the same function for the rear lip forming member 19 which includes a bottom portion 27 in connecting it with the forward edge of the bottom plate 7.

The flexible strips 20 and 21 are removably held in position in the assembled relation through the following means: Along each edge of each strip a wire or rod 22 is permanently fastened, as by sewing. Spring retaining clips 23—23 are fixed to the front transverse connection of the arms 8—8 and to the forward edge of the plate 7 which are provided with curved ends forming seats 24—24 in which the wires 22 at the upper sides of the respective strips are clamped upon being shoved therein through bending the springs outwardly from the surface adjacent thereto. The lower side of each strip is secured to the nozzle lips 18 and 19 through having the wires 22 clamped against said lips by an enclosing metallic strip 25 which is held in place relative thereto by a binding wire 28 inserted therebetween as shown, and which may be withdrawn through openings in the arms 17—17. The strips 25—25 completely enclose the lower extremities of the lips 18 and 19 and, being hard and smooth on their undersides, provide suitable surface-contacting areas for the lips.

The arms 17—17 are further provided with slots 29—29 into which the ends of the rotor supporting pin or shaft 31 of the rotor 30 seats and suitable means for retaining the pin in the slot, such as cam means 32, may be used to prevent unintentional displacement. The rotor, which is driven from the motor pulley 35 through a belt 34, is supported entirely by the arms 17—17 and is free to move therewith, and so with the nozzle lips 18 and 19, within the nozzle.

The foregoing invention provides a cleaner structure having a floating frame or sub-nozzle therein which has floating lips in substantially air-tight relation with the nozzle proper. The lips 18 and 19 are in sealed relation with respect to the mouth of the nozzle as defined by the bottom plate 7 and the transverse connection of arms 8—8 through the use of the sealing strips 20 and 21, as above described, and the clearance between the arms 8—8 and the side arms 17—17 which provide the connecting seals between the lips and also the support therefor is of such magnitude as to make the air leakage therebetween substantially negligible.

In the operation of the machine as the cleaner motor is started the lips are found resting upon the surface covering, the arms 17—17 being pivoted to their lowest position or that in which the forward portion 33 of each arm 17—17 overhangs and rests upon the transverse connection of arms 8—8. The close contact of the lips with the surface covering prevents a large inrush of air into the nozzle in response to the decrease in pressure created therein by the action of the fan and consequently the pressure in the nozzle continues to decrease to a point where the lips and the surface covering therebetween, acting in the manner of the moving side of a bellows, are lifted toward the nozzle proper. This upward movement continues until the resistance of the surface covering to a greater displacement equals the pull upward at which time equilibrium is reached. At that point however the desired lifting of the covering to effect efficient cleaning has been accomplished. It is apparent that the lips will maintain this sealed relation with the surface covering independently of height variations in the nozzle proper for upon the seal being broken gravity will at once pull the lips downward and contact will be made again and the vacuum again built up resulting in a recurrence of the lifting effect.

I claim:

1. A suction cleaner comprising a motor, a fan, and a nozzle carried at a fixed elevation above the surface undergoing cleaning, arms pivoted outside said nozzle and extending thereinto, transverse members connecting said arms within said nozzle and forming lips and flexible wall members connecting said lips to said nozzle in air tight relation.

2. A suction cleaner comprising a motor, a fan, and a nozzle casing providing a nozzle and wheel pockets, a base member pivoted at the rear of said wheel pockets comprising forwardly extending arms extending into said nozzle, a transverse plate extending between said arms and substantially closing said wheel pockets, wheels carried by said plate and extending into said wheel pockets and nozzle lips pivotally connected to said base member, said lips being positioned at the mouth of the nozzle and being adapted to be moved relative thereto as the covering under-

going cleaning is moved vertically by the nozzle suction.

3. In a suction cleaner, a nozzle, a frame within said nozzle forming the nozzle mouth and having a portion pivoted in the rear of the nozzle, and securing means to secure said frame in operative relation with respect to the nozzle, arms pivotally mounted on said frame outside the nozzle and extending into said nozzle and lips in the nozzle mounted on said arms and flexible walls connecting said lips to said frame.

4. In a suction cleaner, a casing including a nozzle, means movably supporting the casing in spaced relation to the supporting surface, a suction-producing means connected to said nozzle, a freely floating frame within said nozzle, a lip formed on said frame and an air seal between said lip and said nozzle, said frame being freely movable vertically relative to said nozzle with the movement of a surface covering undergoing cleaning caused by suction variations in said nozzle.

5. In a suction cleaner, a casing including a nozzle, suction-producing means connected to said nozzle, a freely floating frame within said nozzle, spaced lips on said frame, air seals between said lips and said nozzle and an agitator carried by said frame and positioned between said lips, said frame and said agitator being freely movable vertically relative to said nozzle with the movement of a surface covering undergoing cleaning caused by suction variations in said nozzle.

6. In a suction cleaner, a casing including a nozzle, suction-producing means connected to said nozzle, a freely floating frame within said nozzle, spaced lips on said frame, air seals between said lips and said nozzle and a rotary agitator mounted on said frame parallel to said lips and extending substantially into the plane thereof, said frame and said agitator being freely movable vertically relative to said nozzle with the movement of a surface covering undergoing cleaning caused by suction variations in said nozzle.

7. In a suction cleaner having suction-producing means, a nozzle having a mouth, supporting means for said nozzle spaced therefrom and supporting said nozzle above the surface undergoing cleaning, and freely floating lips lying within the plan confines of said nozzle in sealed relation with the mouth thereof and adapted to lie upon a surface covering undergoing cleaning and to be raised and lowered therewith upon nozzle suction variations.

8. In a suction cleaner having suction-producing means, a nozzle having a transversely extending mouth, supporting means for said nozzle positioned in the rear thereof, a nozzle-pressure-responsive frame floatingly mounted relative to said nozzle, and nozzle lips carried by said frame adapted to rest upon a surface covering undergoing cleaning so that said frame is moved with said covering upon its movement when caused by nozzle suction variations.

9. In a suction cleaner having suction-producing means, a nozzle having a mouth, supporting means for said nozzle spaced therefrom, a frame freely floating in said nozzle, lips carried by said frame in sealed relationship with said nozzle and adapted to lie upon the covering undergoing cleaning, and an agitator mounted on said frame between said lips, said frame and agitator being adapted to automatically move to a position to contact the surface covering undergoing cleaning and to be raised with said covering by the nozzle suction.

Signed at Cleveland in the county of Cuyahoga and State of Ohio the 27th day of Dec., A. D. 1928.

FRANCIS M. CASE.