Feb. 19, 1924. 1,483,972

H. E. HOOVER

SUCTION CLEANER

Filed June 10, 1918 3 Sheets-Sheet 1

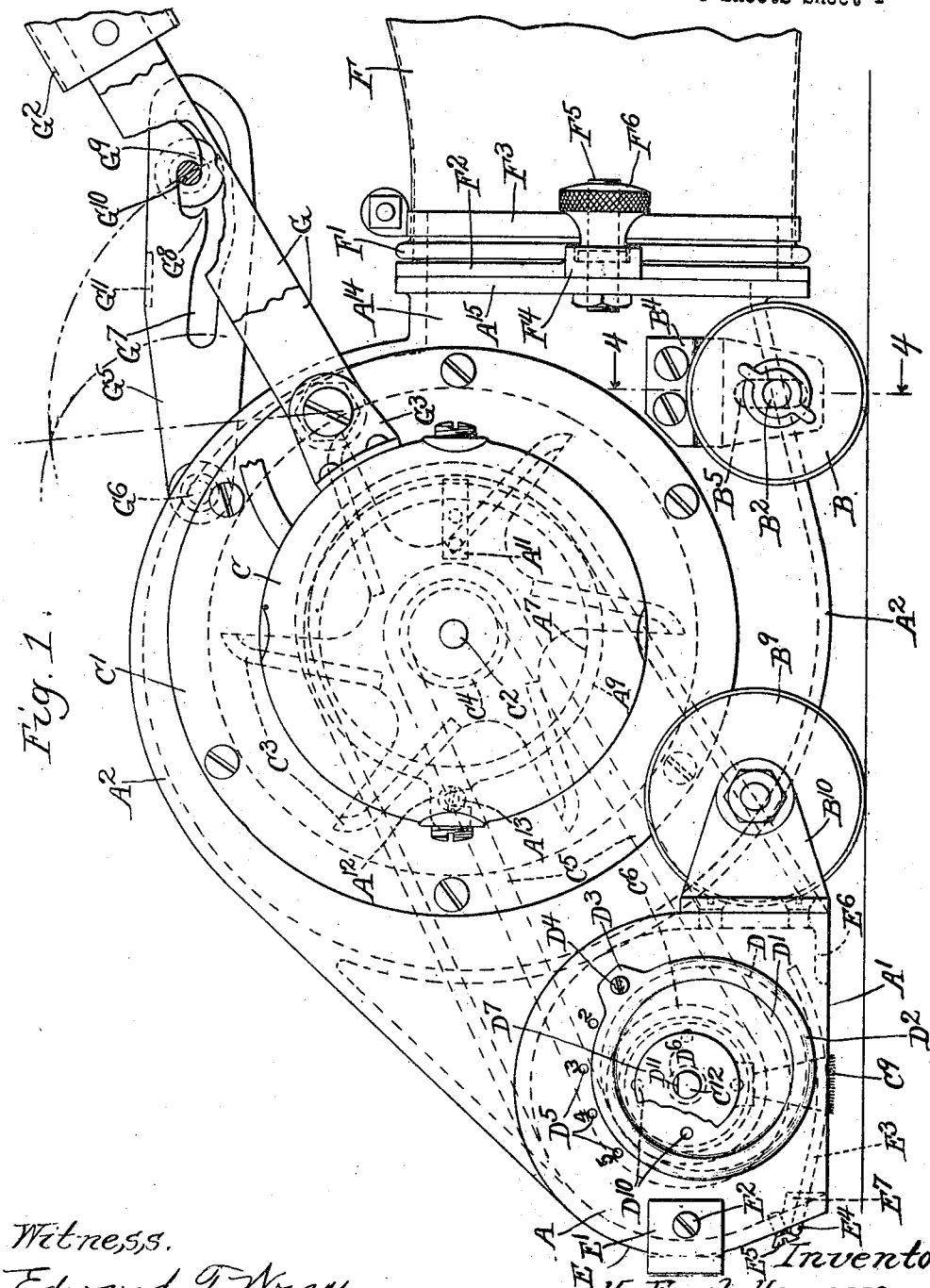


Fig. 1.

Witnesses.
Edward T. Wray.

Inventor.
H. Earl Hoover.
By Parker & Carter
Attorneys.

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SUCTION CLEANER

Filed June 10, 1918 3 Sheets-Sheet 2

Fig. 2.

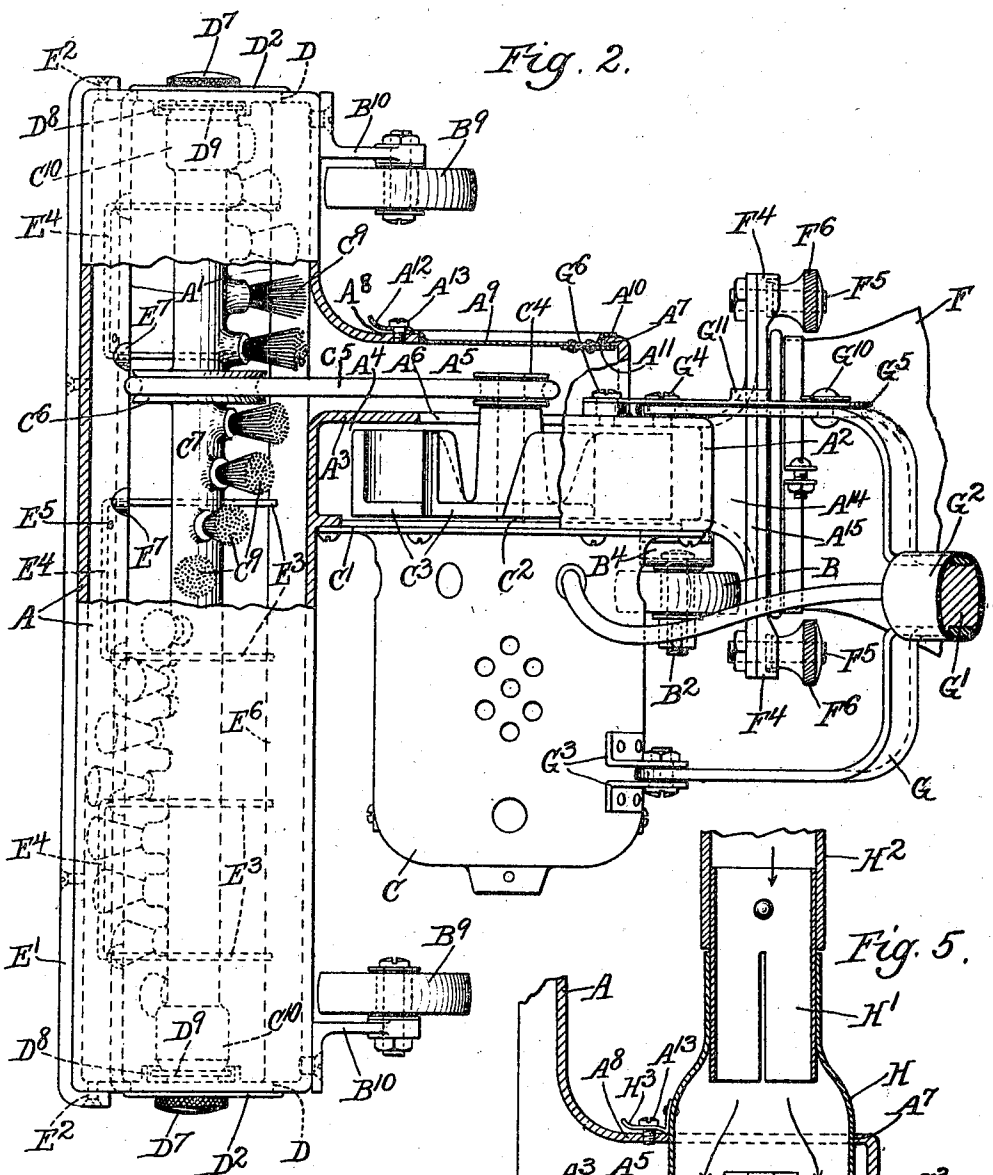


Fig. 5.

Witness.
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SUCTION CLEANER

Filed June 10, 1918 3 Sheets-Sheet 3

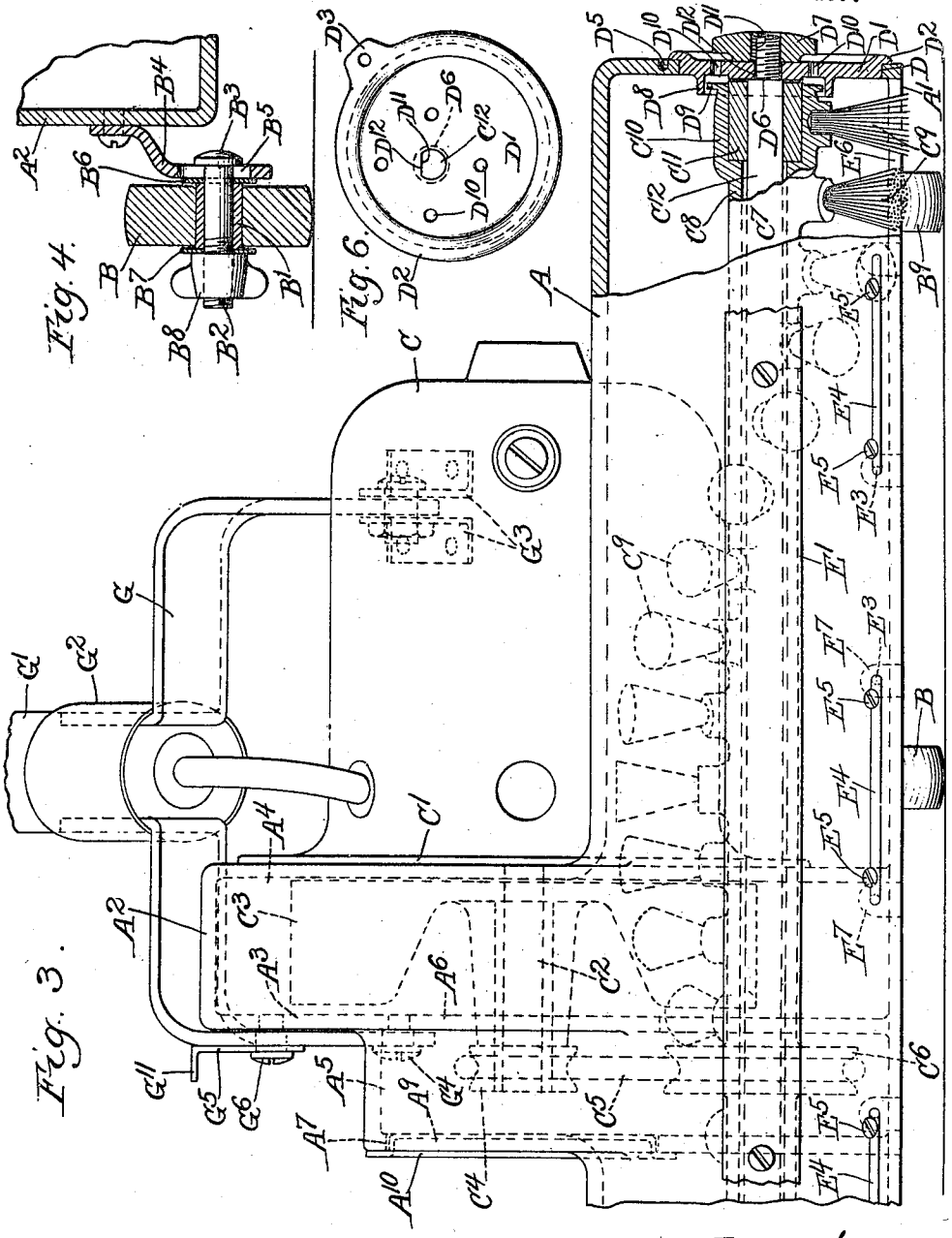


Fig. 3.

Fig. 4.

Fig. 6.

Witness.
Edward T. Wray.

Inventor.
H. Earl Hoover.
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Attorneys.

Patented Feb. 19, 1924. 1,483,972

UNITED STATES PATENT OFFICE.

HOWARD EARL HOOVER, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE HOOVER COMPANY, OF NORTH CANTON, OHIO, A CORPORATION OF OHIO.

SUCTION CLEANER.

Application filed June 10, 1918. Serial No. 239,090.

To all whom it may concern:

Be it known that I, HOWARD EARL HOOVER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Suction Cleaners, of which the following is a specification.

My invention relates to improvements in suction sweepers. It has for one object to provide a new and improved form of sweeper which will be low in height and therefore well adapted to travel under furniture for cleaning purposes, which can be easily assembled and disassembled, light in weight, durable, smooth running and inexpensive to manufacture. Other objects of my invention will appear from time to time in the specification.

The invention is illustrated more or less diagrammatically in the accompanying drawings wherein,

Figure 1 is a side elevation;

Figure 2 is a plan view with parts in section;

Figure 3 is a front elevation with parts in section;

Figure 4 is a section along the line 4—4 of Fig. 1;

Figure 5 is a sectional view showing the hose pipe connection in place.

Figure 6 is an end view of the end closing cap and shaft with nut removed;

Like parts are indicated by similar figures in all the drawings.

A is a laterally extended elongated suction nozzle housing having a downwardly extended open suction mouth A^1. Integral with this housing and extending rearwardly from it is a fan casing A^2. This fan casing is open on one side as indicated and is bounded on the other side by a wall A^3 which divides the casing into the fan chamber A^4 and a suction chamber A^5, the wall A^3 being apertured as at A^6 in register with an aperture A^7 in the outer wall A^8 of the suction chamber. This aperture is closed by a removable cap A^9 flanged as at A^{10} held in position by the clip member A^{11} and the spring A^{12} engaging the screw A^{13}. Extending rearwardly and tangentially from the fan chamber is a discharge passage A^{14} terminating in an extended flange A^{15}.

B is a roller or wheel mounted for rotation on a cylindrical sleeve B^1. Through this cylinder sleeve is passed a stud B^2 having a head B^3 adapted to engage a bracket B^4 projecting outwardly from the housing A^2. This bracket B^4 is slotted as at B^5. A washer B^6 on the stud B^2 engages the end of the sleeve B^1. A similar washer B^7 engages the other end of the sleeve and is engaged by a nut B^8 screw-threaded on the stud so that tightening up of this nut compresses the washer between the nut and the head and locks the whole assembly in adjusted position along the slot B^5 with respect to the bracket B^4 thereby making possible to raise or lower the height of the rear end of the suction cleaner from the floor and thereby raise and lower the suction mouth toward or from the floor by rotating it about the supporting wheels B^9 B^9 which are rotatably mounted on brackets B^{10} B^{10}. These wheels are not adapted to be adjusted in height but the studs are present as in connection with the wheel B and the sleeve washer arrangement is the same so that the wheels may be locked in position by compression of the sleeve, but this does not affect the rotation of the wheel on the sleeve. Attention is called to the fact that the wheels adjacent the nozzle are turned inward, and that the suction mouth and the nozzle overhang a considerable distance beyond the front supporting wheels, thereby making it possible to run the cleaner along the edge of a rug without danger of the wheels dropping off the rug onto the floor or causing the nozzle to bind on the carpet or rug itself.

C is a motor housing closed at one end as indicated, and provided at the other end with a flange C^1 adapted to be fastened on to the open side of the fan housing A^2 to close it. Within this motor housing is a motor not here shown, but it drives a fan shaft C^2. This shaft carries the fan C^3 in the fan housing or chamber A^4, and also a pulley C^4 located within the suction chamber A^5. This pulley C^4 drives an open belt C^5 which in turn travels on a pulley C^6 on the brush C^7 and rotates it. This brush C^7 is made up of a hollow cylindrical brush body C^8 having bristle bunches C^9 arranged in a single continuous spiral row extending substantially

once about the brush and reaching from end to end thereof. This brush body is enlarged at the ends as at C^{10}, and these enlarged ends or cups contain the oilless bearing sleeves C^{11}, which bearings rotate on the brush shaft C^{12}.

The end walls of the suction nozzle are apertured as at D and each aperture is closed by a removable cap D^1 which cap is flanged as at D^2. Each flange has projecting radially outwardly therefrom at one point a lug D^3 provided with a stud D^4 in register with a series of holes D^5 arranged about the periphery of the aperture D. The shaft C^{12} passes through one of these caps D^1 at each end and is shouldered as at D^6 to limit movement of the cap and shaft. D^7 is a nut screwed on a reduced end of the shaft C^{12}, whereby by tightening it up the cap and shaft may be rigidly fastened together.

The ends of the shaft C^{12} are flattened at either end as at D^{11} and these flattened ends engage the flat sided or irregular shaped holes D^{12} in the caps D^1 so that when you rotate the cap at one end of the shaft you rotate the cap at the other end through the same angle and it would be possible to dispense with the means for holding one of the caps against rotation and rely on the shaft passing through to keep it from rotating when the one on the other end is held but, of course, it is better to make them both the same and thus make assurance doubly sure.

The fact that the ends of the shaft are shouldered makes it impossible for too great tightening of the nuts on the shaft to jamb the caps D^1 against the ends of the bearings. Thus, no matter how tight you lock the parts, the brush will always be free to rotate, and when the nuts are loose the caps will be free to rotate with respect to the shaft. It will be noted that the shaft does not pass through these caps at the center but at eccentric points so that a rotation of these caps will result in moving the shaft up or down to raise or lower the brush toward or from the floor for the purpose of adjustment. This of course can only be done when the nuts are released and the caps are pulled out enough so that the pins on the lugs come out of the holes to permit rotary movement or adjustment. D^8 is an annular flange extending inwardly from each cap surrounding the flange D^9 on the end of the brush which flange D^9 is located within the cup thus formed. D^{10}, D^{10} are perforations through the caps whereby a blast of air may enter into the space between the end of the brush and the cap, and thence out between the two flanges to assist in keeping clean the bearings upon which the brush is mounted, and preventing fouling or binding by foreign matter which might otherwise work into the bearing space and lock the parts together, or interfere with the rotation of the brush.

It will be observed that the front wall of the suction nozzle housing is curved as at E, that the most forward projecting part of that wall carries a protecting band or furniture guard E^1 held in position by screws E^2, the wall extends rearwardly and downwardly from such projecting part so as to conform more or less to the curve passed over by the ends of the bristle bunches as they rotate. The lower edge of the wall is reinforced as at E^7 and these reinforced portions are perforated to permit passage of the spring brush guard fingers E^3. These fingers are grouped in U-shaped pairs, having a straight base portion E^4 resting against the outer wall of the suction nozzle housing. This assembly is held in position by two screws E^5 engaging the portion E^4 adjacent both ends so that the spring fingers themselves are held in position, project downwardly and rearwardly across the mouth of the nozzle and are then bent upwardly so that they more or less conform to the path travelled by the ends of the bristle bunches. E^6 is a flange which extends forward from the rear wall of the housing beneath the ends of the guard fingers so that it is imposible for rugs or floor coverings to be drawn into the nozzle far enough to interfere with the brush, but such coverings are held by the suction of the fan up against the open mouth and the guard fingers in such position that the brush bristles may act upon them. Obviously merely withdrawing the screws will make it possible to withdraw any pair of fingers independent of any others.

F is a dust bag having an open mouth as indicated, terminating in a bead F^1 and slipped on to a removable flanged sleeve F^2. The open mouth is held on to this flanged sleeve by a clamping or locking ring F^3, and the sleeve itself is held in position against the flange A^{15} by means of ears F^4 through which pass the studs F^5 which in turn are engaged by the thumb nuts F^6 whereby the parts may be clamped in position so that the dust-laden air discharged radially from the fan chamber will be caught in the dust bag.

G is a handle bail. It communicates with a sweeper manipulating handle G^1 and may be made itself in two parts as indicated, bound together by a sleeve G^2 which clamps them onto the end of the sweeper handle. The free ends of the bail are pivoted one of them upon the brackets G^3 G^3 on the motor housing C, the other upon a pin G^4 on the fan housing A^2. G^5 is the handle bail stop. It is pivoted at one end on the stud G^6 on the fan housing. It is provided with an irregular elongated slot G^7, on one side of which are two adjacent hook members G^8 G^9. G^{10} is a pin projecting from the handle bail

headed at each end and adapted to lie within the slot G^7 to limit the movement of the handle bail. It will be understood that the stop rests by gravity on the pin, that the only way to get it out of the position shown in Figure 1 is to lift it up by engaging the foot piece G^{11}. When this is done the handle may be moved clear down into a position where it does not rise above the top of the fan housing, or it may be moved until it stands straight up. As soon, however, as the bail is moved back, it will drop down into the position shown in Figure 1 when the excursion or rocking movement of the handle with respect to the sweeper is more or less limited as is necessary to permit adjustment during operation to suit the height or convenience of the operator.

In order that the device may be used to suck air through a pipe for use with the ordinary type of hand cleaning tool not here illustrated, the cap A^9 is removed and an enlarged coupling member H is put into the opening A^7 and the opening A^6 closing them both and shutting off the suction nozzle from the fan chamber. This coupling member has thrust into it the connecting end H^1 of the suction hose H^2. It is adapted to be held in position by the spring latch H^3 which engages the pin A^{13}. Of course before this connection is made the brush belt will have to be disconnected from the pulley on the fan shaft.

It will be evident that while I have shown in my drawings an operative device, still many changes might be made both in size, shape and arrangement of parts without departing materially from the spirit of my invention and I wish, therefore, that my drawings be regarded as in a sense diagrammatic.

The use and operation of my invention are as follows:—

Because of the fact that the motor is at one side of and behind the suction nozzle and its axis of rotation is parallel with the suction nozzle, the height of the machine is so reduced that it may be run under beds, chairs, tables and the like, where ordinary machines can not be run. In this connection the handle bail is a narrow rigid structure and it may be dropped down so as to fall completely down below the top of the machine. It is thus possible to run clear in under a bed without interference.

The latch or lock for limiting the movement of the handle bail is always in operation. When the pin on the bail is at one end of the slot handle will be held in a substantially horizontal position, when at the other end of the slot the handle will be held in a substantially vertical position. The horizontal position is used when cleaning under a bed or the like. The vertical position is used when storing the sweeper. The two intermediate positions are immediately assumed when you rotate the handle from either one of the extreme positions. The weight of the stop causes it to drop down when it is released so that the hook members on the upper side of the slot come into opposition to the pin and thus limit the rotational movement of handle and bail with respect to the housing to that narrow movement which is desirable during the operation to permit the position of the handle to conform to or to change with the convenience of the operator.

The height of the nozzle above the floor may be adjusted in the obvious way, by releasing the tension on the stud and moving the roller and stud up and down with respect to the slot in the bracket. As soon as the proper position has been reached the stud is tightened up and the parts will be locked in position, and this is done without any possibility of clamping the roller or wheel itself, because the single cylindrical sleeve in the roller takes up the pressure and protects the roller against binding. The roller itself can easily be taken down or renewed by merely pulling out the stud and releasing and separating the sleeve, the roller, and the two washers. This may be done in connection with any one of the three wheels or rollers of the machine.

The adjustment of the height of the brush which is frequently necessary because the brushes wear though the carpet does not, is accomplished by releasing the tension on the central brush shaft. This makes it possible to move both of the caps closing the holes in the ends of the nozzle housing out until the studs carried by them clear the locking holes in the outer end walls. Then these caps may be rotated and since the brush is eccentrically mounted on the cap, the rotation raises or lowers the brush. Obviously in order to get proper operation, the adjustmest must be the same at both ends and therefore these holes will preferably be numbered and you would set the studs at each end into properly numbered holes before tightening them up. This adjustment is so obvious it is not essential to go to the expense of providing any automatic device to compel the operator to make the adjustment the same at both ends, but in order to make assurance doubly sure the ends of the shaft where they go through the adjusting plates are flattened on one side to conform to flattened holes in the plates so that when you rotate one end of the shaft the plate on that end must rotate the other end and the plate on it to the same distance.

When the device is used to clean draperies and the like by means of the suction hose or when it is desired to change or renew or adjust the belt, the cap opposite the end of the fan and motor shaft is removed by releasing

the holding lug and pulling it out, and this leaves an open space through which the operator may work to take the belt off the pulley as he would do if he were going to take the brush out or to insert the adapter as shown in Figure 5.

If he were going to take the brush out he would unscrew one of the nuts at one end, then take off the belt and then pull the brush and shaft out through the other end since of course the only thing that holds the two caps in place is the tension on the shaft. Of course it would be possible to take out all the guard fingers and let the brush come out to the open mouth, but this would be a very difficult proceeding, and this would not be done under ordinary conditions when removing it endwise is so much easier.

I claim:—

1. The combination with a suction hood having apertured ends, of plates mounted for rotation in such apertured ends, a brush shaft extending through said plates and eccentric thereto, a brush mounted for rotation on said shaft and means cooperating with the shaft for holding the plates in position on the hood.

2. The combination with a suction hood having apertured ends, of plates mounted for rotation in such apertured ends, a brush shaft eccentrically mounted on said plates and a brush rotatably mounted on the shaft, means associated with the shaft for abutting one side of the plate, means associated with the shaft, for abutting the other side of the plate, adapted to clamp the plate between the two said means and means for locking the plates in position against rotation.

3. The combination with an open mouthed suction hood having apertured ends, plates mounted for rotation in such apertured ends, a brush shaft extending through said plates and eccentric thereto, a brush mounted for rotation on said shaft, means for exerting a tension on said shaft to draw said plates inwardly to seat and lock them on the hood and means for adjustably holding said plates against rotation.

4. The combination with a suction hood having apertured ends, of plates mounted in such apertured ends, said apertures and plates so shaped that the plate may occupy different relative rotational positions with reference to the aperture, a brush shaft extending through said plates and eccentric thereto, a brush mounted for rotation on said shaft and means for drawing said plates inwardly to seat and secure the plates on the hood, means for adjustably holding said plates against rotation, and means for limiting inward movement of said plates to prevent binding of the brush.

5. In a suction sweeper a hood, a brush mounted for rotation therein, the end of the hood being apertured, in combination with an integral member comprising a combined closure, brush adjuster and brush thread guard.

6. In a suction sweeper, a hood, a brush mounted for rotation therein, the end of the hood being apertured, a unitary combined aperture closure, brush adjuster and bearing thread guard plate removably seated in the aperture and mounted for rotation therein, the brush being eccentrically mounted on the plate and the plate being flanged to overhang the end of the brush, and means for securing the plate in position.

7. In a suction sweeper having a housing with apertured end walls, a brush mounted for rotation therein, a plate seated in the aperture and mounted for rotation therein, the brush being eccentrically mounted on the plate, the plate being flanged to overhang the end of the brush, there being a similar plate at the other end of the brush, a connecting shaft joining said plates adapted to cause each plate to rotate in unison with the other and means including the shaft for drawing said plates inwardly to seat them in and close said apertures.

8. In a suction sweeper, a suction hood the end walls of which are pierced by openings, plates adapted to close said openings, a shaft mounted in said plates, a brush mounted for rotation on said shaft, said plates provided with air inlet holes opposite the end of the brush, means for locking said plates in position longitudinally and means preventing the plates from rotating.

9. In a suction sweeper, a hood whose ends are apertured, rotatably mounted plates for closing said apertures, a brush eccentrically mounted on said plates for rotation, air inlets in the plates opposite the end of the brush to prevent the brush from fouling and means for locking said aperture closure in position.

10. In a suction sweeper, a hood whose ends are apertured, plates for closing said apertures, a brush eccentrically mounted on said plates for rotation, air inlets in the plates opposite the end of the brush to prevent the brush from fouling, means for rotating the plates and locking them in position so as to adjust the height of the brush in the hood and means for securing said plates against turning.

11. In a suction sweeper, a hood whose ends are apertured, plates for closing said apertures, a brush eccentrically mounted on said plates for rotation and air inlets in the plates opposite the end of the brush to prevent the brush from fouling, deflectors associated with said air inlets to govern the direction of flow of the air currents and means for rotating the plates and locking them in position so as to adjust the height of the brush in the hood.

12. In a suction sweeper having a housing

with apertured end walls, a brush support and adjustment member comprising a plate rotatably mounted in said housing, said plate having a brush bearing eccentrically positioned within it and provided with unobstructed openings adjacent said brush bearing.

In testimony whereof, I affix my signature in the presence of two witnesses this 7th day of June, 1918.

HOWARD EARL HOOVER.

Witnesses:
MARION L. INGRAHAM,
MINNIE M. LINDENAU.