April 3, 1934. W. H. KITTO 1,953,350

SUCTION CLEANER

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FIG. 1.

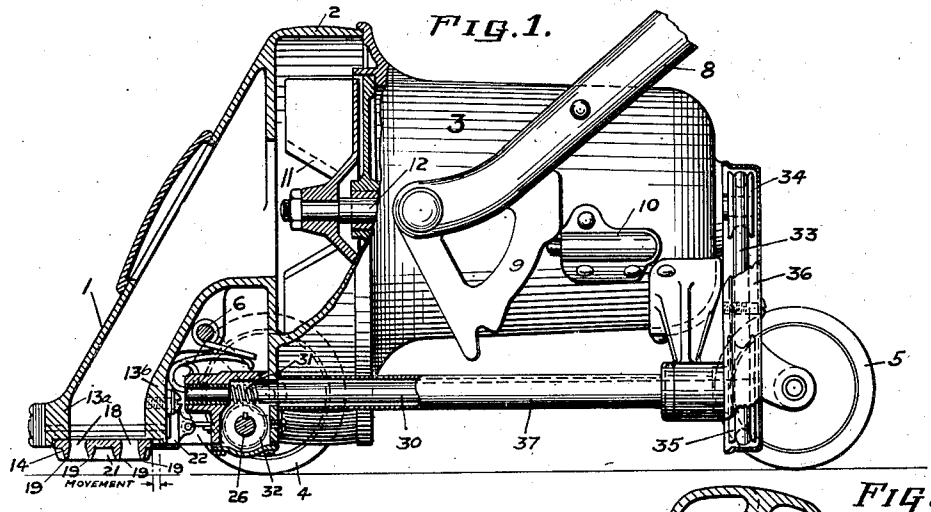


FIG. 3.

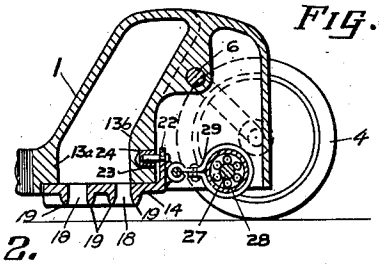


FIG. 2.

FIG. 4.

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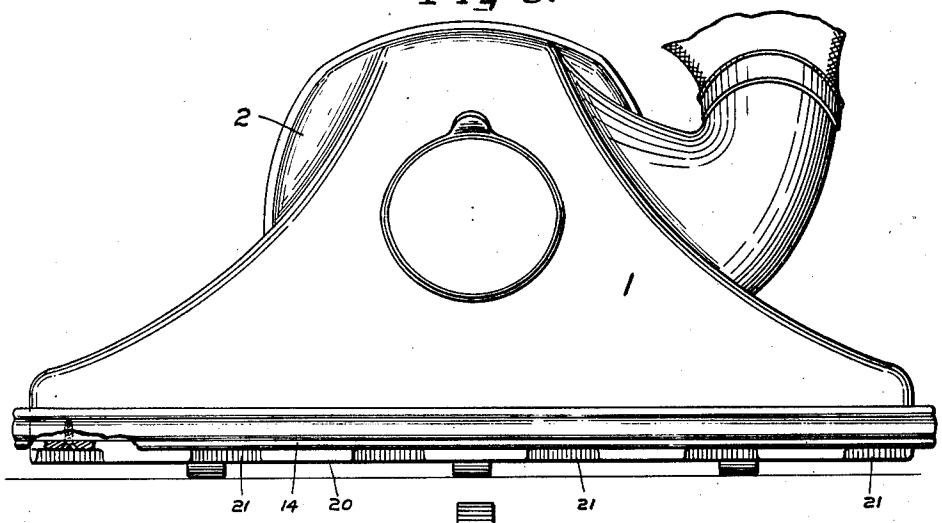
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Fig 5.



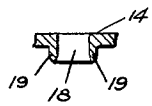


Fig. 7

Fig. 6.

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SUCTION CLEANER

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Application April 1, 1932, Serial No. 602,515

5 Claims. (Cl. 15—13)

The present invention relates to suction cleaners in general and more particularly to a new and novel nozzle construction in suction cleaners. More specifically the invention comprises the provision in a suction cleaner, of an improved surface-contacting agitating construction which in one embodiment is positively actuated to increase the cleaning effectiveness of the machine.

It is an object of the present invention to provide a new and novel surface-covering-agitating construction. It is a further object to provide, in a suction cleaner, a new and novel nozzle mouth construction. A still further object is the provision of a suction cleaner nozzle having numerous surface-contacting lips under which cleaning air is drawn in the operation of the cleaner. These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the annexed drawings to which they relate.

In the drawings in which preferred embodiments of the present invention are disclosed:

Figure 1 is a side view of a modern suction cleaner showing a preferred embodiment of the present invention, with certain parts of the cleaner being broken away for greater clarity;

Figure 2 is a bottom view of the cleaner shown in Figure 1;

Figure 3 is a section upon the line 3—3 of Figure 2;

Figure 4 is a section upon the line 4—4 of Figure 2;

Figure 5 is a front view of a suction cleaner embodying a second embodiment of the present invention;

Figure 6 is a bottom view of the cleaner shown in Figure 5;

Figure 7 is a cross section upon the line 7—7 of Figure 6.

Scientific study of suction cleaner operation discloses that embedded foreign matter in surface coverings is dislodged by passing a pile-deflecting agitating member across the surface of the covering. These observations also disclose that if a stream of cleaning air is passed under this agitating member and between it and the surface covering undergoing cleaning, and therefore through the pile of that covering, that the effectiveness and efficiency of the agitator is greatly increased. In the modern suction cleaner surface covering agitators take many forms. The agitator may be a rotary or reciprocated positively actuated member within the nozzle between the nozzle lips which are parallel transversely extending surface-contacting members in the usual cleaner construction. Some cleaner constructions rely solely upon the surface cleaning accomplished by the cleaning air which flows under the nozzle lips which are themselves so wide as to accomplish substantially no surface agitation. If the nozzle lips of the cleaner are made sufficiently thin, however, they themselves become surface-agitating members. While in the usual cleaner construction the nozzle lips are parallel and extend the entire length of the nozzle defining the sides of the nozzle mouth, such a construction is not the only form which nozzle lips can assume. In a suction cleaner constructed in accordance with the present invention the usual nozzle lips of the aforedescribed type are entirely absent. In their place a multiplicity of angularly disposed thin surface-contacting members are positioned at the mouth of the nozzle and define sides of openings into the nozzle through which cleaning air is drawn. By providing a multiplicity of such lips the number of surface-agitating members is correspondingly increased and the efficiency of the cleaner is similarly effected. In one modification these agitating members are positively actuated thereby further increasing the effectiveness of the cleaner.

Referring again to the drawings, and Figures 1 to 4 in particular, a preferred modification of the invention is disclosed. A suction cleaner whose outer casing comprises a nozzle 1, a fan chamber 2, and a motor casing 3, is shown in the drawings. The machine is movably mounted upon front supporting wheels 4, 4 and a rear wheel 5, the front wheels being pivotally mounted upon a transversely extending crank arm 6 so that they may be adjusted vertically by means indicated generally by the reference character 7 to raise and lower the nozzle 1 relative to the surface covering. As in the usual cleaner construction a pivoted handle 8 is provided through which the operator can exert the necessary force to manually propel the cleaner about upon the surface covering, position-retaining means 9 and 10 being present to retain the handle within certain given positions or ranges of movement. Within the fan chamber 2 is positioned a suction-creating fan 11 which is mounted upon the forward end of the motor shaft 12 which extends from the motor casing 3 into the fan chamber 2. In the operation of the machine the high speed rotation of fan 11 functions to create a reduced pressure in nozzle 1 which effects the drawing of cleaning air into the nozzle and the lifting of the surface covering undergoing cleaning into contact with

the surface-contacting part of the nozzle. The aforedescribed parts of the suction cleaner are those which are found in the usual cleaner construction and no invention is claimed in their general arrangement or specific construction as they form only the framework upon which the present invention is embodied and in cooperation with which it finds its usefulness.

Cleaner nozzle 1 is shaped as the usual cleaner nozzle being enlarged at its lower extremity and elongated transversely of the machine. It is provided with a downwardly facing mouth or slot the forward and rearward edges of which are defined by the front and rear nozzle walls 13*a* and 13*b*, respectively. The nozzle mouth is partially closed by a plate member indicated generally by the reference character 14 which extends the full length of the nozzle 1 and is mounted for sliding movement forwardly and rearwardly across the nozzle through being carried at its ends by the removable plates 16 and 16 which are themselves secured at the nozzle ends by means of screws 17, 17 etc. The member 14 itself is scientifically constructed in such a manner as to provide a plurality of slots, inlets or mouths opening from the exterior of the machine into the nozzle proper. These inlets or mouths are indicated by the reference characters 18, 18 etc. and all extend at angles across the nozzle. Defining the sides and ends of the slots 18, 18 etc. are rigid surface-contacting agitating elements which extend downwardly and are of relatively thin width. The agitating members defining the sides of the slots 18, 18 are indicated by reference characters 19, 19, etc. while the agitating elements at the ends of the slots, and which extend parallel to the nozzle walls 13*a* and 13*b*, are indicated by the reference characters 20, 20 etc. These elements 19 and 20 extend downwardly from the nozzle into such positions that they are adapted to be contacted by the lifted surface covering in the operation of the machine, the said members being of such height that open ended channels 21, 21 etc., which extend entirely across the member 14 and are open at both ends thereof, are formed. The presence of these channels 21, 21 etc. is of utmost importance for, being open ended, they permit the entrance of cleaning air at their ends which is drawn into the nozzle through the slots 18, 18, having first passed under the agitating members 19, 19, for the entire length of those agitating members. Cleaning air is, of course, drawn under the members 20, 20 into the slots 18 but the air passing under these members does not of necessity traverse the channels 21, 21 etc.

At the back of the member 14 and extending upwardly therefrom are spaced arms 22, 22, each of which is provided near its upper extremity with a forwardly extending pin 23 which slidingly seats within a bearing 24. The function of pins 23, 23 and bearing seats 24, 24 is to maintain the proper alignment of member 14 with respect to the nozzle 1.

Spaced directly in the rear of the nozzle and carried by bearings 25, 25 is a rotatable shaft 26 at the opposite ends of which are carried eccentric arms 27, 27. Bearings 28, 28 are seated upon these arms 27, 27 being themselves enclosed by the connecting links 29, 29 which are connected pivotally at their opposite ends to the arms 22, 22. It is clear that from the relationship of the parts that upon the rotation of shaft 26 the connecting links 29, 29 will be moved forwardly and rearwardly of the machine to effect the sliding of member 14 in the plates 16, 16 which carry it. The extent of this movement is indicated in Figure 1. Rotation of shaft 26 is accomplished by power transmission means comprising a rotatable shaft 30 which is connected to the shaft 26 through gears 31 and 32 and which is itself rotated by means of a belt 33 which is driven by a pulley 34 at the rearward extremity of the motor shaft 12 and which cooperates with rigidly mounted pulley 35 on the shaft 30. The pulleys and belt are suitably enclosed in a housing 36, the shaft 30 within a tubular housing 37 and the shaft 26 within a similar housing 38.

In the operation of the suction cleaner constructed in accordance with the present embodiment of the invention upon the rotation of the driving shaft 12 the suction-creating fan 11 creates a reduced pressure within the nozzle 1 which in turn draws air into the nozzle through the openings 18, 18 etc. The surface covering which is immediately below the nozzle is lifted into contact with the surface-contacting agitating lips 19, 19 and 20, 20 so that the air then entering the nozzle must pass between the agitating elements and the surface covering. These agitating members being relatively thin function to efficiently disturb the pile through being reciprocated at relatively high speed transversely of the nozzle by means of the aforedescribed actuating mechanism. The cleaning air enters the nozzle, therefore, under surface-contacting positively actuated agitating elements.

The channels 21, 21 etc. perform a valuable function in the operation of the machine for they serve as passageways through which air may pass in order that cleaning air may enter the nozzle under the entire length of the lips 19, 19 etc.

Referring now to the embodiment of the invention shown in Figures 5 to 7, inclusive, the general suction cleaner construction is similar to that described in connection with the first embodiment. According to the present invention, however, the surface-contacting agitating elements are not positively actuated. The plate member 14 is rigidly secured to the lower extremity of the nozzle proper by means of screws 40, 40 etc. The actuating power-transmission mechanism described in connection with the first embodiment is not included in this construction and for surface agitation reliance is placed solely upon the effectiveness of the stationary agitating elements in contact with the surface covering as the cleaner is moved thereover. Member 14 in this embodiment is constructed as in the first described embodiment with slots or mouths 18, 18 etc. which are defined by the agitating lips or elements 19, 19 and 20, 20. The angularly extending channels 21, 21 between the lips 19, 19 are present as in the first embodiment and provide means through which cleaning air can gain entrance between those lips for their full length. In this embodiment, as in that first described, the agitating elements are made as shown in Figure 7, the lower edges being reduced in thickness so as to penetrate to a relatively great depth in the surface covering undergoing cleaning.

I claim:

1. In a suction cleaner, a nozzle, means to create a reduced pressure in said nozzle and to draw cleaning air therethrough, a plurality of surface-contacting agitating elements angularly disposed across said nozzle defining the sides of openings thereinto, means preventing the entrance of air into said nozzle between certain of said elements,

and means to positively actuate said agitating elements.

2. In a suction cleaner, suction-creating means, a nozzle including walls defining a mouth, an agitator movably mounted at said nozzle mouth, said agitator including means closing the mouth of said nozzle and providing slots opening thereinto and downwardly extending agitating elements extended along said slots cooperating with said closing means to provide channels to conduct air along said slots when said agitating elements are in contact with a surface covering undergoing cleaning, and means to positively actuate said agitator.

3. A suction cleaner construction as defined in claim 6 in which the agitator is mounted for sliding movement and the actuating means reciprocate it in the direction of cleaner travel.

4. In a suction cleaner, a nozzle having a downwardly facing mouth, means closing the mouth of said nozzle and providing a multiplicity of openings thereinto, and downwardly extending rigid agitating elements defining the boundaries of the openings in said means under which cleaning air must pass in entering said nozzle, the summation of the surface-contacting lengths of said elements being greatly in excess of the distance around the area contacted by said nozzle, and means to positively actuate said rigid agitating elements relative to a surface covering undergoing cleaning.

5. In a suction cleaner, a body including the nozzle, means movably supporting said body with the surface-contacting portion of said nozzle spaced above the surface covering undergoing cleaning, the surface-contacting portion of said nozzle being movable relative to the body of said cleaner and being formed as a plurality of agitating elements having a total length greater than the periphery of the mouth of said nozzle and defining the sides of openings into said nozzle under which cleaning air entering said nozzle must pass, and means to actuate said elements relative to the cleaner body and to the surface covering in the operation of the cleaner.

WILLIAM H. KITTO.

CERTIFICATE OF CORRECTION.

Patent No. 1,953,350. **April 3, 1934.**

WILLIAM H. KITTO.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, line 16, claim 3, for "6" read 2; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of June, A. D. 1934.

Bryan M. Battey

(Seal) **Acting Commissioner of Patents.**