

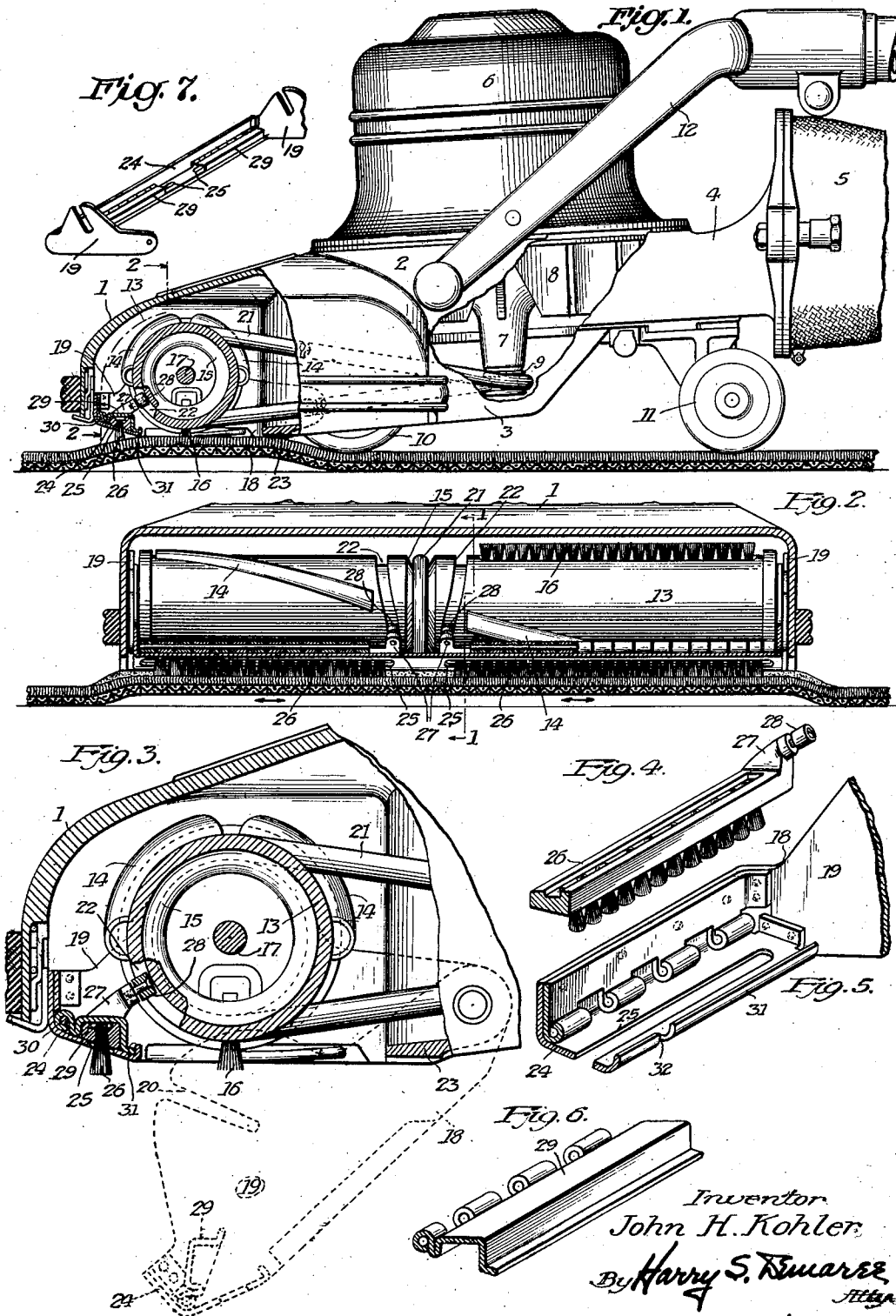
Dec. 26, 1933.

J. H. KOHLER

1,940,954

SUCTION CLEANER

Filed April 11, 1931



Inventor
John H. Kohler
By Harry S. Ruzar
Attorney

UNITED STATES PATENT OFFICE

1,940,954

SUCTION CLEANER

John H. Kohler, Canton, Ohio, assignor to The Hoover Company, North Canton, Ohio, a corporation of Ohio

Application April 11, 1931. Serial No. 529,318

9 Claims. (Cl. 15-8)

The present invention relates to suction cleaners and particularly to new and improved agitating means in suction cleaners. More specifically the invention comprises the provision, in a suction cleaner, of the combination of a rotary agitator, embodying both positive beating and brushing means, with a reciprocating brush whose direction of movement is parallel to the axis of the rotary agitator.

It is an object of the present invention to provide a new and improved suction cleaner. It is a further object to provide new and improved surface-agitating means in a motor-driven suction cleaner. A still further object is the provision, in a suction cleaner, of combined rotary and reciprocating agitating means. Still another object is the provision of a suction cleaner in which rotary agitating means are provided in the suction cleaner nozzle from which a reciprocating brush is driven. A still further object is the provision, in a motor driven suction cleaner, of a rotary agitator embodying positive agitating means and brushing means, and a horizontally reciprocating agitator comprising a brush. These and other objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.

In the drawing in which a preferred embodiment of the present invention is disclosed:

Fig. 1 discloses a side view of a modern suction cleaner, with certain parts broken away, with the present invention embodied therein;

Fig. 2 is a section upon the line 2-2 of Fig. 1;

Fig. 3 is an enlarged section thru the cleaner similar to that shown in Fig. 1 showing, in dotted lines, the supporting frame of the rotary and reciprocating agitators pivoted downwardly from the nozzle mouth;

Fig. 4 is a view in perspective of a reciprocating brush element;

Fig. 5 is a partial view in perspective of the agitator-supporting frame showing the reciprocating brush seat;

Fig. 6 is a view in perspective of the pivoted latch or retaining cover of the brush seat;

Fig. 7 is a view in perspective of the pivoted brush supporting frame.

The present invention is disclosed embodied in a modern suction cleaner which comprises a main casing or casing including a nozzle 1, a fan chamber 2, which is interiorly connected to the nozzle 1 by means of the air passageway 3, and an exhaust outlet 4 to which is detachably connected a dust bag 5. A motor casing 6 is

positioned upon the main casing immediately above the fan chamber 2 and houses a suitable driving motor, which is not shown but the shaft 7 of which extends downwardly thru the fan chamber 2 where the fan 8 is mounted thereon. The shaft 7 extends into the rear end of the air passageway 3 where it carries a suitable pulley 9. The cleaner is movably supported by means of front wheels, of which one is shown resting upon a supporting surface being indicated by reference character 10, and by means of a rear wheel 11. A pivoted handle 12 is mounted on the casing of the cleaner and provides means by which the operator can propel the machine over the surface covering undergoing cleaning.

Within the nozzle 1 of the cleaner and extending thereacross is a rotary agitator which, in its general appearance, differs but slightly from a common and well known type. This agitator comprises a large diameter cylindrical body 13 on the surface of which are mounted helically-extending rigid beater elements 14, 14 which extend substantially the length of the agitator, with the exception of a small central portion which is reduced in diameter to form a pulley 15. Carried by the cylindrical body 13 of the agitator and seated within the periphery thereof are longitudinally-extending brushes 16, 16 which are of a common and well known type and which are removably secured in their seats in any suitable manner. Upon the surface body 13 of the agitator, immediately adjacent the sides of the pulley 15, which is connected to the driving pulley 9 on the motor shaft 7 by a suitable belt 21, are encircling cam races positioned below the periphery of the body. These cam races are designated by the reference characters 22, 22 and have a function which will be apparent from the following description. A shaft 17, which extends thru the agitator with each of its ends resting in a seat 20 in the side member 19 of the frame 18, rotatably supports the agitator.

Between the side members 19, 19 of the frame 18, which is pivoted within the nozzle 1 at a point somewhat in the rear of the rear nozzle lip 23, is a front cross member 24 which extends closely adjacent and parallel to the front wall of the nozzle 1, being secured thereto, and holding the frame 18 within the nozzle, by ordinary and suitable means which form no part of the present invention. This cross member 24 slopes downwardly from the lower end of the front wall of the nozzle 1 and forms the front lip of the nozzle thereby cooperating with the rear nozzle lip 23 in defining the nozzle mouth. The lip 24,

however, differs from the usual nozzle lip thru being provided with two transversely-extending openings or apertures 25, 25, each of which extends parallel to the axis of the rotary agitator and has a length substantially equal to half the length of the agitator. Seated upon the lip 24 with their bristles projecting downwardly thru the apertures 25, 25 are brush elements 26, 26 which comprise rigid backs having the flexible brush bristles mounted therein. The length of each brush element 26 is slightly less than the length of the aperture 25 in the nozzle lip 24 thru which the bristles extend, thereby permitting the brush a limited range of movement transversely of the agitator mouth, that is, parallel to the longitudinal axis of the agitator itself. To make use of this permissible movement of the brushes 26, 26 in order to obtain the maximum agitation of the surface covering undergoing cleaning, each brush element 26, 26 is provided at its inner end, with an upstanding lug 27 on which is mounted a roller or head 28 of such size that with the brush seated upon the front lip 24 the roller 28 extends within the adjacent cam race 22 in the cylindrical body 13 of the rotary agitator, with the result that upon the rotation of that body the brush 26 will be reciprocated back and forth as the roller 28 is moved by the cam. To insure the permanent positioning and the correct allinement of each brush 26 with the aperture 25, relative to which it must slide, a pivoted cover element 29 is provided which is pivotally mounted upon a pin 30 carried by the side of the transverse member or lip 24. The cover member 29 is adapted to closely enclose the sides and top of the brush 26 to hold it in contact with the upper surface of the lip 24. To prevent the unintentional displacement of the cover relative to the lip the forward edge of the lip is curved upwardly, as at 31, and is adapted to resiliently clamp the forward edge of the cover which extends against it in the closed position.

In the operation of a suction cleaner constructed in accordance with the present invention, the suction-creating fan within the fan chamber is rotated by the driving motor resulting in a decrease in the pressure existing within the nozzle thereby effecting the lifting of the surface covering undergoing cleaning against the nozzle lips, as is clearly indicated in Figure 1. With the surface covering suspended against the nozzle lips the rotary agitator is rotated at high speed by the driving belt 21 which is connected, as aforescribed, between the pulleys 15 and 9, the latter carried by the motor shaft. The beating elements 14, 14 upon the agitator function to violently vibrate the surface covering to dislodge the embedded foreign matter which is positioned therein. The longitudinally-extending brushes 16, 16 upon the agitator surface cooperate with the rigid beating elements 14, 14 and assist in the removal of the light dirt. As the agitator is revolved the brushes 26, 26, which are carried by the front nozzle lip 24 of the cleaner, are reciprocated transversely or parallel to the longitudinal axis of the rotating agitator and, thru extending below the nozzle lip, contact the surface covering which is positioned adjacent thereto and function to deflect, bend and agitate the pile of that covering in a direction at right angles to the direction of vibration and bending effected by the beating elements 14, 14 and the brush elements 16, 16 carried by the rotary agitator.

To effect the removal of the agitators constructed in accordance with the present invention from the nozzle, it is only necessary to pivot the supporting frame 18 downwardly to the position shown in dotted lines in Figure 3. With the frame so positioned the rotary agitator may be lifted therefrom, the supporting shaft 17 sliding outwardly from its open-ended seat 20 in each end plate 19 of the frame. With the rotary agitator removed it is then possible to pivot each brush-holding cover 29 on its supporting pin 30, a recess 32 being conveniently provided in the forward edge of the nozzle lip into which an instrument such as a screw driver may be inserted to wedge the cover free from the retaining forward edge of the lip. With the cover pivoted back it is then possible to remove the brush 26 by merely lifting it from the lip and withdrawing the bristles thru the aperture 25 thru which they were extended, there being two brush elements, the same operation is necessary to release the other element.

I claim:

1. In a suction cleaner, a driving means, a rotary agitator operatively connected to said driving means, and a horizontally reciprocating agitator operatively connected to said rotary agitator and mounted for reciprocation in a direction at an angle to the direction of cleaner motion.

2. In a suction cleaner, a body, a rotary agitator carried by said body, a reciprocating agitator carried by said body, means supporting said reciprocating agitator for movement parallel to the axis of said rotary agitator, and means to actuate said agitators.

3. In suction cleaner, means to displace the surface covering undergoing cleaning from the supporting surface, means to vibrate the surface covering, means to brush the surface covering, and second means to brush the surface covering at right angles to the direction of brushing of said first-mentioned brush means.

4. In a suction cleaner, means to displace the surface covering undergoing cleaning from the supporting surface, rotary means to vibrate the surface covering and to brush the surface covering, and horizontally reciprocating means to brush the surface covering in a direction parallel to the axis of said rotary means.

5. In a suction cleaner, a body including a nozzle, a rotary agitator mounted in said nozzle, driving means operatively connected to said agitator, a transversely and horizontally reciprocating agitator carried in said nozzle, cooperating means on said rotary and on said reciprocating agitators to reciprocate the latter upon rotation of the former.

6. In a suction cleaner, a body including a nozzle, a rotary agitator mounted in said nozzle, driving means operatively connected to said agitator, a transversely and horizontally reciprocating agitator carried in said nozzle, cooperating means on said rotary and on said reciprocating agitators to reciprocate the latter upon rotation of the former, said cooperating means comprising a cam race formed on said rotary agitator and a contact member carried by said reciprocating agitator.

7. In a suction cleaner, a body including a nozzle having a lip, a rotary agitator mounted in said nozzle, driving means operatively connected to said agitator, a reciprocating agitator carried by and extending closely adjacent said nozzle lip and extending parallel to said rotary agitator, cooperating means on said rotary and

on said reciprocating agitators to reciprocate the latter upon the rotation of the former.

8. In a suction cleaner, a nozzle, a pivoted frame positioned in said nozzle one side of said frame forming a nozzle lip, a rotary agitator carried by said frame, a brush carried by said frame and slidable parallel to said agitator, means to actuate said agitator and said brush, said agitator and said brush being adapted to be removed from said nozzle upon the pivoting of said frame from said nozzle.

frame positioned in said nozzle one side of said frame forming the front nozzle lip and being formed with an elongated slot, a rotary agitator carried by said frame and extending parallel to said front nozzle lip, a brush element slidably carried by and extending thru said slot in said front nozzle lip, a recessed cam groove on said rotary agitator, a projecting member carried by said brush element seated in said cam groove, and means to rotate said agitator.

80
85

JOHN H. KOHLER.

9. In a suction cleaner, a nozzle, a pivoted

90
95
100
105
110
115
120
125
130
135
140
145
150

15
20
25
30
35
40
45
50
55
60
65
70
75