Aug. 14, 1956 G. T. FILLERY 2,758,328

COMBINED SUCTION CLEANER AND FLOOR POLISHER

Filed Feb. 29, 1952 3 Sheets-Sheet 1

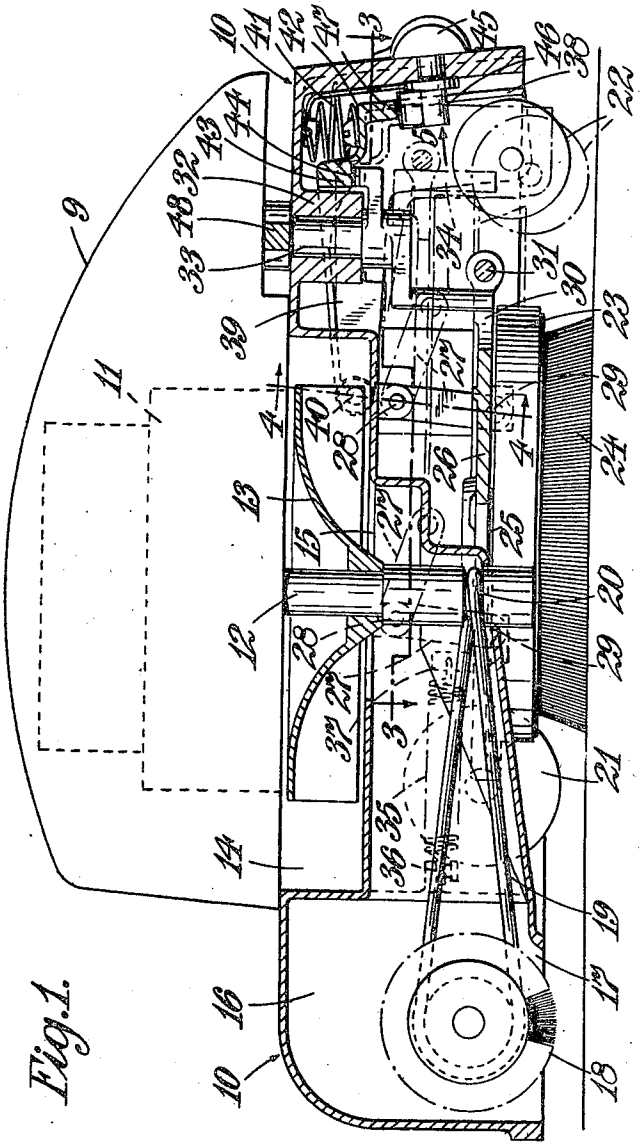

Fig. 1.

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Fig. 4.

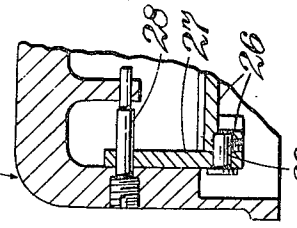

Fig. 5.

Fig. 2.

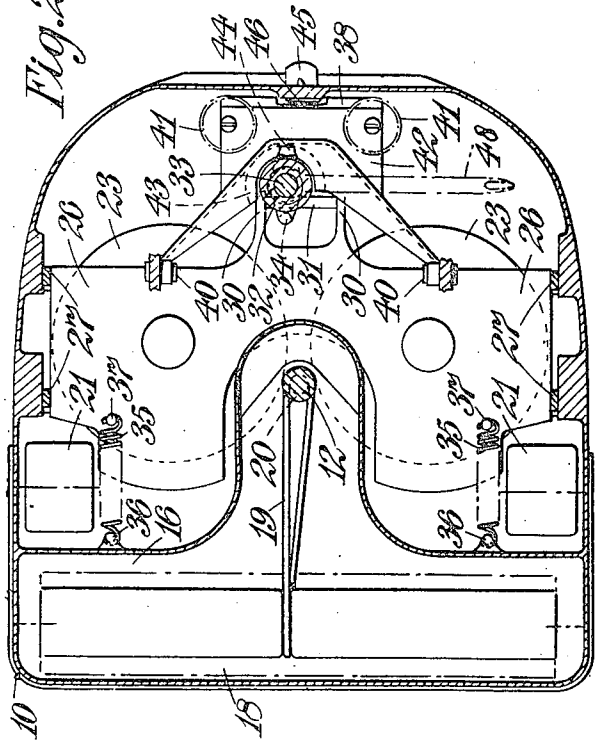

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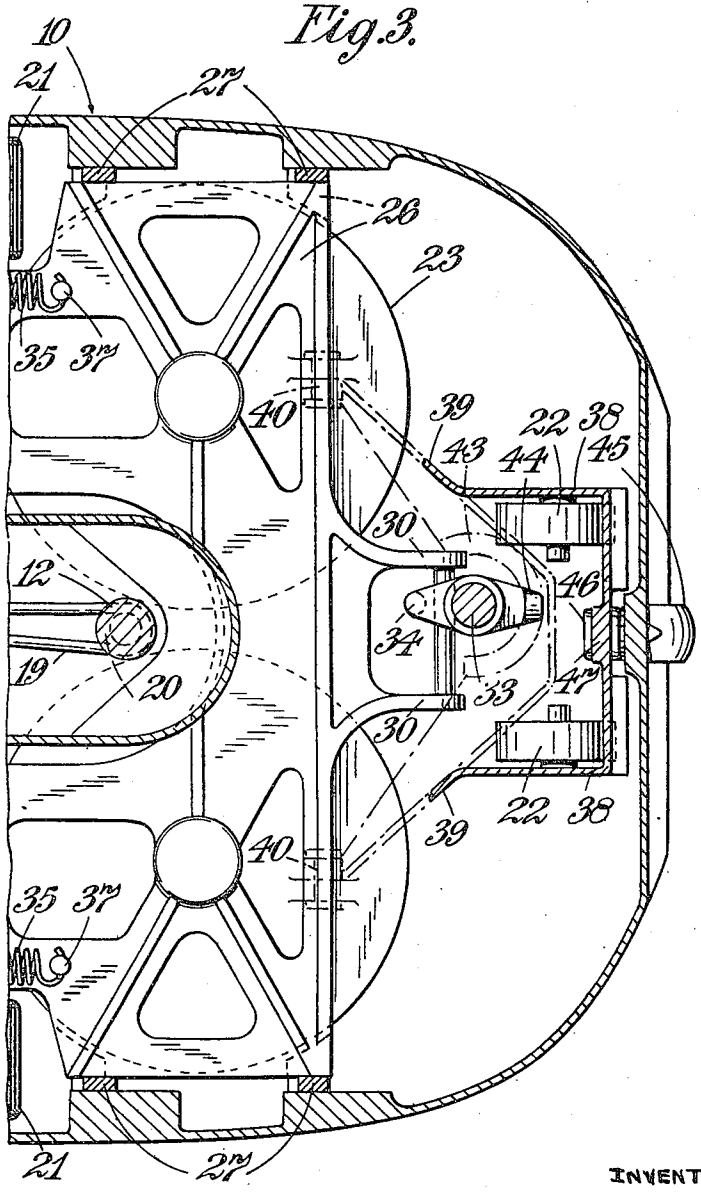
Fig. 3.



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COMBINED SUCTION CLEANER AND FLOOR POLISHER

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Application February 29, 1952, Serial No. 274,136

Claims priority, application Great Britain March 14, 1951

14 Claims. (Cl. 15—328)

This invention relates to a combined suction-cleaning and floor-polishing apparatus of the kind comprising a casing formed integrally with or carrying a suction nozzle, a rotary floor polishing element or elements carried by the casing for retraction into the casing and an electric motor, carried by the casing which drives the polishing element or elements when in the operative position, the suction nozzle and polishing elements being each adjustable from an on-the-floor position to an off-the-floor position and vice versa.

It is to be understood that when the suction nozzle is in the on-the-floor position it may be either in actual contact with the floor surface or may be slightly raised therefrom and that when in the off-the-floor position it may operate with a reduced suction effect to carry away dust raised during polishing.

This invention concerns apparatus in which when the polishing elements are in the on-the-floor position the nozzle is in the off-the-floor position and vice versa and means are provided simultaneously to adjust the polishing element or elements and the suction nozzle and to connect or disconnect, as is appropriate, the drive to the polishing elements and the object of the present invention is the provision of an improved construction of said means—which for convenience will hereinafter be referred to briefly as the adjusting means.

A preferred construction of combined suction-cleaner and floor-polishing apparatus in accordance with the present invention will now be described, merely by way of example, with reference to the accompanying drawings whereof:

Figure 1 is a side view partly in section of an apparatus in accordance with this invention,

Figure 2 is a diagrammatic sectional plan view of the apparatus of Figure 1, to a smaller size, showing the main elements thereof,

Figure 3 is a section on the line 3—3 of Figure 1,

Figure 4 is a section on the line 4—4 of Figure 1 showing a detail of construction, and

Figure 5 is a view in the direction of the arrow 5 of Figure 1 showing a constructional detail.

Referring to Figures 1, 2 and 3: the apparatus comprises a casing, generally indicated by the reference numeral 10, on the top of which is mounted an electric motor 11 enclosed within a housing 9 which drives a vertical spindle 12 projecting into the casing 10. A fan 13, of any known or convenient construction, is mounted on the spindle 12 within a fan chamber 14 which forms part of the casing 10. An opening 15 places the fan chamber 14 in communication with a suction nozzle generally indicated at 16 so that, in well known manner, air is drawn through the nozzle 16 by the fan 13. The nozzle 16 has an opening 17 of generally rectangular form in plan within which rotates a brush 18 which is driven by belt 19 from the spindle 12. It will be noted in Figure 1 that the spindle 12 is grooved at 20 to receive the band 19.

The casing 10 is supported on a pair of side rollers 21 and back rollers 22, all of which are mounted within the casing 10.

The nozzle 16 is towards the front of the casing 10 and in the rear portion thereof there is disposed the polishing elements and the adjusting means therefor. Each polishing element comprises a backing disc 23 which carries the bristles 24 and each disc 23 is rotatably supported by bearing 25 from a carrier plate 26. The carrier plate 26 (as shown in Figures 2 and 3) is common to both polishing elements which rotate about parallel vertical axes and, as shown in Figure 3, are arranged so that the peripheries of the discs 23 are spaced apart by a small amount and less than the diameter of the spindle 12. The spindle 12 is adapted, as later described in detail, to enter between the peripheries of the discs 23 and separately to drive each disc. If desired the driving spindle 12 may be faced with rubber to engage the discs 23 or the latter may, alternatively or additionally, be formed with a rubber facing. The spindle 12 constitutes the rotary driving member referred to above.

The carrier plate 26 is supported at opposite sides by a pair of parallel links 27 each of which is pivotally secured to the casing 10 by pin 28 and to the carrier 26 by the pin 29 (see Figure 4). Thus, each side of the carrier 26 is supported from the casing 10 by a parallel link mechanism which permits the carrier 26 and the brushes 24 to be simultaneously moved in the horizontal and vertical directions. In Figure 1 the position of the links 27, the carrier 26 and the brushes 24 is shown in full lines when the brushes are in the on-the-floor position and in chain dotted lines when the brushes are in the off-the-floor position and it will be observed that the links 27 are moved from the former position to the latter position by pivotal adjustment in the rearward direction and upwardly into the casing.

The carrier plate 26 is formed on its rear edge with a pair of lugs 30 which are connected together by a pin 31. The casing 10 is formed with a boss 32 that constitutes a bearing for a spindle 33 which passes downwardly through the casing 10 and carries at its lower end a crank pin 34 which engages the pin 31 so that with rotation of the spindle 33 from the full line position shown in Figure 1 to the chain dotted position the carrier plate 26 is drawn rearwardly to move the polishing elements 24 from the on-the-floor position to the off-the-floor position. Spindle 33 is manually adjusted by lever 48 and there may be provided a catch, such as a ball catch, which ensures that the spindle 33 is held against inadvertent displacement in either of its two positions referred to. Each of a pair of springs 35 (are on each side of a vertical plane passing through spindle 12) has one end anchored to the casing, as at 36, and the other end secured to the carrier plate 26, as at 37, the arrangement being that the plate 26 is drawn forwardly i. e. towards the nozzle 16 (see Figure 3) and to its on-the-floor position. The springs 35 therefore hold the pin 31 against the crank pin 34.

The links 27 when the polishing elements 24 are in their on-the-floor position are slightly to one side of a vertical dead center position as is apparent from Figure 1. The polishing elements when in their on-the-floor position support the casing 10 and the motor 11 and the links 27 being beyond the vertical dead center position the weight of the casing 10 and motor 11 is applied to the links 27 tending to move the carrier 26 towards the left as seen in Figure 1. Such movement is prevented by engagement of discs 23 with spindle 12 which constitutes a stop limiting the movement of the polishing elements at their on-the-floor position.

The rear wheels 22 are vertically adjustable so that when the polishing elements 24 are in their on-the-floor position the wheels 22 are raised relatively to the casing

10 to ensure that they do not engage the floor during polishing. The wheels 22 are lowered when the polishing elements are in their off-the-floor position so that the wheels 22 engage with the floor and, in certain circumstances as later described, tilt casing 10 to bring opening 17 close to the floor.

The mechanism for raising and lowering the wheels 22 is more particularly shown in Figure 1 to which reference will now be made. The wheels 22 are carried by a frame 38 integrally formed with a pair of arms 39 each pivoted to the casing 10 upon alining pins 40. As is shown in Figure 3, the arms 39 branch from opposite sides of the frame. Springs 41 which are located between the casing 10 and a platform 42 forming a part of the frame 38 urge frame 38 downwardly, the frame 38 pivoting about the pins 40. Frame 38 is formed with a cam surface 43 which coacts with a follower 44 secured to crank 34, the arrangement being that with rotation of the spindle 33 follower 44 is adjusted relatively to cam 43 to raise the frame 38 or to permit the springs 41 to lower it, the springs 41 and cam mechanism 43—44 thus serving cooperatively as means for vertically moving said frame. The cam 43 and the crank pin 34 are so disposed that when the polishing elements 24 are lowered, frame 38 and the rollers 22 are raised and vice versa.

It is customary to provide adjustment for the nozzle 16 to take account of the different pile thicknesses of the carpets which are being cleaned and to adjust the nozzle 16 to a datum position depending upon the nature of the carpet. This is provided for in the apparatus being described by having a knob 45 pivotally mounted on the rear face of the casing 10 and carrying a square block 46 (see Figure 5). Adjustment of the knob 45 serves to rotate the block 46 the center of which is offset with respect to the axis of rotation of the knob 45. The block 46 engages with a curved face 47 provided on frame 38 and maintained in engagement with the block 46 by springs 41. As is evident from Figure 5 rotation of the knob 45 will bring one or other of the flat faces of the block 46 beneath face 47, the block 46 serving to limit the downward movement of the frame 38, the extent of the downward movement being determined by whichever face of the block is brought opposite the portion 47 of frame 38. In this way the extent to which the rollers 22 are lowered is adjustable to determine the datum setting of the nozzle 16. Of course, the frame 38 is lowered by springs 41 when crank 34 suitably adjusts follower 44 relatively to cam 43 as above described.

In an alternative arrangement to that described above the crank 34 may be formed with a cam surface to cooperate with a follower on the frame 38.

By providing a certain looseness for the pivotal connection of the links 27 to the carrier plate 26 and/or the casing 10 the carrier plate is capable of movement across the casing 10 so that when the discs 23 are moved into engagement with spindle 12 the discs 23 will automatically adjust themselves to bring the spindle centrally between the discs. It is thereby ensured that both discs will be driven uniformly. It follows that by making these parts to non-precision standards the advantage referred to is obtained and the cost of manufacture is kept low.

I claim:

1. A combined suction-cleaning and floor-polishing apparatus comprising a casing normally supported on rollers, a suction nozzle carried by the casing and communicating with the interior thereof, an electric motor carried by the casing, a suction fan driven by the electric motor and communicating with said nozzle to suck air therethrough, a rotary driving member driven by said motor, a pair of depending arms pivotally attached to said casing for swinging movement in a substantially vertical plane, a carrier member pivotally attached to said arms and forming therewith a parallel linkage suspended from said casing, a vertical axle rotatably mounted in said carrier member and horizontally spaced from said rotary driving member, a polishing element rotatably mounted on said vertical axle, and manually operatable means for swinging said arms, said arms when swung guiding said carrier member and polishing-element through a single continuous arc and bringing said polishing element at one end of said arc into frictional engagement with said rotary driving member and into a lowered position relative to said casing in which it contacts the floor and supports said casing and suction nozzle away from the floor, and bringing said polishing element at the other end of said arc into a position transversely removed from engagement with said rotary driving member, raised with respect to said casing and off the floor, so as to permit said casing and nozzle to approach the floor.

2. Apparatus as claimed in claim 1 in which said arms in moving from one end of said arc to the other pass through a vertical dead center position.

3. Apparatus as claimed in claim 2 in which there are two pairs of arms for supporting said carrier arranged within the casing at opposite sides of the carrier, one pair on each side, and each pair of arms constituting a parallel-link mechanism.

4. Apparatus as claimed in claim 3 wherein there are two polishing elements mounted on parallel vertical axles, and the axis of rotation of said driving member is in a vertical plane passing between said polishing elements, a horizontal line passing through the axes of the polishing elements being normal to said plane.

5. Apparatus as claimed in claim 4 in which the said arms move in planes parallel to said vertical plane.

6. Apparatus as claimed in claim 5 wherein the polishing elements are each provided with a disc the periphery of which is adapted for frictional driving engagement with the driving member and spring means urging the carrier to a position in which said discs each engage said driving member.

7. Apparatus according to claim 6 wherein said manually operatable means for swinging said arm supported carrier comprises a manually adjustable crank mechanism having a crank pin which engages the carrier to draw it, on adjustment of the crank mechanism, in one direction against the action of said spring means.

8. Apparatus as claimed in claim 7 wherein when the polishing elements are in the on-the-floor position the polishing discs engage the driving member which constitutes a stop preventing further swinging movement of the carrier on its arms in the forward direction.

9. Apparatus as claimed in claim 1 in which the casing is provided with at least one vertically adjustable roller for supporting it above the floor when said brush is in its off-the-floor position and manually adjustable means mounted on said casing for varying the vertical position of said roller with respect to said casing when said brush is in its off-the-floor position.

10. Apparatus according to claim 9 in which said roller is mounted on a carrying frame which is pivotally mounted on the casing.

11. Apparatus as claimed in claim 10 wherein the means for varying the vertical position of said roller includes a manually adjustable stop limit.

12. Apparatus as claimed in claim 11 in which said frame-limiting stop comprises a block of rectangular outline the rectangular surfaces of which are engaged by said frame, said block being rotatable about an axis, the normal distances from said axis to a plurality of said rectangular surfaces being unequal.

13. A combined suction cleaner and floor polisher comprising a casing, an electric motor on the casing, a substantially vertical spindle driven by the motor, a suction nozzle on the casing, a fan driven by the motor to suck air through the nozzle, a pair of circular polishing brushes, a carrier from which the brushes are rotatably suspended within the casing, means supporting the carrier

from the casing for movement in a single continuous arc between an off-the-floor position and an on-the-floor position in which said spindle frictionally drives the brushes, a crank mechanism to move the carrier in said arc to retract the brushes to within the casing and at the same time disengage the brushes from the spindle, a frame carried by the casing for substantially vertical movement relatively thereto, casing-supporting wheels carried by the frame, means including a cam mechanism to move said frame, and a common manual control for simultaneously actuating the crank and cam mechanisms whereby the frame with its wheels is lowered relatively to the casing when the carrier is raised to retract the brushes.

14. A combined suction cleaner and floor polisher as

claimed in claim 13 in which the crank mechanism and a part of the cam mechanism are carried by a shaft which is rotated by said common manual control and the wheel-carrying frame has a cam face engaged by said part.

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