

Aug. 18, 1953

W. A. HUMPHREY
SUCTION CLEANING DEVICE HAVING AGITATOR DRIVE
BELTING IN AIR DUCT AND CONVERSION
PASSAGEWAY INDEPENDENT OF BELTING

2,648,868

Filed June 15, 1949

2 Sheets-Sheet 1

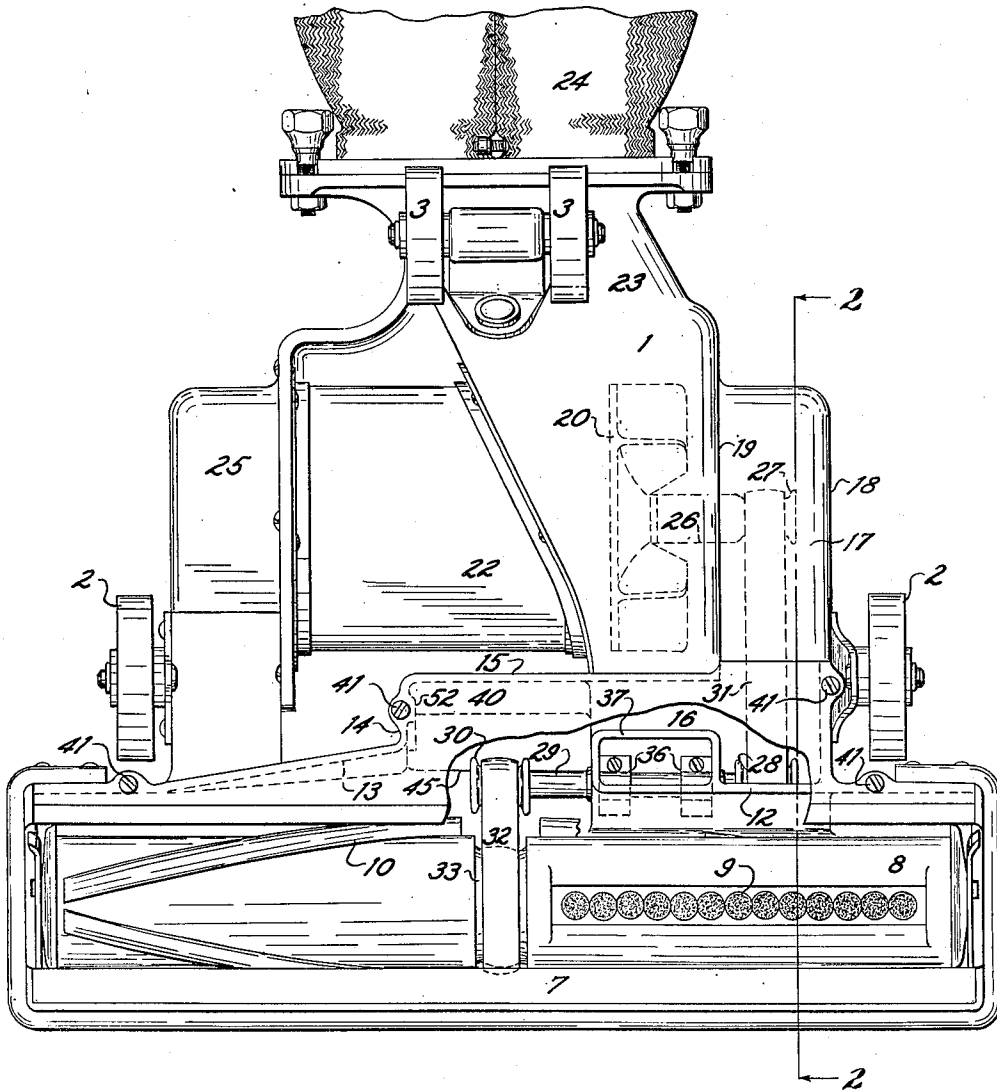


Fig. 1

INVENTOR.

Warren A. Humphrey

BY

Harry S. Duvarre
ATTORNEY.

Aug. 18, 1953

W. A. HUMPHREY
SUCTION CLEANING DEVICE HAVING AGITATOR DRIVE
BELTING IN AIR DUCT AND CONVERSION
PASSAGEWAY INDEPENDENT OF BELTING

2,648,868

Filed June 15, 1949

2 Sheets-Sheet 2

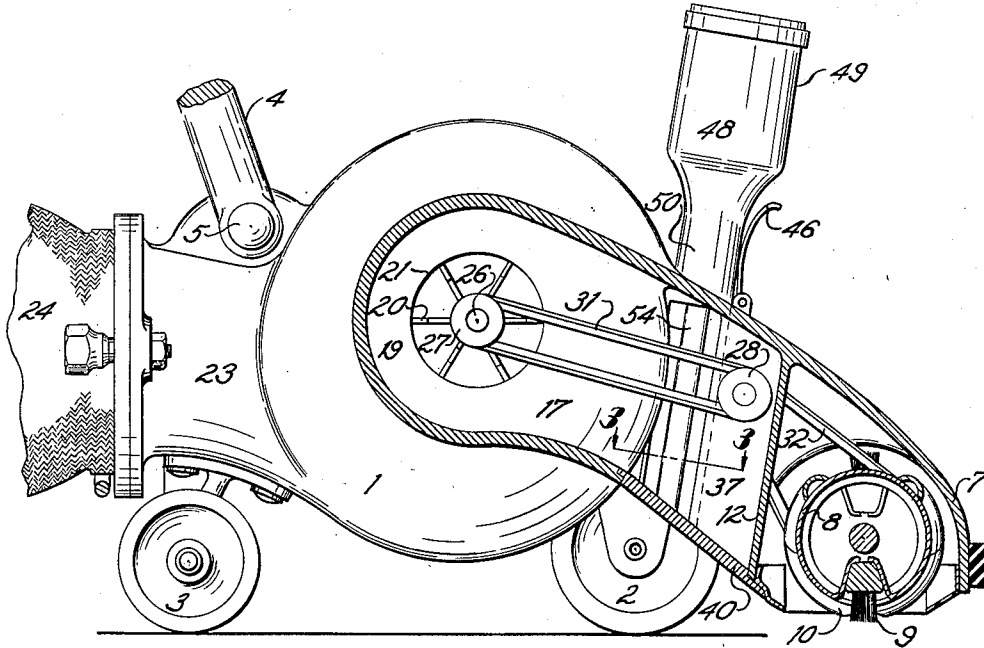


Fig. 2

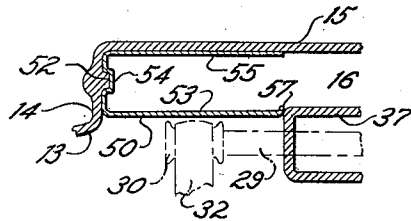


Fig. 3

INVENTOR.
Warren A. Humphrey
BY
Harry S. Dumas
ATTORNEY.

UNITED STATES PATENT OFFICE

2,648,868

SUCTION CLEANING DEVICE HAVING AGITATOR DRIVE BELTING IN AIR DUCT AND CONVERSION PASSAGEWAY INDEPENDENT OF BELTING

Warren A. Humphrey, Canton, Ohio, assignor to
The Hoover Company, North Canton, Ohio, a
corporation of Ohio

Application June 15, 1949, Serial No. 99,204

3 Claims. (Cl. 15—337)

1

My invention relates to the art of cleaning apparatuses and in particular to a suction cleaning device provided with a power driven cleaning element in the suction nozzle thereof and adapted to be converted to off-the-floor cleaning operation by a conversion device.

It is an object of my invention to provide a suction cleaning device of the type having a rotary agitator in the suction nozzle, a motor driven suction air fan mounted on an axis parallel to the axis of rotation of the agitator characterized by the provision of an air duct entering the suction air fan on one side of the cleaner and entering the nozzle substantially at the center thereof.

It is a further object of the invention to provide a suction cleaner having a drive mechanism including belting running in the suction air stream which drives a rotary cleaning element in the cleaning nozzle at the center thereof from a fan shaft on one side of the cleaner.

It is a further object of the present invention to provide a suction cleaner including a belt driven agitator in which the belting runs in the air duct connecting the suction nozzle to the suction air fan and having provision for a dusting tool converter element to be inserted into the air duct in a manner completely to seal the nozzle and without straddling belting or other moving parts of the agitator drive mechanism.

Other and more specific objects and advantages of the invention will become apparent as the description proceeds when taken in connection with the accompanying drawing in which:

Figure 1 is a bottom plan view partly in section of a suction cleaning apparatus embodying my invention;

Figure 2 is a side elevational view taken along the line 2—2 of Figure 1 and looking in the direction of the arrows; and

Figure 3 is a sectional view taken on the line 3—3 of Figure 2 looking in the direction of the arrows with certain parts above the plane of the section line shown by dashed lines.

The suction cleaning apparatus illustrated in the drawing comprises an ambulatory frame indicated generally at 1 which is supported by front and rear supporting wheels 2 and 3, respectively. A manipulating handle structure 4 is pivotally secured at 5 to the rear portion of the frame approximately above the rear supporting wheels 3.

The forward portion of the frame 1 is hollowed out to form a laterally elongated surface cleaning suction air nozzle 7 within which is rotatably

2

mounted a surface cleaning element 8. The cleaning element 8 carries a brush strip 9 and rigid agitator bars 10 on the periphery thereof which are designed to sweep and agitate a surface covering drawn up against the mouth of the suction nozzle 7 in the operation of the device.

The front wall of the nozzle structure 7 is defined by the downwardly curved top and front wall of the main frame structure 1. The rear wall of the nozzle structure is defined in part by a vertical partition wall 12 which, as shown in Figure 1, extends from the right hand extremity of the nozzle to a point adjacent the center thereof. The rear wall of the nozzle is also bounded in part by a slightly angularly positioned partition wall 13 extending from the left hand extremity of the nozzle, as viewed in Figure 1, to a position adjacent the center thereof terminating in spaced relation to the end of the partition 12. Adjacent the central portion of the nozzle the partition 13 joins with a rearwardly directed partition wall 14 extending substantially parallel to the longitudinal center line of the main frame 1. The partition wall 14 merges into a partition wall 15 which is substantially parallel to the wall 12 and extends in spaced relation thereto to a point positioned to the right, as viewed in Figure 1, of the center point termination of the partition 12. The partition 15 bridges the gap between the facing ends of the partitions 12 and 13 and forms an air channel 16 positioned parallel to the hollow nozzle 7 and in communication therewith through the gap between the walls 12 and 13.

The end of the cleaner frame structure defines an air passage 17 which communicates with the passage 16 and terminates at its forward end against the wall 12. This passage is defined by an outer side wall 18 which is spaced from a frame wall 19 forming one wall of a fan chamber within which is positioned a suction air fan 20. The wall 19 is provided with a central opening 21 forming an air inlet or fan eye. The suction air fan 20 is driven by a suitable electrical motor which is encased within a housing 22 forming part of the main frame structure 1.

The fan 20 is provided with a conventional discharge duct which is housed within a rearwardly projecting portion 23 of the frame structure 1. It is to the frame portion 23 that the rear wheels 3 are connected. The air exhaust 23 discharges into the usual filter bag structure 24.

The left hand end of the frame structure, as

viewed in Figure 1, is provided with a housing 25 identical in appearance with the housing 18. This however is a dummy construction to make the cleaner body symmetrical.

The outer end of the fan shaft 26 carries a pulley 27 which is connected by a belt 31 to a pulley 28 mounted on one end of a jack shaft 29. The other end of the jack shaft 29 carries a pulley 30 connected by a belt 32 to a pulley 33 formed in the central portion of the agitator 8. The pulleys 27—28 and belt 31 are in the air duct 17 whereas the pulleys 30—33 and belt 32 are partially in the nozzle and partially in the air duct 16, hence both belts run in a moving dirt laden air stream which has been found to facilitate the operation of suction cleaner drive belts and to prolong their life.

The jack shaft 29 is supported in bearings 36 secured to the upper portion of the frame 1 within a rectangular substantially vertically extending housing 37. The housing 37 extends from the bottom to the top of the frame structure and projects into the air duct 16. The housing 37 removes the bearings 36 from the dirt laden air stream and protects them from the abrasive action of dirt. The bottom wall of the cleaner housing includes a removable plate 40 secured to the bottom of the frame 1 by a plurality of screws 41. The plate 40 closes a portion of the forward end of the bottom portion of air duct 17, the whole of the bottom portion of air duct 16, the junction between the nozzle 7 and the air duct 16, and the bottom rear portion of the nozzle 7. The lower end of the walls forming the chamber 37 and of the walls 12, 13, 14 and 15, all abut the upper face of plate 40 to seal all of the air ducts, and to seal the chamber 37 from the dirt laden air stream. The removable plate 40 provides for ready access to the lower side of the nozzle, to both belts and to the jack shaft.

The central portion of the end plate 18 may have a removable section, not shown, to provide for access to the belt 31 and pulley 27.

The top wall of the casing 1 at its center portion above the air duct 16 is provided with a rectangular opening indicated at 45 providing access to the air duct 16 rearwardly of the jack shaft 29, belt 32 and pulley 30 and to the left, in Figure 1, of the chamber 37. The opening 45 is normally closed by a cover plate 46 pivotally mounted on the upper portion of the frame 1. As shown in Figure 2, the plate 46 is in its open position and a tubular air conducting dusting tool converter element 43 is inserted into the opening 45. The dusting tool 48 is adapted to be connected in a known manner to a flexible hose carrying any one of a number of cleaning tools on its operating end. The dusting tool converting element 43 comprises a cylindrical hose connecting socket portion 49 which merges into a connecting conduit 50 of generally rectangular cross-section. The section 50 is dimensioned to slide into the air channel 16 and snugly fit with the marginal walls of the opening 45 to form an air seal therewith. The lower end of the conduit 50 extends to and seals against the bottom closure plate 40 of the suction air channel.

Referring now to Figure 3, the manner in which the dusting tool cooperates with the air channels to seal the same and to avoid the belting will become apparent. The end wall 14 of the air duct 16 is provided with a rib 52 inclined at an angle which is parallel to the wall 12. The rectangular section 50 of the converter 43 is provided with a front wall 53 adapted to close the

span between the end of the rectangular housing 37 and the end of wall 13 rearwardly of shaft 29 and pulley 30 thus sealing the nozzle 7 and its driving mechanism from the air channel 16 at this point. The end wall of the converter tool is provided with a channel portion 54 which is shaped complementally to the rib 52 and is adapted to engage therewith to form a positioning and guiding element for the dusting tool. The converter is also provided with a side wall 55, opposite to the wall 53, which lies against the wall 15. That portion of the end wall of the conversion element within the cleaner body opposite to the wall 54 is removed to provide an opening 57 facing into the air duct 16. It is readily apparent from the foregoing that the dusting tool converter completely seals the air ducts 16 and 17 from the floor nozzle 7 without straddling any moving parts, and this is accomplished with the belting in the air stream. The complete air seal with the belting in the air ducts is achieved by sealing a portion of the drive mechanism in the housing 37 and sealing the conversion element against one wall of the housing 37.

The foregoing arrangement is particularly advantageous because it permits the dusting tool converting element to be inserted into the forward top portion of the cleaner where that is most easily accomplished. The top center mounting of the conversion element so connects the dusting tool converter to the cleaner that the cleaner is readily pulled after the dusting tool on its supporting wheels 2 and 3 without any tendency to overturn or to travel in a direction not following the operator. The present construction also realizes the advantages of full center drive of the agitator with a horizontal motor fan unit rotating on an axis parallel to the axis of the agitator.

While I have illustrated and described the invention in considerable detail, it is to be understood that various changes may be made in the arrangement, proportion and construction of parts without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. Suction cleaning apparatus comprising a casing structure defining a suction nozzle, a suction air fan chamber and an air duct communicating the air inlet portion of said fan chamber with the central portion of said nozzle, a motor fan unit in said casing having a fan in said fan chamber, a shaft on said fan extending into said air duct, a rotary cleaning element mounted in said nozzle; mechanism for driving said cleaning element from said fan shaft including a first belt in said air duct arranged to be driven from said fan shaft, a second belt in said air duct arranged to drive said rotary cleaning element, said belts being in spaced relation to each other, and mechanism for conveying driving motion from said first belt to said second belt having spaced belt connecting portions in said air duct and an intermediate portion which is air sealed from said air duct; and means forming a converter passageway from the top central portion of said casing structure at the front thereof into said air duct between the portions of said air duct housing said belts and adjacent the portion of said driving motion conveying mechanism sealed from said air duct whereby a converting tool may be inserted into said air duct to seal the same from said nozzle at a point in said air duct which

5

does not house any part of said driving mechanism.

2. Suction cleaning apparatus comprising a body structure, a surface cleaning nozzle extending across said structure, a rotary cleaning element mounted in said nozzle, a motor fan unit in said structure mounted for rotation on an axis substantially parallel to said nozzle, said motor fan unit having an air inlet adjacent one side of said structure, means in said structure defining a suction air duct communicating the inlet of said fan with the central portion of said nozzle, a shaft on said fan extending into said air duct at one side of said structure, a jack shaft having one end in said air duct adjacent said one side of said structure and its other end in said air duct rearwardly of the center of said rotary cleaning element, and a pair of belts one connecting said shaft and jack shaft and the other connecting said cleaning element and said jack shaft, means journalling said jack shaft on said body structure in air sealed relation to the portion of said air duct between said belts, said body structure having an opening in the top central portion thereof between said nozzle and said motor to that portion of said air duct between the portions of said air duct housing said belts whereby a converting tool may be inserted into said air duct to seal off said nozzle from said fan.

3. Suction cleaning apparatus comprising a casing structure defining a suction nozzle, a suction air fan chamber having an air inlet portion adjacent one side of said structure and an air duct communicating the air inlet portion of said fan chamber with the central portion of said nozzle and having a central portion angu-

6

larly related to its end portions, a motor fan unit in said casing having the fan in said fan chamber, a shaft on said fan extending into said air duct, a rotary cleaning element mounted in said nozzle, and mechanism for driving said cleaning element from said fan shaft including a belt in each end portion of said air duct and a shaft drivingly connecting said belts having its ends in said air duct and its central portion mounted in said casing in air sealed relation to the central portion of said air duct, an opening in the top central portion of said casing to the central portion of said air duct, and means in said central portion of said air duct forming a converter tool seat whereby a converter tool may be inserted into said air duct between the portions of said air ducts housing said belts to seal said nozzle from said fan.

WARREN A. HUMPHREY.

References Cited in the file of this patent
UNITED STATES PATENTS

Number	Name	Date
1,900,885	Smellie -----	Mar. 7, 1933
1,900,889	Becker -----	Mar. 7, 1933
2,148,656	Smellie -----	Feb. 28, 1939
2,166,863	Frame -----	July 18, 1939
2,197,641	Holm-Hansen -----	Apr. 16, 1940
2,253,289	Demaree -----	Aug. 19, 1941
2,253,309	Smellie -----	Aug. 19, 1941
2,366,481	Berg -----	Jan. 2, 1945

FOREIGN PATENTS

Number	Country	Date
592,072	Great Britain -----	Sept. 5, 1947