July 6, 1954 E. J. BALLUFF 2,682,681

CONVERSION ARRANGEMENT FOR SUCTION CLEANERS

Filed Sept. 14, 1948 2 Sheets-Sheet 1

FIG. 1.

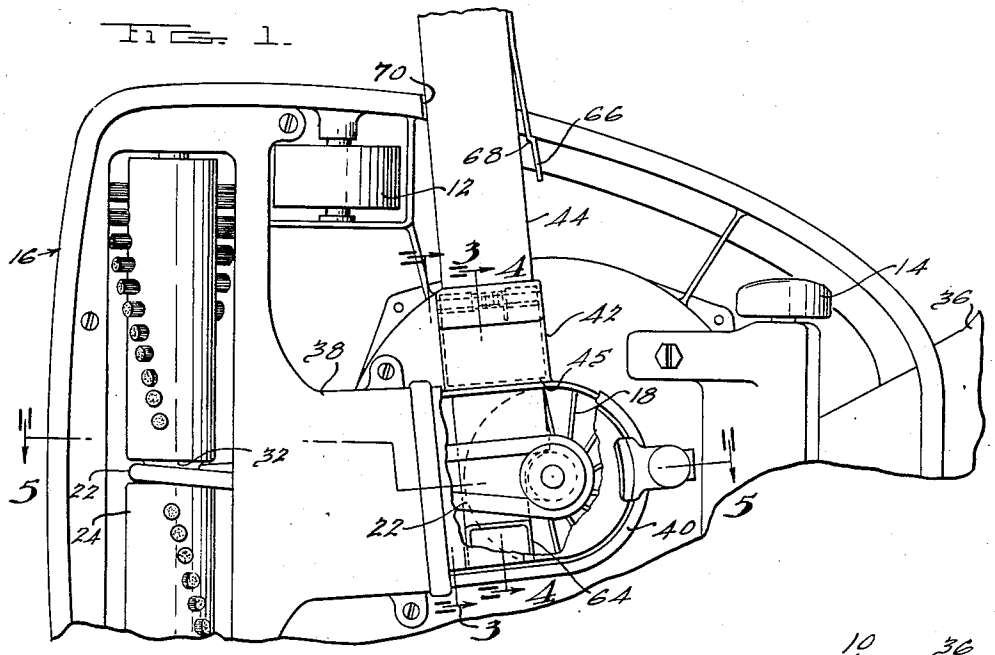


FIG. 2.

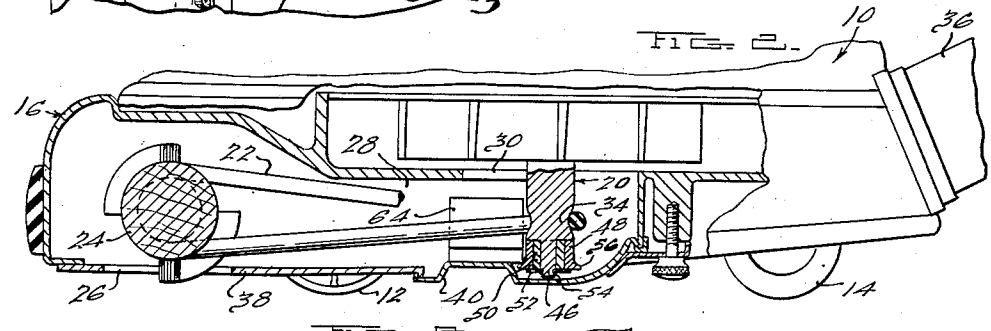


FIG. 3.

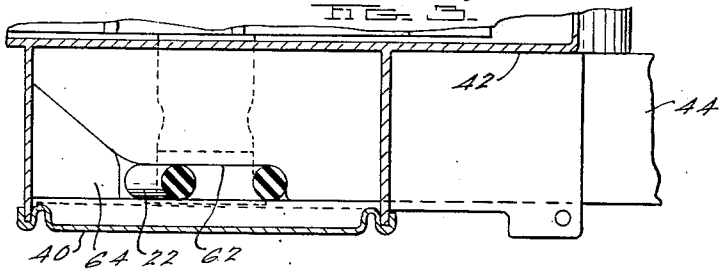
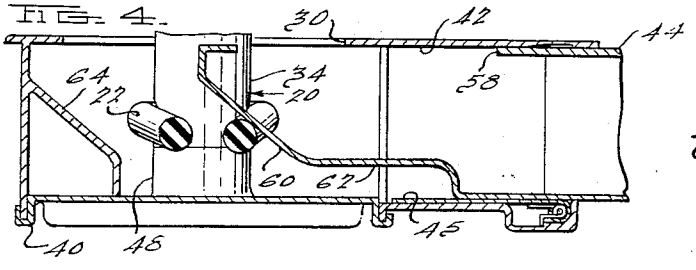


FIG. 4.



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FIG. 5.

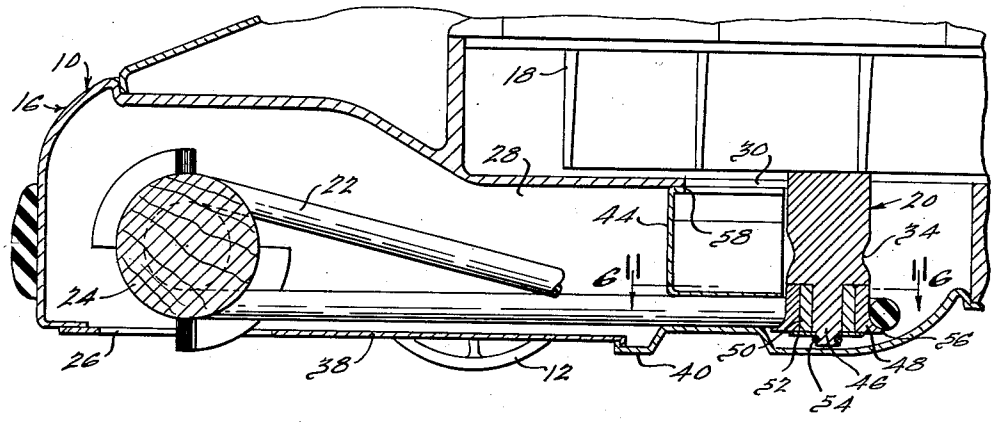


FIG. 6.

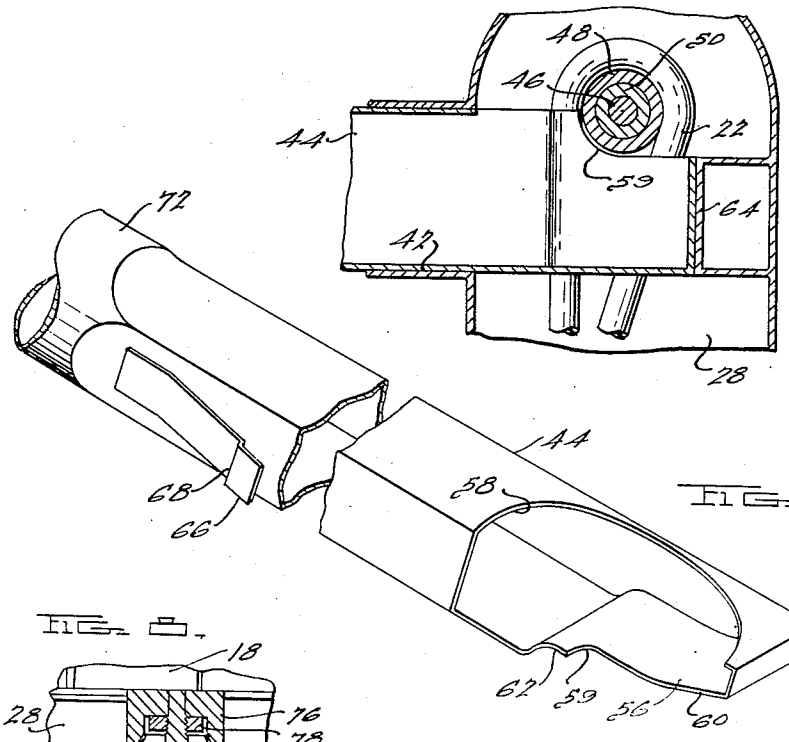
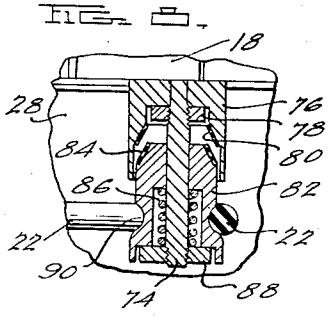


FIG. 7.

FIG. 8.



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CONVERSION ARRANGEMENT FOR SUCTION CLEANERS

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Application September 14, 1948, Serial No. 49,219

11 Claims. (Cl. 15—332)

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This invention relates to suction cleaners, and particularly to new and useful improvements therein whereby a suction cleaner may be converted for off-the-floor cleaning operations.

A principal object of the invention is to provide in a suction cleaner a new and improved arrangement for converting the cleaner for off-the-floor cleaning operations.

Other and further objects of the invention will be apparent by reference to the accompanying drawings of which there are two sheets, which, by way of illustration, show preferred embodiments and the principles thereof and what I now consider to be the best mode in which I have contemplated applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Fig. 1 is a fragmentary bottom plan view of a cleaner embodying the invention;

Fig. 2 is a fragmentary sectional view on a reduced scale of a cleaner embodying the invention as used in normal cleaning operations, and taken generally along the line 5—5 of Fig. 1;

Fig. 3 is an enlarged fragmentary sectional view taken along line 3—3 of Fig. 1;

Fig. 4 is an enlarged fragmentary sectional view taken along line 4—4 of Fig. 1, with the converter only partially inserted;

Fig. 5 is a fragmentary sectional view of a cleaner embodying the invention arranged for off-the-floor cleaning operations, taken along line 5—5 of Fig. 1;

Fig. 6 is a fragmentary sectional view taken along line 6—6 of Fig. 5;

Fig. 7 is a perspective view of the converter element; and

Fig. 8 is a view similar to a portion of Fig. 5 illustrating a modified form of the invention.

The suction cleaner embodying the invention may comprise a casing 10, front and rear wheels 12 and 14, a floor nozzle 16, an electric motor (not shown), a motor-driven suction fan 18, belt driving means indicated generally at 20, an endless elastic belt 22, and an agitator 24 operatively associated with nozzle 16. The nozzle 16 has a downwardly presented mouth 26 arranged to pass over a surface covering to be cleaned.

The interior of the nozzle 16 is connected by an air passageway 28 to a fan air inlet 30, and in normal cleaning operations, belt 22 runs on a

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pulley 32 of the agitator 24 and on a pulley 34 of the belt driving means 20, so that operation of the fan by the motor will also drive the agitator 24. The operation of the fan induces a flow of air into the nozzle 16 through the mouth 26 thereof. Such air is conducted through the air passageway 28 and the fan air inlet 30 into the fan which pumps such air into the dirt collecting and filtering bag 36.

The nozzle mouth 26 and the air passageway 28 are formed by removable plates 38 and 40. A laterally opening port 42 in the side wall of the air passageway 28 is adapted to receive a converter 44, the cross section of which is shaped to fit the port 42. The port 42 is normally closed by an inwardly opening spring operated closure 45, pivotally mounted in port 42. In its closed position, the closure 45 acts to seal off the air passageway 28 from the outside of the cleaner.

The pulley 34, which, as shown, is formed on a continuation of the motor and fan shaft and is driven by the electric motor, as is the fan 18. An extension 46 of the pulley 34 forms a shaft on which an idler 48 is journaled by means of a sleeve bearing 50. Extension 46 freely turns through sleeve bearing 50. A washer 52 retains the sleeve bearing 50 and the idler 48 and is held in place by a snap ring 54. A flange 56 limits the downward displacement of the belt 22.

The inserted end 56 of the converter 44 is shaped to fit and seat in the air passageway 28 to prevent the flow of air from the nozzle 16 to fan air inlet 30 and is then in air flow relation with the fan air inlet 30 through opening 58 in the converter 44. Converter 44 is cut away at 59 to accommodate the pulley 34 and idler 48, as shown in Fig. 6 and Fig. 7. During insertion of the converter 44, a slanting face 60 of the inserted end 56 of the converter engages the belt 22 as the converter is moved to its seat in the air passageway, and thereby the belt 22 moves down along the face 60 until it is held between a notch 62 of the converter 44 and a portion of the cover plate 40, this action shifting belt 22 onto idler 48. A part 64 of the air passageway 28 is shaped to fit the slanting wall 60 of the converter and thereby effectively seals off the nozzle 16 from the fan air inlet 30, as shown in Fig. 3. When the belt 22 is thus forced on to the idler 48, the driving connection between the agitator 24 and the fan 18 is broken.

The casing 10 has an opening 70 through which converter 44 may be inserted. A spring finger or latch 66 on the converter is provided with a notch 68, engageable with casing 10 to secure

converter 44 in the port 42. When spring finger 66 is pressed inwardly, the notch 68 passes through the opening 70 and the converter may be removed. The exterior end 72 of the converter may be connected to a suitable flexible hose to which may be attached the customary suction cleaning tools. The belt 22 is elastic and will be stretched by the insertion of the converter. Upon removal of the converter, the belt 22 will return to ts original position in driven relation with pulley 34, thus re-establishing the driving connection between fan 18 and agitator 24.

In the embodiment illustrated in Fig. 8, clutch means are used to disrupt the driving relation between the fan 18 and the agitator 24. A motor-driven shaft 74 extends into the air passageway 28. An extension 76 of the fan is rigidly secured to shaft 74 by a nut 78. Extension 76 has annular clutch face 80. A pulley member 82 is rotatably mounted on shaft 74 and has a clutch face 84 on its upper end operable with clutch face 80. A spring 86 backed by a nut 88 retains pulley member 82 and normally holds the clutch faces 80 and 84 in engagement, thereby causing the pulley 82 to turn with the fan 18 and drive the agitator 24.

When the converter 44 is inserted into port 42, the wall 60 of the converter acts upon the belt 22, which is retained in a groove 90 of pulley member 82, to compress the spring 86, thereby disengaging clutch faces 80 and 84. Fan 18 will now be free to turn independently of the pulley 82, and the driving connection between fan 18 and agitator 24 will be broken. When the converter is removed, spring 86 urges the clutch face 84 of the pulley 82 back into engagement with the clutch face 80. As the clutch faces re-engage, pulley 82 will again be driven by fan 18, re-establishing the driving relation between fan 18 and agitator 24.

While I have illustrated and described preferred embodiments of my invention, it is understood that these are capable of modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. A suction cleaner having a casing, a floor nozzle, a motor driven suction fan having an air inlet, an air passageway in said casing between said air inlet and said nozzle, a surface cleaning agitator in said nozzle, said fan having a shaft rotatable therewith and provided with a pulley in said air passageway, an idler in said passageway and in line with said pulley, an elastic belt in said passageway between said agitator and said pulley for driving said agitator during operation of said fan, said air passageway being provided with a converter port adjacent said pulley, a converter comprising a hollow air conducting member insertable in said passageway through said port in a direction normal to the axis of rotation of said shaft, the inserted end of said converter having an inclined lower wall movable across the strands of said belt during insertion of said converter for effecting movement of said belt in a direction normal to the path of movement of said converter thereby causing said belt to shift out of driving relation with said pulley and on to said idler so as to break the driving relation between said motor and said agitator, said air passageway being shaped to cooperate with said converter to prevent the flow of air from said nozzle to said fan air inlet, and said converter when inserted in said passageway being in air flow relation with said fan air inlet.

2. A suction cleaner having a casing, a floor nozzle, a motor driven suction fan having an air inlet, an air passageway in said casing between said air inlet and said nozzle, a surface cleaning agitator in said nozzle, said fan having a shaft rotatable on a vertical axis and provided with a pulley in said air passageway, an idler in said passageway and in line with said pulley, an elastic belt in said passageway between said agitator and said pulley for driving said agitator during operation of said fan, said air passageway being provided with a laterally extending converter port adjacent said pulley, a converter insertable in said passageway through said port, said converter comprising a hollow air conducting member open at one end thereof on the sides adjacent said pulley and said fan air inlet, the inserted end of said converter having a slanting wall engageable with said belt at a point adjacent said pulley, said belt being movable relative to said converter along said wall upon insertion of said converter for causing said belt to shift out of driving relation with said pulley and on to said idler so as to break the driving relation between said motor and said agitator, said air passageway being shaped to cooperate with said converter to prevent the flow of air from said nozzle to said fan air inlet, said inserted end of said converter being shaped to accommodate said belt between the bottom of said converter and the floor of said air passageway.

3. A suction cleaner according to claim 2 wherein said floor of said air passageway comprises a removable cover plate for said air passageway.

4. A suction cleaner having a casing, a floor nozzle, a motor driven suction fan having an air inlet, an air passageway in said casing between said air inlet and said nozzle, a surface cleaning agitator in said nozzle, said fan having a shaft rotatable therewith and provided with a pulley and an idler in line with said pulley in said air passageway, a belt in said passageway between said agitator and said pulley for driving said agitator during operation of said fan, said air passageway being provided with a laterally extending converter port and a closure therefor adjacent said pulley, a converter comprising a hollow air conducting member insertable into said air passageway through said port in a direction normal to the axis of rotation of said shaft, the inserted end of said converter being open on the sides thereof adjacent said pulley and fan air inlet, means for detachably securing said converter to said cleaner when inserted in said port, the inserted end of said converter being engageable with said belt at a point adjacent said pulley and being shaped to cause said belt to move relative to said converter and said pulley in a direction normal to the path of movement of said converter from said pulley on to said idler so as to break the driving relation between said motor and said agitator, said air passageway being shaped to cooperate with said converter to prevent the flow of air from said nozzle to said fan air inlet.

5. A suction cleaner having a casing, a floor nozzle, a motor driven suction fan having an air inlet, an air passageway in said casing between said air inlet and said nozzle, a surface cleaning agitator in said nozzle, said fan having a shaft provided with a pulley and an idler thereon in said air passageway, an elastic belt in said pas-

sageway between said agitator and said pulley for driving said agitator during operation of said fan, said air passageway being provided with a converter port in one side thereof, a converter comprising a hollow air conducting member insertable in said passageway through said port, said member being open at one end thereof on the sides adjacent said pulley and said fan air inlet, the inserted end of said converter having a slanting lower wall arranged to move across the strands of said belt at a point adjacent said pulley causing said belt to shift in a direction normal to the path of movement of said converter from an upper position on said pulley to a lower position on said idler so as to break the driving connection between said motor and said agitator, said air passageway being shaped to fit said converter when inserted so as to prevent the flow of air from said nozzle to said fan air inlet.

6. A suction cleaner having a floor nozzle, a motor driven suction fan having an air inlet, an air passageway between said air inlet and said nozzle, a surface cleaning agitator in said nozzle, said fan having a shaft rotatable therewith, said shaft including spring operated clutch means at one end thereof, a clutch member forming a pulley, a belt on said pulley extending through said passageway between said agitator and said pulley for driving said agitator during operation of said fan, said air passageway being provided with a laterally extending converter port adjacent said pulley, a converter comprising a hollow air conducting member insertable into said passageway through said port in a direction normal to the axis of rotation of said shaft, said air conducting member being open at one end thereof on the sides adjacent said pulley and said fan air inlet, the inserted end of said converter having a wall cooperable with said belt during insertion of said converter for shifting the belt driving means end of said belt in a direction normal to the path of movement of said converter and axially of said shaft thereby disengaging said clutch means so as to shift said pulley out of driving relation with said fan, thereby breaking the driving relation between said fan and said agitator, said air passageway being shaped to cooperate with said converter to prevent the flow of air from said nozzle to said fan air inlet.

7. A suction cleaner having a floor nozzle, a motor driven suction fan having an air inlet, an air passageway between said air inlet and said nozzle, a surface cleaning agitator in said nozzle, said fan having a shaft rotatable therewith and provided with an annular clutch face within said shaft, a clutch member normally engaged with said clutch face by a spring so as to turn with said shaft, said clutch member forming a pulley, a belt on said pulley extending through said passageway between said agitator and said pulley for driving said agitator during operation of said fan, said air passageway being provided with a laterally extending converter port adjacent said pulley, a converter comprising a hollow air conductive member insertable in said passageway through said port in a direction normal to the axis of rotation of said shaft, said member being open at one end thereof on the sides adjacent said pulley and said fan air inlet, the inserted end of said converter having a wall cooperable with said belt during insertion of said converter for shifting the belt driving means end of said belt in a direction normal to the path of movement of said converter and axially of said shaft thereby disengaging said clutch means so as to shift said pulley out of driving relation with said fan and therefore breaking the driving relation between said fan and said agitator, said air passageway being shaped to cooperate with said converter to prevent the flow of air from said nozzle to said fan air inlet.

8. A suction cleaner having a floor nozzle, a motor driven suction fan having an air inlet, an air passageway between said air inlet and said nozzle, a surface cleaning agitator in said nozzle, said fan having a shaft rotatable therewith, said shaft including clutch means at one end thereof, a clutch member forming a pulley, a belt on said pulley extending through said passageway between said agitator and said pulley for driving said agitator during operation of said fan, a converter port in said air passageway, a converter comprising a hollow air conducting member insertable into said passageway through said port in a direction normal to the axis of rotation of said shaft, said converter being shaped to seat in said passageway so as to prevent the flow of air from said nozzle to said fan air inlet, the inserted end of said converter having a wall cooperable with said belt during insertion of said converter for shifting the belt driving means end of said belt in a direction normal to the path of movement of said converter and axially of said shaft thereby disengaging said clutch means so as to shift said pulley out of driving relation with said fan, thereby breaking the driving relation between said fan and said agitator.

9. A suction cleaner having a casing, a floor nozzle, a motor, a suction fan driven by said motor and having an air inlet, an air passageway in said casing extending between said nozzle and said fan air inlet, a surface cleaning agitator associated with said nozzle and operable for acting upon a surface covering presented to said nozzle during cleaner operation, motor operated belt driving means in said air passageway, a belt in said passageway and arranged on and extending between said agitator and said driving means, the end of said belt arranged on said belt driving means being shiftable along the axis of said driving means between two positions, in one of which positions said driving means drives said belt and agitator during operation of said fan and in the other of which positions said fan operates without said driving means driving said belt and agitator, said belt normally being arranged in said one position so as to drive said agitator simultaneous with fan operation, said air passageway being provided with a laterally facing converter port adjacent said fan air inlet, a converter comprising a hollow air conducting member insertable in said passageway through said port and arranged to obstruct said passageway so as to prevent the flow of air from said nozzle to said fan air inlet, and said converter when arranged in said converter port being in air flow relation with said fan air inlet, said converter and a wall of said passage cooperating to accommodate said belt therebetween, said converter having one wall thereof movable in a direction normal to the axis of rotation of said belt driving means and engageable with said belt during insertion of said converter for shifting said belt in a direction normal to the path of movement of said converter and axially of said driving means from said one position to said other position so as to break the driving relation between said motor and said agitator.

10. A suction cleaner having a casing, a floor nozzle, a motor, a fan driven by said motor and

having an air inlet, an air passageway in said casing extending between said nozzle and said fan air inlet, a surface cleaning agitator associated with said nozzle, said fan being provided with a belt driving means in axial alignment therewith, a belt in said passageway and forming part of a driving connection between said agitator and said belt driving means for driving said agitator during operation of said fan, said air passageway being provided with a laterally facing converter port adjacent said fan air inlet, and means for converting the cleaner for off-the-floor cleaning operations comprising a hollow air conducting converter member insertable in said passageway through said port in a direction normal to the axis of rotation of said belt driving means and into air conducting relation with said fan air inlet, the inserted end of said converter member having a wall cooperable with said belt during insertion of said converter for shifting the belt driving means end of said belt in a direction normal to the path of movement of said converter and axially of and relative to said belt driving means so as to shift said belt out of driven relation with said belt driving means in order to break the driving relation between said motor and said agitator.

11. In a suction cleaner having a casing, a floor nozzle, a motor, a suction fan driven by said motor and having an air inlet, an air passageway in said casing extending between said nozzle and said fan air inlet, a surface cleaning agitator associated with said nozzle and operable for acting upon a surface covering presented to said nozzle during cleaner operation, a shaft driven by said motor, pulley means on said shaft and in said air passageway, a belt in said passageway and arranged on and extending between said pulley means and said agitator, the end of said belt

arranged on said pulley means being shiftable axially of said shaft between two positions, in one of said positions said pulley means driving said belt and agitator during operation of said fan and in the other of said positions said fan operating without said pulley means driving said belt and agitator, said belt normally being arranged in said one position so as to drive said agitator simultaneously with fan operation, said air passageway being provided with a laterally facing converter port adjacent said fan air inlet, a converter comprising a hollow air conducting member insertable in said passageway through said port and arranged to obstruct said passageway so as to prevent the flow of air from said nozzle to said fan air inlet, and said converter when arranged in said converter port being in air flow relation with said fan air inlet, said converter having a fixed cam surface thereon movable across the strands of said belt between said pulley means and said agitator during insertion of said converter, said cam surface cooperating with said belt for shifting said belt axially of said shaft from said one position to said other position so as to break the driving relation between said motor and said agitator.

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