July 6, 1954 R. L. TRIMBLE 2,682,680

CONVERSION ARRANGEMENT FOR SUCTION CLEANERS

Filed March 17, 1948 4 Sheets-Sheet 1

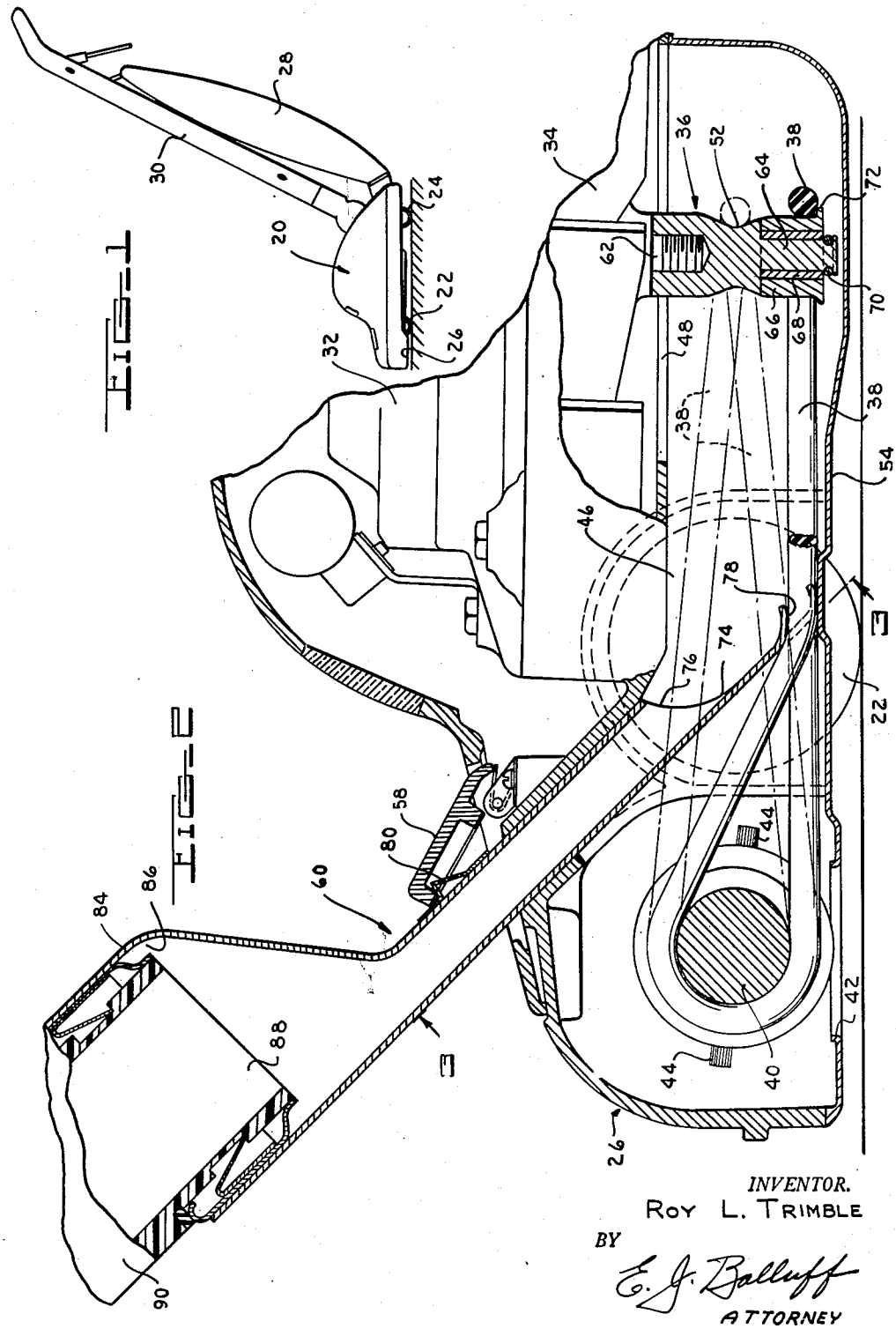


FIG. 1

FIG. 2

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CONVERSION ARRANGEMENT FOR SUCTION CLEANERS

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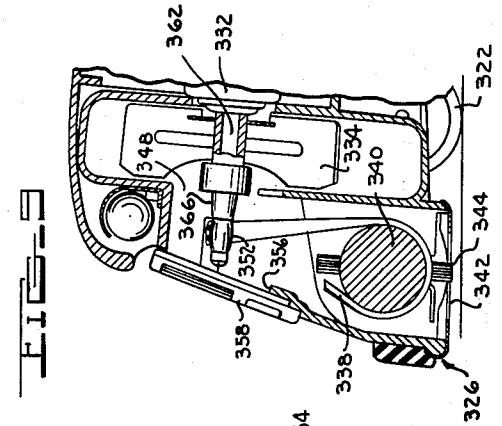


FIG. 9

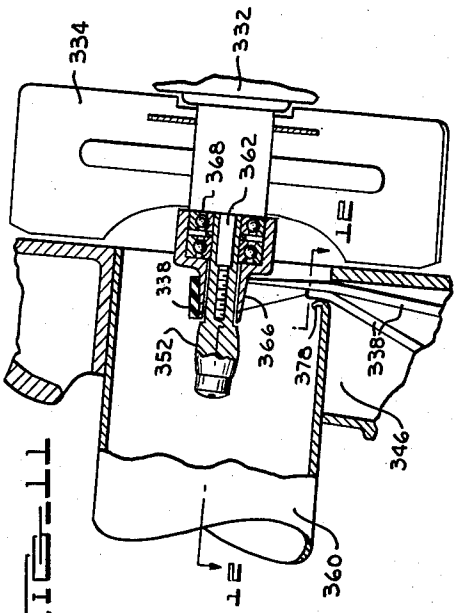


FIG. 11

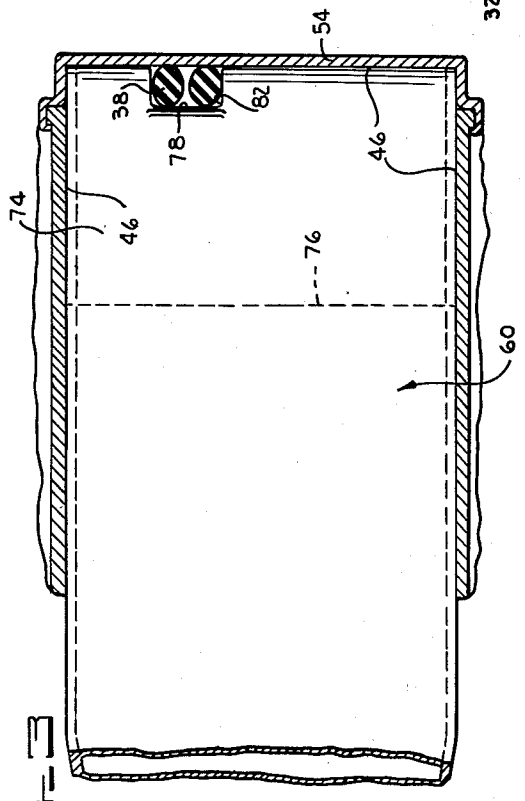


FIG. 8

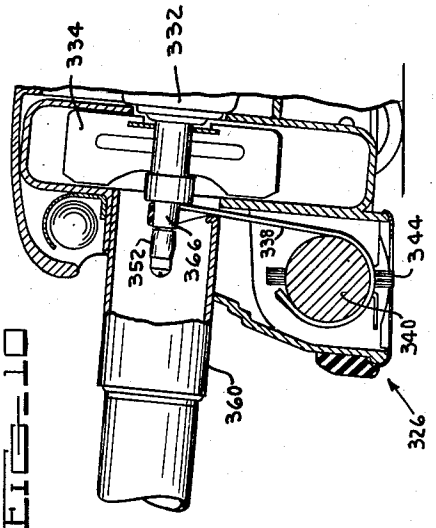


FIG. 10

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CONVERSION ARRANGEMENT FOR SUCTION CLEANERS

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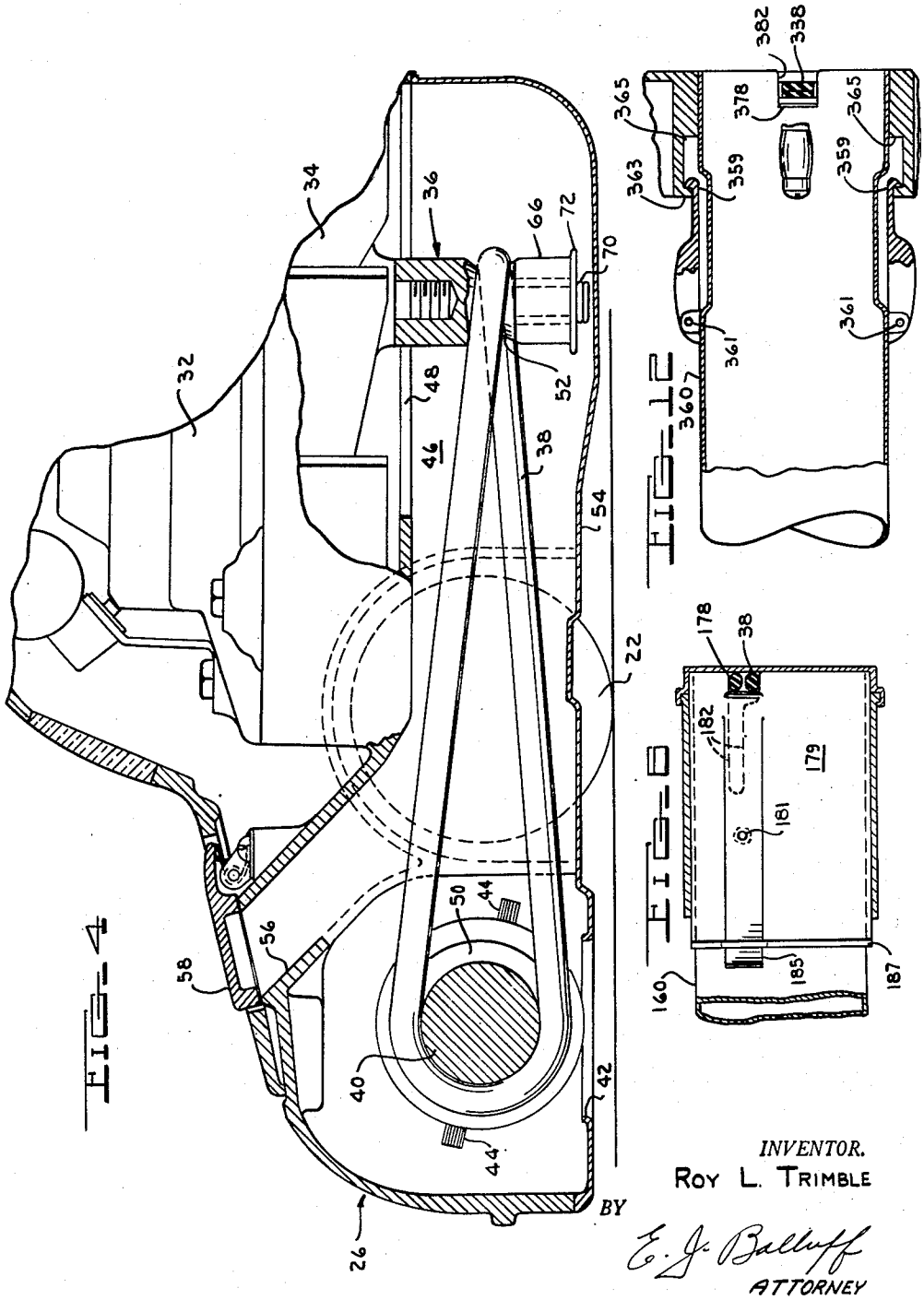


FIG-4

FIG-12

FIG-8

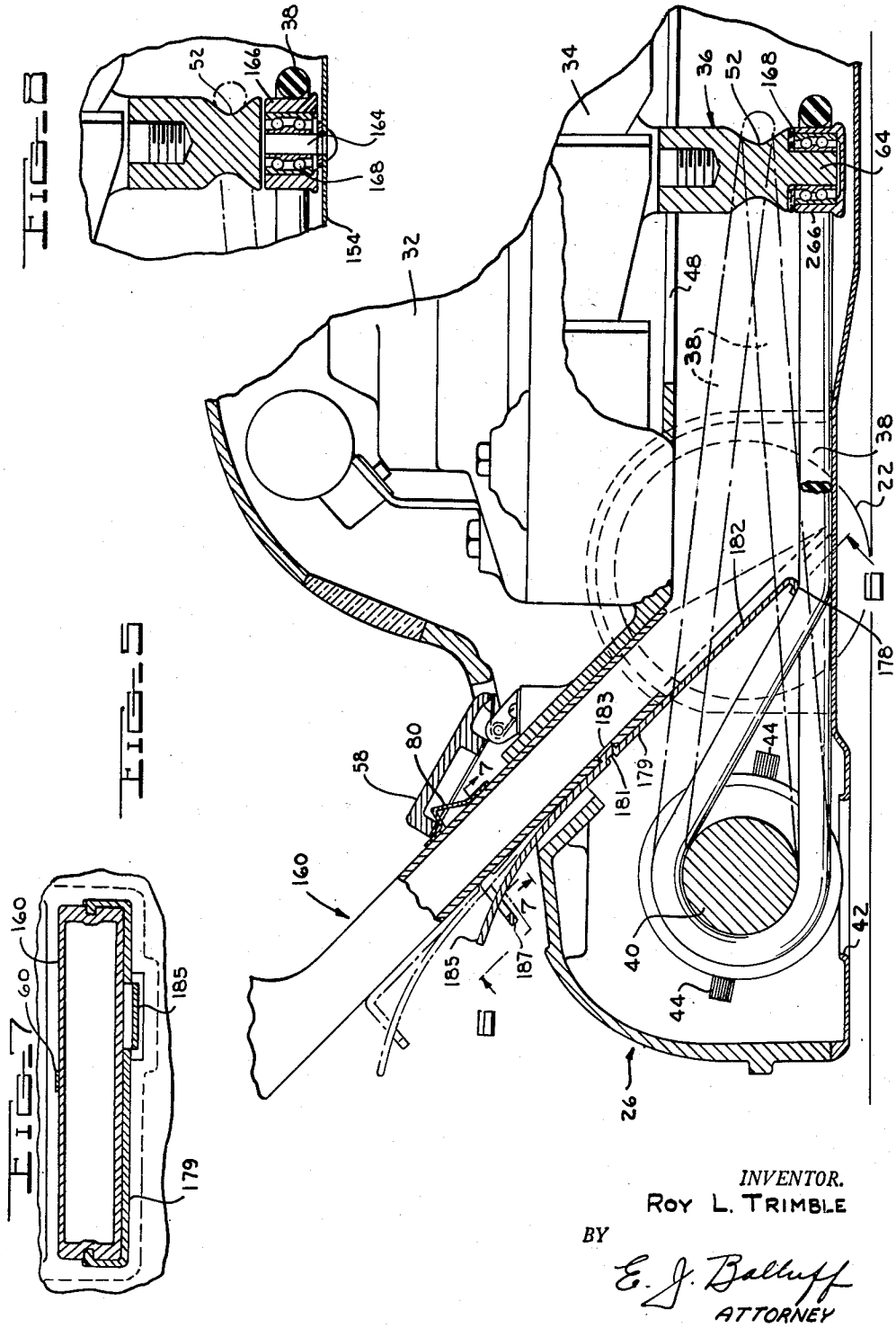
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CONVERSION ARRANGEMENT FOR SUCTION CLEANERS

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2,682,680

UNITED STATES PATENT OFFICE

2,682,680

CONVERSION ARRANGEMENT FOR SUCTION CLEANERS

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Application March 17, 1948, Serial No. 15,430

15 Claims. (Cl. 15—332)

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This invention relates to floor type suction cleaners in general and has particular reference to certain new and useful improvements whereby the cleaner may be converted for off-the-floor cleaning operations.

More particularly the invention embraces a suction cleaner provided with a surface covering cleaning nozzle and an agitator associated therewith having new, efficient and simple means whereby the driving connection between the motor of the cleaner and the agitator may be broken in order that the cleaner may be used for suction cleaning and other operations where operation of the agitator is not desired.

A principal object of the invention, therefore, is to provide in a suction cleaner of the type indicated a new and improved arrangement for breaking the driving connection between the motor of the cleaner and the agitator thereof.

Another object of the invention is to provide in a suction cleaner of the type indicated 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 from the following description and claims and will be understood by reference to the accompanying drawings, of which there are four 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 those 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. I also contemplate that of the several different features of my invention, certain ones thereof may be advantageously employed in some applications separate and apart from the remainder of the features.

In the drawings:

Fig. 1 is a side elevational view of a cleaner embodying the invention;

Fig. 2 is an enlarged, fragmentary vertical sectional view of the cleaner illustrated in Fig. 1 arranged for off-the-floor cleaning operations;

Fig. 3 is a fragmentary sectional view taken along the line 3—3 of Fig. 2, looking in the direction of the arrows;

Fig. 4 is a view similar to Fig. 2 but showing the cleaner arranged for normal on-the-floor cleaning operations;

Fig. 5 is a view similar to Fig. 2 and illustrating a modified form of the invention;

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Fig. 6 is a fragmentary sectional view taken along the line 6—6 of Fig. 5, looking in the direction of the arrows;

Fig. 7 is a fragmentary sectional view taken along the line 7—7 of Fig. 5, looking in the direction of the arrows;

Fig. 8 is a fragmentary sectional view showing a modification of the aforesaid embodiments employing different belt driving and securing means;

Fig. 9 is a fragmentary sectional view of another type of cleaner embodying the invention and arranged for normal on-the-floor cleaning operations;

Fig. 10 is a view similar to Fig. 9 but illustrating the cleaner arranged for off-the-floor cleaning operations;

Fig. 11 is an enlarged fragmentary view of part of the mechanism illustrated in Fig. 10; and

Fig. 12 is a fragmentary sectional view taken along the staggered line 12—12 of Fig. 11.

A suction cleaner embodying the invention may, as illustrated in Fig. 1, comprise a body or casing 20 provided with front and rear wheels 22 and 24, a surface covering cleaning nozzle 26, a dirt collecting and filtering bag 28, and a handle 30 pivoted to the cleaner and forming a means for maneuvering the same over a surface or surface covering to be cleaned.

The cleaner further includes, as illustrated in Figs. 2 and 4, an electric motor 32, a suction creating fan 34, a belt driving means indicated generally at 36, a belt 38 and a surface covering agitator 40 operatively associated with the nozzle 26. The nozzle 26 is provided with a downwardly presented mouth 42 arranged to be passed over a surface covering to be cleaned. The surface covering agitator 40 may comprise a rotary body provided with beating and/or sweeping bristles 44 and rotatably mounted in the nozzle 26 and arranged so that the bristles or tufts 44 will beat and/or sweep the surface covering presented to the nozzle mouth 42.

The interior of the nozzle 26 is connected by an air passageway 46 with the air inlet 48 to the fan 34, and during normal floor cleaning operations the belt 38 is arranged as illustrated in Fig. 4 to run on a pulley 50 on the agitator 40 and on a pulley 52 forming a part of the belt driving means 36 so that during operation of the fan 34 by the motor 32 the agitator 40 will be driven. As is well known, the operation of the fan induces a flow of air into the nozzle 26 through the mouth 42 thereof, and such air is conducted through the passage 46 and the fan air inlet 48 into the fan which pumps such air

into the dirt collecting and filtering bag 28 which functions to separate the dirt from the air and to permit the escape of the air. The flow of air into the nozzle mouth 42 lifts or tends to lift the surface covering into contact with the mouth of the nozzle where the surface covering agitator 40 is effective to beat and/or sweep such surface covering in order to expedite the removal of dirt therefrom.

The passageway 46 and the nozzle mouth 42 may be formed by a removable bottom plate 54. An upwardly facing converter port 56, normally closed during floor cleaning operations by a cover 58, communicates with the air passageway 46 and is adapted to receive, when the cover 58 is open, as illustrated in Fig. 2, a coupling or converter member indicated generally at 60, the cross section of the converter member 60 being shaped so as to fit that of the port 56.

The belt driving means 36 which includes the pulley 52 includes the motor 32 and its shaft 62, it being understood that the fan 34 is mounted upon and driven by the motor shaft 62, as is the pulley 52. A reduced extension 64 of the pulley 52 forms a shaft on which an idler 66 is journalled by means of sleeve bearing 68. A snap ring 70 retains the idler 66 assembled on the shaft 64, and the idler is provided with a radially extending flange 72 to limit the downward displacement of the belt 38.

In the modification illustrated in Fig. 8 the idler 166 is journalled by means of a ball bearing 168 on a stub shaft 164 which is mounted on the removable bottom plate 154. In both cases the idler is aligned with and adjacent the pulley 52 so that the belt 38 may be shifted from one to the other, as will be explained more fully hereinafter.

The converter or coupling member 60 comprises a hollow air conducting member which is insertable in the passageway 46 through the port 56, and when so arranged obstructs the passageway 46 so as to prevent the flow of air from the nozzle 26 to the fan air inlet 48. The inserted end 74 of the converter member 60 is shaped to fit and seat in the passageway 46, as illustrated in Figs. 2 and 3, and when so arranged the interior of the converter is in air flow relation with the fan air inlet 48, the converter member 60 on the fan air inlet side thereof being formed as indicated at 76 so that air is free to flow from the interior of the converter member 60 through the passageway 46 into the fan through the inlet 48 thereof.

A part 78 of the inserted end of the converter during movement of said converter toward its seat in the passageway is engageable with the strands of the belt 38 for shifting the belt driving means end of the belt 38 out of driven relation with the belt driving means 36 and on to the idler 66 so as to break the driving relation between the motor 32 and the agitator 40 while permitting the continued operation of the fan 34 by the motor 32.

The converter port cover 58 may be employed as a keeper to cooperate with the latch 69 on the converter member 60 for securing the converter 60 in properly assembled relation with the cleaner, as illustrated in Fig. 2.

The belt 38 is formed of elastic material and the engaged portion of the belt is displaced laterally out of a straight line condition, that is, its normal running position, by the converter 60, and the belt is stretched by the insertion of the converter 60 which engages the belt between the agitator 40 and the pulley 52 so that upon removal of the converter from the cleaner the belt will automatically restore itself in driven relation with the pulley 52. The strands of the belt 38, when the converter 60 is inserted in the passage 46 as just described, are accommodated between the inserted end 74 of the converter and the wall of the passageway formed by the bottom plate 54 by a notch 82 provided in the converter 60 below the belt engaging part 78 thereof.

The exterior end 84 of the converter member 60 may be formed as illustrated to provide a socket 86 of a coupling which is adapted to detachably receive the coupling end 88 on one end of a flexible hose 90, to the other end of which various suction cleaning tools may be connected as is customary.

The force exerted during movement of the converter 60 toward its seat in the passageway 46 by the part 78 of the converter on the strands of the belt 38 will cause the belt to run off of the pulley 52 and on to the idler 66. Since the idler 66 is free to turn on the shaft 64, it will be apparent that the belt 38 when on the idler 66 will not be driven, and hence the agitator 40 will be at rest. The friction between the converter 60 and the strands of the belt 38 and the latter and the bottom plate 54 will prevent the driving of the belt 38 by the idler 66 even though there may be some friction between the bearing 68 and the shaft 64. Preferably the bearing 68 should have a free running fit on the shaft 64.

In the embodiment illustrated in Figs. 5, 6 and 7 the cleaner per se without reference to the removable converter element 160 is the same as that illustrated in the preceding modifications, except that a ball bearing 168 is employed like that shown in Fig. 8, and the idler 266 and the bearing 168 are mounted on the reduced shaft 64 formed on the end of the belt driving means 36. Hence the same reference characters will be used in Figs. 5, 6 and 7 to indicate parts which are the same as those in the previous modifications.

The converter 160 is quite similar to the converter 60 except that the notch 182 therein is of such length that the inserted end of the converter 160 may be seated in the air passageway without shifting the belt 38 out of its driven relation with the belt driving means 36.

A member 179 is slidable on the outside of the converter 160 and has an end 178 thereof which is movable across the slot 182 to engage the strands of the belt 38 in order to cause the belt to shift out of engagement with the pulley 52 and on to the idler 266 in the same manner as that previously described with reference to the end 78 of the converter member 160. The slide member 179 also closes that part of the slot above the strands of the belt 38. In its belt disengaged position the slide member 179 is locked against movement relative to the converter member 160 by means of a detent and notch indicated at 181 and 183. The slide member 179 is retractable independently of the remainder of the converter member 160 since the detent 181 is carried on a spring finger 185 whereby the detent 181 may be separated from the notch 183 in order to permit the slide member 179 to shift to its upper position as indicated in dotted lines relative to the remainder of the converter 160. The slide member 179 is provided with a tab or handle 187 whereby it may be advanced or retracted relative to the converter member 160. With this arrangement it

is possible to drive the agitator of the cleaner without having air flow into the nozzle of the cleaner. This might be desirable in some cases where a rotary brush is employed in the nozzle in lieu of the agitator 40 for scrubbing and/or polishing operations per se without reference to cleaning operations. From the foregoing it will be evident that with the arrangement provided the cleaner may be employed for straight suction cleaning operation without operation of the agitator, or the agitator may be operated without providing for the flow of air into the nozzle 26

In the modification illustrated in Figs. 9, 10 11 and 12 a form of the invention employing a horizontal shaft motor cleaner is illustrated. Such a cleaner includes a motor 332, a fan 334, a fan air inlet 348, a nozzle 326 having a downwardly presented nozzle mouth 342, and a rotary brush and/or agitator 340 having heating and/or sweeping means 344. A converter port 356 is aligned with the fan air inlet 348 and is closed by a converter port cover 358 suitably detachably held in place.

The agitator 340 is driven by means of a belt 338 from a belt driving means which includes a pulley 352 on which the belt runs. The belt driving means is mounted on the shaft 362 of the motor 332 and on which shaft the fan 334 is mounted so that during normal floor cleaning operation, for which the cleaner as illustrated in Fig. 9 is arranged, the fan 334 will be operated while the agitator 340 is being driven so that the agitator will beat and/or sweep the surface covering presented to the nozzle mouth 342 and the fan 334 will effect a flow of dirt laden air into the nozzle through the mouth 342 thereof, thence through the fan air inlet 348, and is thence pumped by the fan 334 into a suitable dirt collecting and filtering means, such as a bag like that illustrated in Fig. 1. The cleaner shown in Fig. 9 is supported on front and rear supporting wheels 322.

When it is desired to convert the cleaner for off-the-floor cleaning operations, the converter port cover 358 is removed and a converter 360 is inserted in the port 356 and seated in the fan air inlet 348 as shown in Figs. 10, 11 and 12. In the previous modifications the converter was rectangular in cross section, whereas in the present instance the converter member 360 is circular in cross section as is the converter port 356 and the fan air inlet 348.

Spring pressed latches 359 pivoted at 361 on the outside of the converter member 360 engage keepers 363 formed at the outer ends of slots 365 for detachably securing the converter to the cleaner. The inserted end of the converter 360 is provided with a notch 382 for accommodating the belt 338, and a part 378 of the inserted end of the converter is engageable with the strands of the belt 338 during the insertion of the converter 360 into the converter port and upon movement of the converter member toward its seat in the passageway 346 to engage the strands of the belt 338 and shift the belt driving means end thereof off of the pulley 352 and on to the idler 366, the idler being mounted on a bearing 368 so that it is free to run on the shaft 362.

By pressing the latches 359 toward each other they may be disengaged from the keepers 363 and the converter 360 may be withdrawn from the cleaner.

The belt 338 is elastic and stretched when in the position shown in Figs. 10, 11 and 12 so that upon removal of the converter from the cleaner

the belt will return to its driven relation with the pulley 352. The slight frictional drag between the hub of the idler 366 and the shaft on which it is mounted will permit the idler 366 to turn sufficiently when the converter coupling 360 is removed to permit the belt to run off of the idler 366 and on to the pulley 352. Of course a belt and pulley of the kind illustrated in the other modification may be employed in this modification if desired, the round cross section belt shown in the other modification having a tendency to roll about its own axis, which possibly might make such form of belt easier to shift between its idler and its driving pulley.

The converter 360 when inserted in the cleaner as shown in Figs. 10, 11 and 12 extends across the air passageway 346 between the nozzle 326 and the fan air inlet 348 and hence shuts off the flow of air through the nozzle 326 when the converter 360 is inserted. After the converter has been removed and the converter port cover 358 reassembled to the converter port, the cleaner is ready for on-the-floor cleaning operations. The converter 360, like that illustrated in the other modifications, is provided with coupling means whereby a flexible hose may be attached thereto.

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. In a suction cleaner, a body, a floor nozzle, a motor, a suction fan driven by said motor and provided with an air inlet, an air passageway in said body 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, said fan having a shaft provided with a pulley in said air passageway, an idler aligned with and adjacent said pulley, a belt in said passageway and arranged in driving relation with said agitator and said pulley for driving said agitator during operation of said fan, said air passageway being provided with a converter port, 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, a part of said converter during movement into said passageway being engageable with said belt between said pulley and said agitator for shifting said belt 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 belt being elastic and being stretched when shifted onto said idler, said idler being arranged relative to said pulley to permit said belt to automatically shift itself back onto said pulley when said part of said converter is disengaged from said belt.

2. A suction cleaner according to claim 1 wherein said converter port is upwardly facing and arranged between said nozzle and said fan air inlet; and said idler is arranged on the side of said pulley remote from said fan.

3. A suction cleaner according to claim 1

wherein said converter port is aligned with said fan air inlet and said idler is arranged on the same side of said pulley as said fan.

4. A suction cleaner according to claim 1 wherein said idler is carried by said fan shaft.

5. For use with a suction cleaner having a body, a floor nozzle, a motor, a suction fan driven by said motor and provided with an air inlet, an air passageway in said body 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 pulley in said air passageway driven by said motor, an idler aligned with said pulley, a belt in said passageway and arranged in driving relation with said agitator and said pulley for driving said agitator during operation of said fan, said air passageway being provided with a converter port, 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, a part of said converter during insertion thereof into said passageway being engageable with said belt and operative during the inserting movement of said converter for shifting the belt onto said idler so as to break the driving relation between said motor and said agitator.

6. For use with a suction cleaner having a body, a floor nozzle, a motor, a suction fan driven by said motor and provided with an air inlet, an air passageway in said body 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 pulley driven by said motor, an idler aligned with said pulley, a belt extending through said passageway and arranged in driving relation with said agitator and said pulley for driving said agitator during operation of said fan, said air passageway being provided with a converter port, a converter comprising a hollow air conducting member insertable in said passageway through said port, the inserted end of said converter being shaped to fit and seat in said passageway so as to prevent the flow of air from said nozzle to said fan air inlet, and said converter when so arranged in said converter port being in air flow relation with said fan air inlet, means for securing said converter when so arranged to said cleaner, a part of said converter during movement of said converter toward its seat in said passageway being engageable with said belt for shifting the same onto said idler so as to break the driving relation between said motor and said agitator.

7. For use with a suction cleaner having a body, a floor nozzle, a motor, a suction fan driven by said motor and provided with an air inlet, an air passageway in said body 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 pulley in said air passageway driven by said motor, an idler aligned with said pulley, a belt in said passageway and arranged in driving relation with said agitator and said pulley for driving said agitator during operation of said fan, said air passageway being provided with a converter port, converter means adapted to be positioned across said passageway and shaped to fit in said passageway so as to prevent the flow of air from said nozzle to said fan air inlet and to establish flow of air into said passageway through said converter port during operation of said fan, part of said converter means during movement thereof toward such position across said passageway being engageable with said belt for shifting the same onto said idler so as to break the driving relation between said motor and said agitator, said converter means and a wall of said passageway cooperating to accommodate therebetween said belt when positioned on said idler.

8. A suction cleaner having a body, a floor nozzle, a motor, a fan driven by said motor and provided with an air inlet, an air passageway in said body extending between said nozzle and said fan air inlet, a surface cleaning agitator associated with said nozzle, a shaft driven by said motor and provided with belt driving means, a belt extending through said passageway and forming at least part of a driving connection between said agitator and said belt driving means for driving said agitator during operation of said fan, said cleaner having a converter port communicating with said air passageway, and means for converting the cleaner for off-the-floor cleaning operations comprising an idler adjacent and aligned with said belt driving means and a converter comprising a hollow air conducting member insertable in said converter port in air flow relation with said fan air inlet, said converter being engageable with said belt between said belt driving means and said agitator for displacing said belt axially out of engagement with said belt driving means and onto said idler so as to break the driving relation between said motor and said agitator, said belt being elastic and an engaged portion thereof being stretched and displaced by said converter out of a straight line condition when said belt is shifted onto said idler by said converter, whereby disengagement of said converter from said belt will cause said belt to automatically restore itself to driving relation with said belt driving means.

9. A suction cleaner according to claim 8 wherein said idler is carried by said fan shaft.

10. A suction cleaner according to claim 8 wherein a stub shaft is arranged in line with said fan shaft and said idler is mounted on said stub shaft.

11. A suction cleaner according to claim 8 wherein said converter is provided with a notch for accommodating said belt and a belt engaging member movable across said notch forms said part which shifts said belt out of driving relation with said belt driving means.

12. A suction cleaner having a body, a floor nozzle, a motor, a suction fan driven by said motor and provided with an air inlet, an air passageway in said body 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, belt driving means driven by said motor, an elastic belt in said passageway and forming at least 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 converter port, a converter comprising a hollow air conducting member, internally free of obstructions, insertable in said

passageway through said port, the inserted end of said converter being shaped to fit and seat in said passageway so as to prevent the flow of air from said nozzle to said fan air inlet, and said converter when so arranged in said converter port being in air flow relation with said fan air inlet, a belt receiving member adjacent said belt driving means, a part of said converter being engageable with said belt between said belt driving means and said belt receiving member so as to stretch and displace the engaged portion of said belt out of a straight line condition and in a direction to effect displacement of the belt driving means end of said belt axially of said belt driving means and onto said belt receiving member for shifting the belt out of driven relation with said belt driving means so as to break the driving relation between said motor and said agitator, said belt due to the elasticity thereof being automatically movable from said belt receiving member back into driven relation with said belt driving means upon disengagement of said part of said converter from said belt.

13. A suction cleaner according to claim 12 wherein said part of said converter is operable by and during the insertion of said converter into said passageway to shift said belt out of driven relation with said belt driving means.

14. A suction cleaner having a body, a floor nozzle, a motor, a suction fan driven by said motor and provided with an air inlet, an air passageway in said body 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, belt driving means driven by said motor, a belt in said passageway and forming at least 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 converter port, converter means adapted to be positioned across said passageway and shaped to fit in said passageway so as to prevent the flow of air from said nozzle to said fan air inlet and to establish flow of air into said passageway through said converter port during operation of said fan, a belt receiving member adjacent said belt driving means, said belt receiving member being free from operative connection with said belt driving means so that the latter may be driven by said motor while said belt receiving member remains stationary, a part of said converter means being engageable with said belt between said belt driving means and agitator so as to stretch and displace a strand of said belt out of a straight line condition between said belt driving means and said agitator so as to displace the belt driving means end of said belt axially of said belt driving means and onto said belt receiving member for shifting said belt out of driven relation with said belt driving means so as to break the driving relation between said motor and said agitator, said part of said converter means and a wall of said passageway cooperating to accommodate said belt therebetween, said part of said converter means being operable to shift said belt out of said driven relation during movement of said part toward said wall of said passageway.

15. A suction cleaner having a body, a floor nozzle, a motor, a suction fan driven by said motor and provided with an air inlet, an air passageway in said body 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 driven belt driving means, an idler coaxial with and adjacent said belt driving means, 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 converter port, 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, said converter having a notch for accommodating said belt, and said converter port being in air flow relation with said fan air inlet, said converter having means movably mounted on the outside thereof engageable with said belt between said belt driving means and said agitator for shifting said belt axially of said belt driving means onto said idler and out of driven relation with said belt driving means so as to break the driving relation between said motor and said agitator, said belt being elastic and the engaged portion thereof being bent out of a straight line condition by said movable means, said idler being arranged relative to said belt driving means to permit said belt to automatically shift itself back onto said belt driving means when said movable means is disengaged from said belt.

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