Oct. 5, 1948. D. C. GERBER 2,450,828

CONVERTER FOR SUCTION CLEANERS

Filed May 12, 1943 3 Sheets-Sheet 1

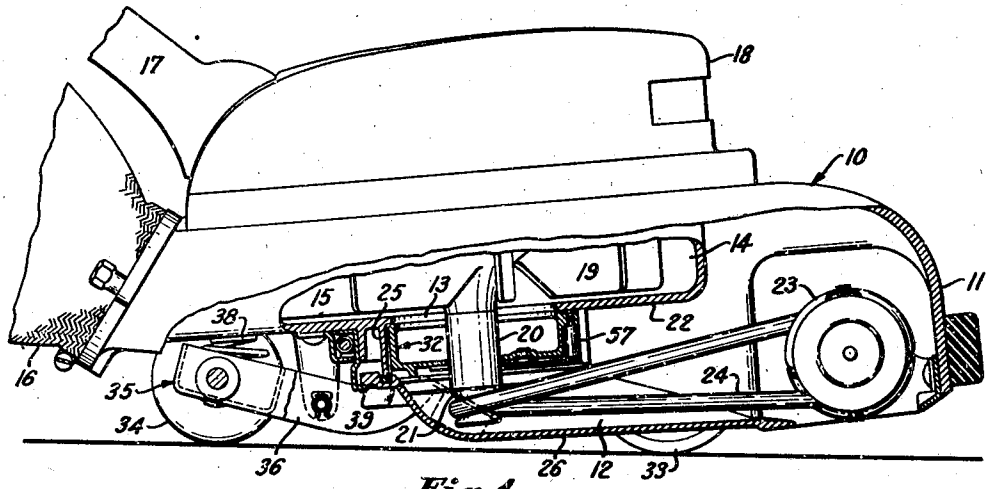


Fig. 1

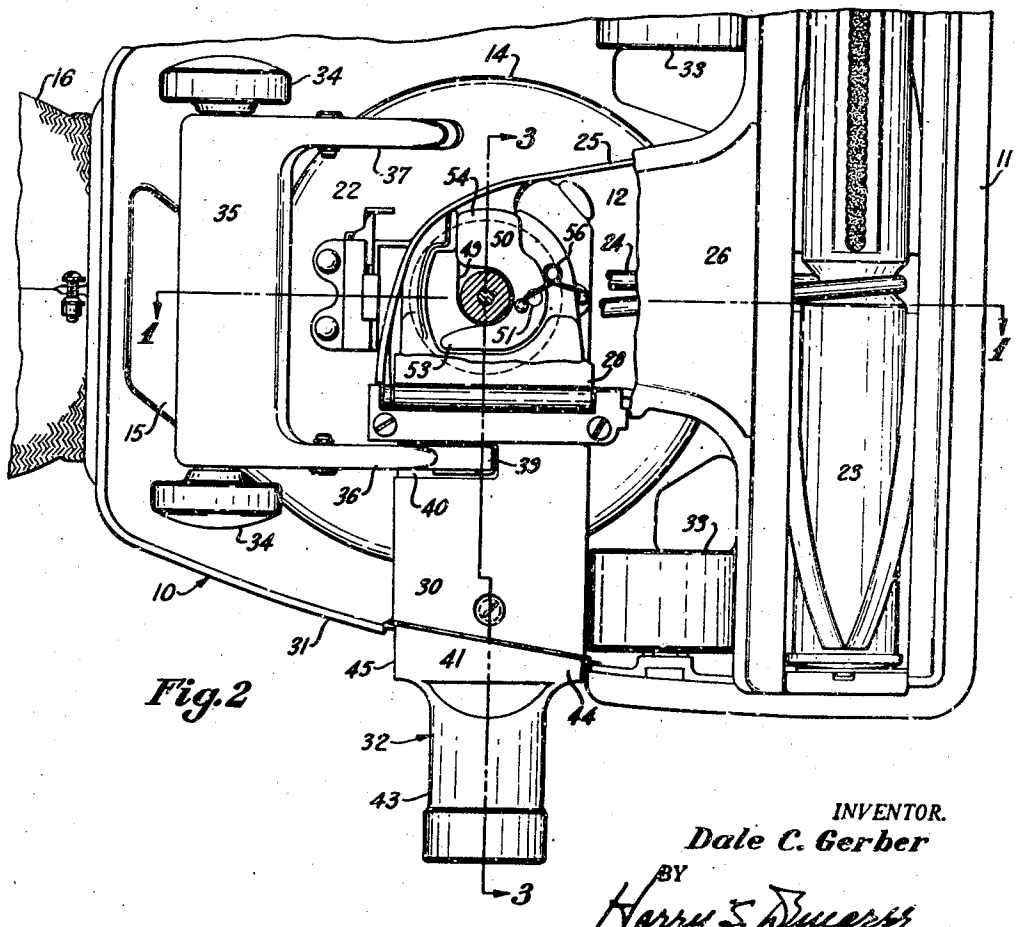


Fig. 2

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CONVERTER FOR SUCTION CLEANERS

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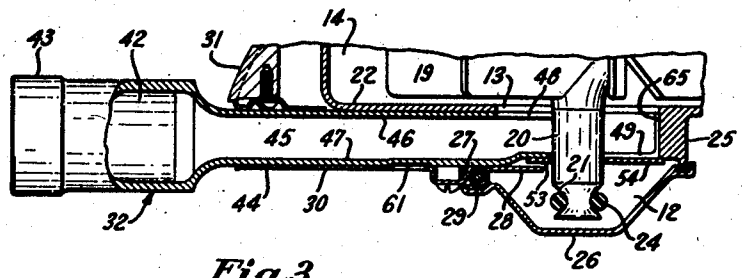


Fig. 3

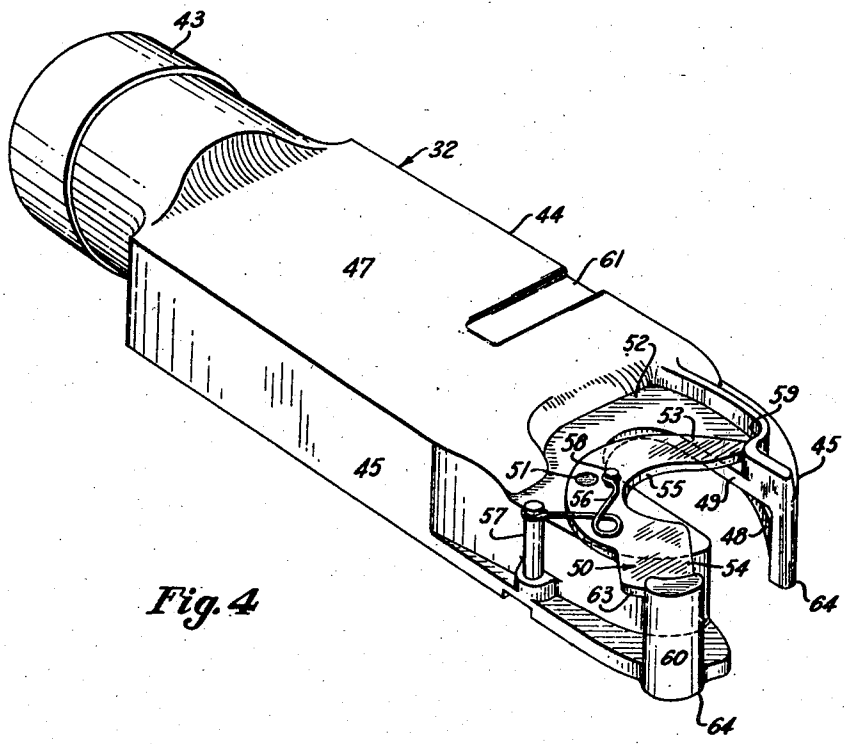


Fig. 4

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CONVERTER FOR SUCTION CLEANERS

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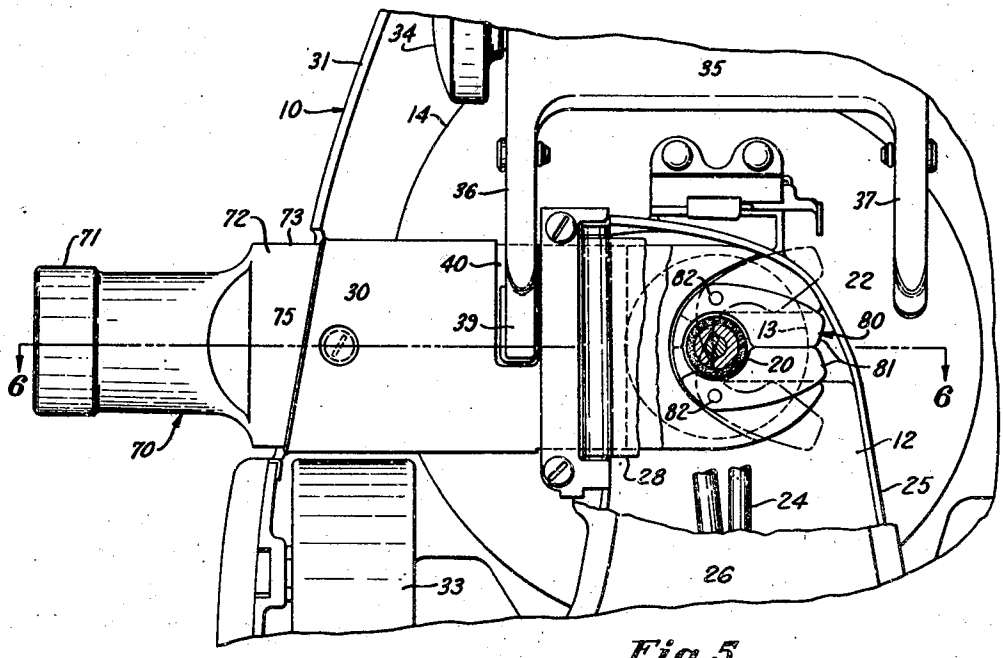


Fig. 5

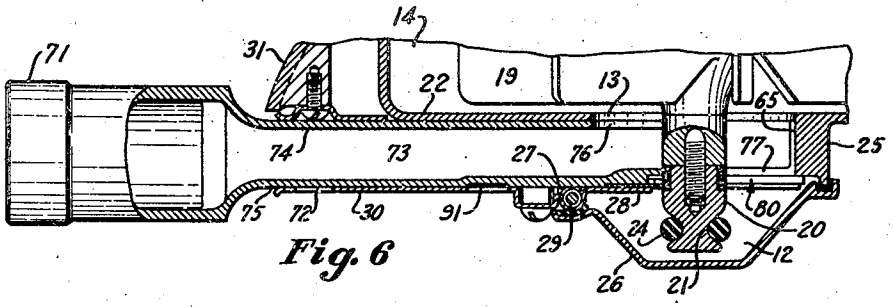


Fig. 6

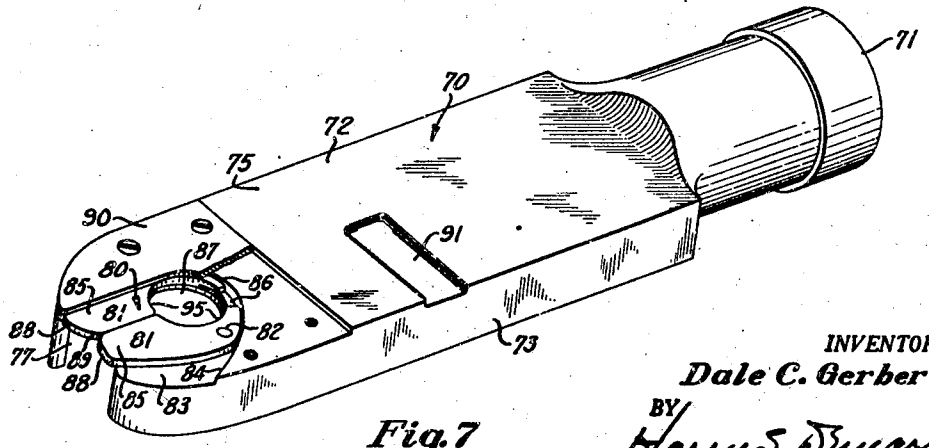


Fig. 7

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UNITED STATES PATENT OFFICE

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CONVERTER FOR SUCTION CLEANERS

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Application May 12, 1943, Serial No. 486,632

8 Claims. (Cl. 15—16)

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The present invention relates to suction cleaners generally and more particularly to a new and improved dusting tool converter and its connection to the suction cleaners for converting the cleaner from an on-the-floor unit to an off-the-floor unit.

An object of the invention is to provide a new and improved suction cleaner. Another object is to provide a new and improved converter element for off-the-floor cleaning. A further object is to provide a converter element having valve means to enclose the motor shaft. Another object is to provide a converter element having valve means actuated by the motor shaft to close the valve about the motor shaft to seal the cleaner nozzle from the suction creating means. Further objects and advantages of the invention will be apparent from the following specification and drawings, wherein:

Figure 1 is a side elevation, partly in section, taken along the line 1—1 of Figure 2, showing the suction cleaner in position for off-the-floor cleaning;

Figure 2 is a bottom plan view of Figure 1 showing the converter element in position;

Figure 3 is a section along the line 3—3 of Figure 2;

Figure 4 is a perspective view of the converter element disconnected from the suction cleaner;

Figure 5 is a bottom plan view with parts broken away disclosing another embodiment of the invention with the converter element in position for off-the-floor cleaning;

Figure 6 is a section along the line 6—6 of Figure 5, and

Figure 7 is a perspective view of the converter element disconnected from the suction cleaner.

The embodiment of the invention disclosed in Figures 1 to 4 comprises a suction cleaner having a body 10 provided with a nozzle 11 interiorly connected through a suction air passageway 12 with an eye 13 of a fan chamber 14 from which rearwardly extends an exhaust passageway 15 for conveying dirt-laden air into a dirt filtering bag 16 removably attached at its lower end to the cleaner body 10 and at its upper end supported by a handle 17 pivotally mounted on the cleaner body. A housing 18 encloses an unshown motor positioned on the cleaner body 10 above the fan chamber and its shaft extends downwardly through the chamber 14 where it carries a fan 19, and attached to the lower end of the motor shaft is a pulley 20 in the suction air passageway 12, the pulley 20 having a belt engaging groove 21 spaced below the bottom wall 22 of the fan chamber 14. An agitator 23 is rotatably mounted in the nozzle 11 and is driven by a power transmitting belt 24 connected to the pulley groove 21. The suction air passageway 12 extends from the nozzle 11 to the fan eye 13 and is formed by a wall 25 depending from the cleaner body 10 and a removable bottom plate 26. An opening 27 is provided in the wall 25 of the suction air passageway adjacent the fan eye 13 and is normally closed by a spring actuated valve 28 pivotally mounted along its lower edge on a pin 29 supported on a converter receiving casing 30. The converter receiving casing 30 is of rectangular cross-section and extends from the suction air passageway wall 25 transversely of the cleaner body to a depending skirt 31 for reception of a dusting tool converter element 32 when the cleaner is converted to off-the-floor cleaning.

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The cleaner body is supported on front and rear wheels 33 and 34, respectively, the front wheels having a greater tread area than the rear wheels to maintain the nozzle 11 in proper adjustment with the surface being cleaned. The rear wheels 34 are rotatably supported on a bracket 35 pivotally attached to the cleaner body 10 and is provided with forwardly extending arms 36 and 37, which are normally urged by a spring 38 to abut the fan chamber bottom wall 22 for maintaining the cleaner nozzle in its proper range of adjustment for on-the-floor cleaning. The arm 36 of the wheel supporting bracket 35 has an extension 39 which projects through an opening 40 in the converter receiving casing 30 to act as a barrier to prevent insertion of the converter element 32 into the suction air passageway 12 unless the nozzle 11 is raised off the surface into position for off-the-floor cleaning.

The converter element 32 which converts the cleaner for off-the-floor cleaning, comprises a hollow body 42 having at one end a tubular portion 43 to which is removably connected an unshown flexible hose provided at its opposite end with a suitable unshown cleaning tool for engagement with the surface to be cleaned. Adjacent the tubular portion 43 is a rectangular portion 44 formed with a side wall 45, a top wall 46 and a bottom wall 47. At the forward end of the converter body in the top wall 46 is an opening 48 of substantially the size of the fan eye 13, and a slot 49 is formed in the side wall 45 and bottom wall 47 for the reception of a part of the belt pulley 20 which extends between the fan chamber bottom wall 22 and the belt 24.

The slot 49 is closed by a valve 50 of substantially hook-shape pivotally mounted on a pin 51

supported on a depressed area 52 of the bottom wall 47. The valve 50 is provided with an arcuate section 53 and a slot closing section 54 and between these two sections is a curved marginal edge 55. A spring 56 has one end attached to a pin 57 mounted on the converter top wall 46 and the opposite end of the spring is attached to a pin 58 on the valve 50, and the spring functions normally to maintain the arcuate portion 53 of the valve across the slot 49 so that it abuts a shoulder 59 on the converter element 32, while the slot closing portion 54 of the valve is clear of the slot and is protected by an abutment 60 provided at the forward end of the converter element. A depression 61 is provided in the converter bottom wall 47 for receiving the barrier 39 to lock the converter element in proper position in the cleaner body for off-the-floor cleaning.

In normal on-the-floor cleaning, the cleaner body 10 is moved over the surface to be cleaned by the handle 17 and the rotating agitator 23 dislodges the dirt from the surface covering. The suction creating fan 19 draws the air and dirt through the nozzle 11 and suction air passageway 12 and discharges the dirt-laden air into the dirt bag 16.

To convert the cleaner for off-the-floor cleaning, pressure is exerted on the rear end of the motor housing 18 to raise the nozzle 11 from the surface covering and cause the barrier 39 on the wheel bracket 35 to move downwardly away from the cleaner body 10 and out of the converter receiving casing 30 whereby the converter element 32 may be inserted therein. When the converter element 32 is in proper position, the pressure is removed from the motor housing 18 and the barrier 39 moves into the recess 61 in the converter element and holds the latter in position and also maintains the agitator 23 out of the engagement with the surface covering.

As the converter element 32 passes through the converter receiving casing 30, the forward end abuts the valve 28 and pivots it downwardly into the suction air passageway 12. Upon further forward movement of the converter element into the converter receiving casing, the slot 49 passes about the motor pulley 20, and the defining edge 55 of the arcuate portion 53 of the valve 50 contacts the motor pulley 20 which pivots the valve to cause the slot closing portion 54 of the valve to pass about the opposite side of the motor pulley 20 and close the forward end of the slot 49 to cut off communication between the nozzle 11 and the fan chamber 14. When the converter is in proper position, the forward marginal edge 63 of the slot-closing portion 54 of the valve 50 seats beneath the lower defining edge of the depending wall 25, and the forward end 64 of the converter abuts the vertical surface 5 of the depending wall 25 to thereby form a seal against the passage of air therebetween. In this position of the converter element, dirt-laden air is drawn through the unshown dusting tool and flexible hose, the converter element 32, fan eye 13, into the fan chamber 14 and is discharged by the fan 19 into the dirt bag 16.

The foregoing conversion for off-the-floor cleaning can be made, if desired, while the belt 24 is rotating the agitator 23 and these parts remain in operation while the converter element 32 is in use. In order to re-convert for on-the-floor cleaning, pressure is exerted on the rear end of the motor housing 18 to remove the barrier 39 out of the depression 61 in the converter element 32, to thereby unlock the latter and permit its removal from the converter receiving casing 30. Upon removing the converter element 32, the motor pulley 20 contacts the defining edge 55 of the slot-closing valve portion 54 to move the valve 50 to its open position, and such movement is assisted by the spring 56 which causes the valve to shift to position as shown in Figure 4.

Another embodiment of the invention is disclosed in Figures 5 to 7 and comprises a converter element 70 which is inserted in the converter receiving casing 30 of the suction cleaner desribed in the foregoing embodiment. The converter element 70 comprises a hollow body having at one end a tubular portion 71 to which is removably connected un unshown flexible hose provided at its opposite end with a suitable unshown cleaning tool for engagement with the surface to tbe cleaned. Adjacent the tubular portion 71 is a rectangular portion 72 formed with a wall 73, a top wall 74 and a bottom wall 75. At the forward end of the converter body in the top wall 74 is an opening 76 of substantially the size of the fan eye 13 and a slot 77 is formed in the side wall 73 and the bottom wall 75 for the reception of that part of the pulley 20 which extends between the fan chamber bottom wall 22 and the belt 24.

The slot 77 in the converter bottom wall 75 is closed by a valve 80 having two cooperating sections 81 movably supported on pins 82 mounted on the converter bottom wall in a depressed area 83 formed by an arcuate shoulder 84. Each valve section 81 includes a slot-closing portion 85 and a valve-closing portion 86 and these portions cooperate when the valve sections 81 are in closed position to define an opening 87 which is adapted to receive the motor pulley 20. The forward defining edges of the valve sections 81 are curved as indicated at 88 to provide therebetween a substantially V-shaped section 89 when the valve is closed for the initial engagement with the motor pulley 20 to move the valve sections 81 to open position when the converter element 70 is inserted in the converter receiving casing 30, and the portions 86 of the valve sections 81 are offset so as to overlap each other when the valve sections are moved to open position. The valve sections 81 are disposed between the converter bottom wall 75 and a removable plate 90 mounted on the converter bottom wall. A depression 91 is provided in the converter bottom wall 75 for receiving the barrier 39 to lock the converter element 70 in proper position in the cleaner body for off-the-floor cleaning.

The cleaner is placed in position for off-the-floor cleaning in the manner previously described by depressing the rear end of the cleaner body so that the converter element 70 may be inserted into the converter receiving casing 30. As the converter element 70 passes through the converter receiving casing 30, the forward ends 88 of the valve sections 81 abut the valve 28 and pivot it downwardly into the suction air passageway 12. Upon continued insertion of the converter element 70, the forward ends 88 of the valve sections 81 contact the motor pulley 20 which forces the valve sections 81 to spread apart to permit the converter element to be completely inserted to proper position. As the valve sections 81 are moved to open position, the inner ends 86 of the valve sections are caused to move into the slot 77 in the converter bottom wall and thereafter come in contact with the motor pulley 20 to cause the valve sections 81 to pivot in the opposite direction so that the slot-closing por-

tions 85 of the valve sections 81 close off the slot 77 and enclose the motor pulley 20 to cut off communication between the nozzle 11 and the fan chamber 14. In this position of the converter element, dirt-laden air is drawn through the unshown dusting tool and flexible hose, the converter element 70, fan eye 13, into the fan chamber 14 and discharged by the fan into the dirt bag 16.

In order to re-convert for on-the-floor cleaning, pressure is exerted on the rear end of the motor housing 18 to remove the barrier 39 out of the depression 91 to unlock the converter element 70 which can then be removed from the converter receiving casing 30. Upon removing the converter element 70, the defining edges 95 of the slot-closing valve sections 85 abut the pulley 20 which causes the valve sections 81 to pivot to their open position whereby the converter element 70 may be completely removed from the converter receiving casing 30.

I claim:

1. In a suction cleaner, a cleaner body having a nozzle, a fan chamber having a fan eye, a suction air passageway between said nozzle and fan eye, a fan in said fan chamber, a shaft extending through said fan eye into said air passageway, a motor for driving said fan and shaft, means defining a port in said air passageway adjacent said fan eye for receiving a converter element, a converter element insertable through said port into register with said fan eye, means defining a slot on said converter element passing transversely of said shaft, and a valve pivoted intermediate its ends on said converter element, said valve having one portion engageable with said shaft for moving said valve to uncover said slot, and another portion engageable with said shaft for moving said valve to close said slot and seal said nozzle from said fan chamber.

2. In a suction cleaner, a cleaner body having a nozzle, a fan chamber having a fan eye, a suction air passageway between said nozzle and fan eye, a fan in said fan chamber, a shaft extending through said fan eye into said air passageway, a motor for driving said fan and shaft, means defining a port in said air passageway adjacent said fan eye for receiving a converter element, a converter element insertable through said port into register with said fan eye, means defining a slot on said converter element passing transversely of said shaft, and a valve having two cooperating sections pivoted intermediate its ends, each section having portions engageable with said shaft to move said valve sections to uncover said slot and to move said valve sections to close said slot and seal said fan chamber from said nozzle.

3. A dusting tool converter for suction cleaners having a nozzle, a fan chamber having a fan eye, a suction air passageway between said nozzle and fan eye and having a port adjacent said fan eye, a motor for driving a suction creating fan in said fan chamber and driving a shaft extending through said fan eye into said air passageway, and comprising a conduit adapted to be inserted through the port in the passageway into register with the fan eye, said conduit having a slot to accommodate the shaft, and a unitary valve pivotally mounted on said conduit and having a first and a second shaft engaging portion, said first portion engaging said shaft to close said valve upon insertion of the converter, and said second portion engaging said shaft to move said valve to open position when the converter is removed from the suction cleaner.

4. A dusting tool converter for suction cleaners having a nozzle, a fan chamber having a fan eye, a suction air passageway between said nozzle and fan eye and having a port adjacent said fan eye, a motor for driving a suction creating fan in said fan chamber and driving a shaft extending through said fan eye into said air passageway, comprising a conduit adapted to be inserted through the port in the passageway into register with the fan eye, said conduit having a slot to accommodate the shaft, and a valve comprising cooperating sections pivotally mounted on said conduit, each of said sections having a first and a second portion engageable with the shaft, engagement of said first portion opening said valve to permit passage of said slot about the shaft, and engagement of said second portion with said shaft moving said valve sections to close said slot to seal the nozzle from the fan chamber.

5. In a suction cleaner, a cleaner body having a nozzle, a fan chamber having a fan eye, a suction air passageway between said nozzle and fan eye, a fan in said fan chamber, a shaft extending through said fan eye into said air passageway, a motor for driving said fan and shaft, means defining a port in said air passageway adjacent said fan eye for receiving a converter element, a converter element insertable through said port into register with said fan eye, means defining a slot in said converter element passing transversely of said shaft, a valve movably mounted on said converter element for enclosing said shaft to seal said nozzle from said fan chamber, means on said valve engageable with said shaft to open said valve for passage of said converter transversely of said shaft, and means operatively connected to said valve for thereafter closing said valve about said shaft to seal said nozzle from said fan chamber.

6. A dusting tool converter for suction cleaners having a nozzle, a fan chamber having a fan eye, a suction air passageway between said nozzle and fan eye and having a port adjacent said fan eye, a motor for driving a suction creating fan in said fan chamber and driving a shaft extending through said fan eye into said air passageway, comprising a conduit adapted to be inserted through the port into the air passageway in register with the fan eye, said conduit having a slot to accommodate the shaft, a valve movably mounted on said conduit for enclosing the shaft and to close said slot to seal the nozzle from the fan chamber, means on said valve engageable with the shaft to open said valve for passage of said conduit transversely of the shaft, and means operatively connected with said valve for thereafter closing said valve about the shaft to seal the nozzle from the fan chamber.

7. In a suction cleaner, a nozzle, a fan chamber, a fan in said fan chamber, an air passageway connecting said nozzle and said fan chamber, drive means including a shaft in said air passageway, means for operating said fan and drive means, means defining a port in said air passageway for receiving a converter element, a converter element inserted through said port into said air passageway, means defining an opening in said converter through which said drive means extends, a valve movably mounted on said converter for closing said opening around said drive means to seal said nozzle from said fan chamber, and means on said valve extending into a

position for engagement with said shaft to move said valve to said closed position during insertion of said converter element.

8. A dusting tool converter for suction cleaners having an air passageway connecting a nozzle and suction creating means, said air passageway having a port, drive means including a shaft in the air passageway, said converter comprising a conduit adapted to be inserted through the port into the air passageway, said conduit having an opening for receiving the drive means, a valve movably mounted on said converter for closing said opening around said drive means to seal the nozzle from the fan chamber, and means forming part of said valve extending into a position for engagement with said shaft during insertion of the converter into the air passageway for moving said valve to its closed position.

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