Sept. 23, 1969 W. O. GOLLOWAY, JR 3,467,980

SUCTION CLEANERS

Filed Dec. 13. 1967 2 Sheets-Sheet 1

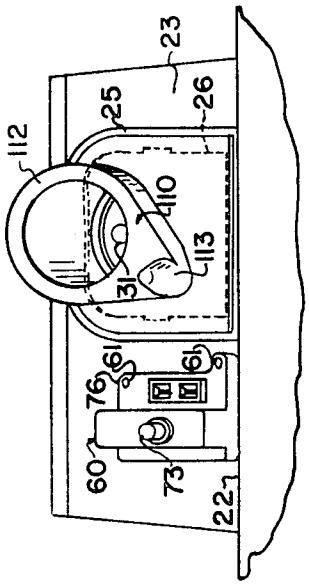


Fig. 4

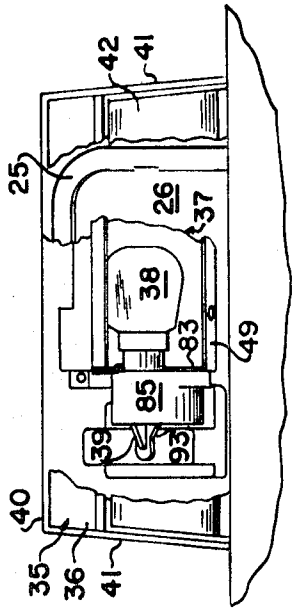


Fig. 2

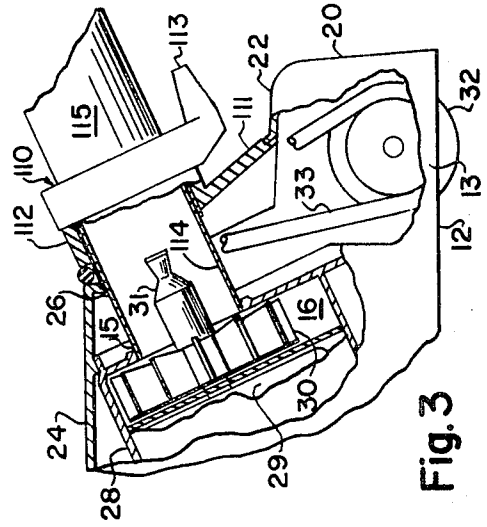


Fig. 3

Fig. 1

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SUCTION CLEANERS

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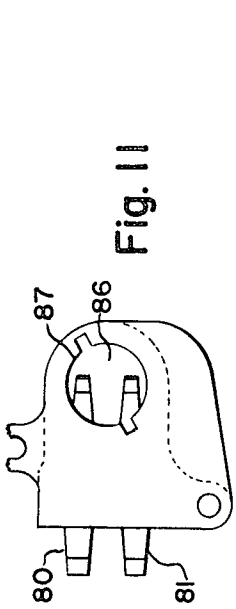


Fig. 11

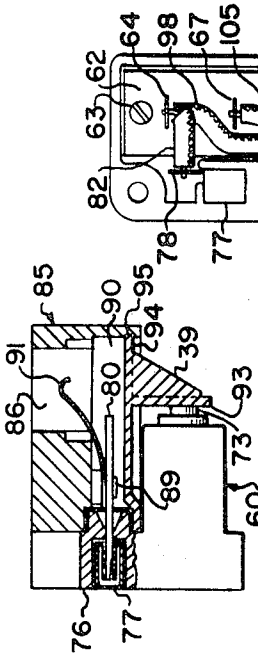


Fig. 10

Fig. 8

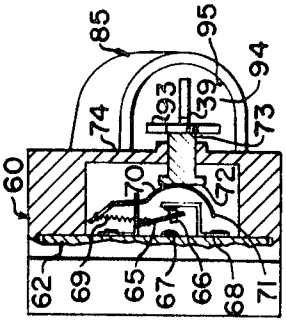


Fig. 7

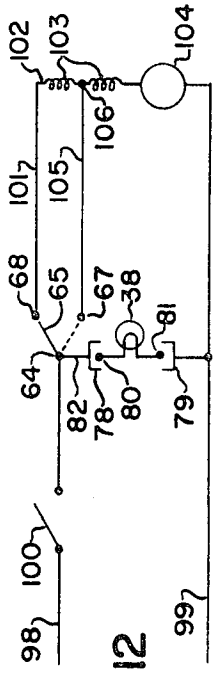


Fig. 12

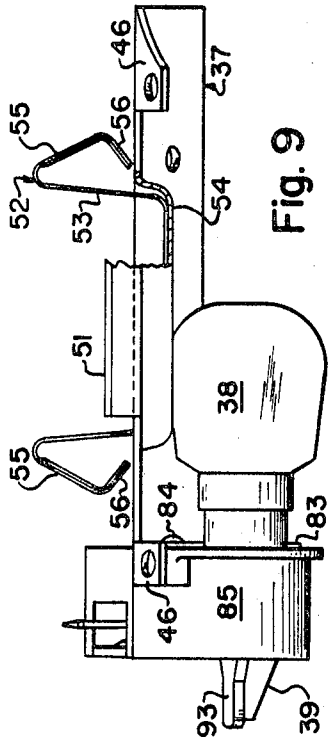


Fig. 9

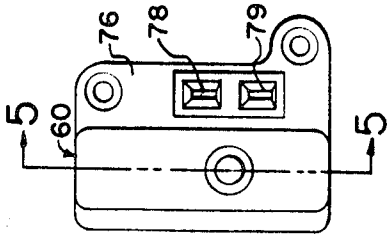


Fig. 6

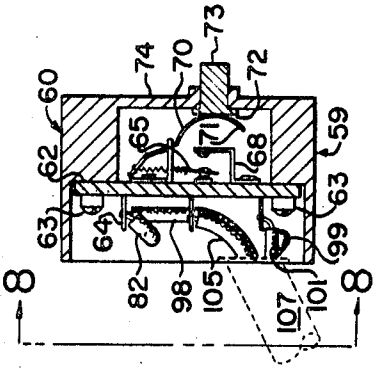


Fig. 5

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3,467,980

SUCTION CLEANERS

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Int. Cl. A47l 5/32, 11/20
U.S. Cl. 15—324 7 Claims

ABSTRACT OF THE DISCLOSURE

In an upright suction cleaner removable attachment of the cover for the converter port controls operation of the suction creating motor-fan unit and the dirt finder lamp for cleaning surfaces on and off-the-floor.

Background of the invention

The invention relates to an upright cleaner which can be used for on-the-floor and off-the-floor cleaning by removable attachment of the cover for the converter port. Mounted on the cleaner body and converter port cover are cooperating switch and contact means which effect operation of the suction creating motor-fan unit at different speeds and also controls the dirt finder lamp circuit upon removable attachment of the converter port cover.

Summary

According to the present invention an upright suction cleaner is provided with a port which is closed by a cover for on-the-floor cleaning and the cover is removed to expose the opening to permit attachment of tools to the source of suction to convert the cleaner for off-the-floor use.

A multi-speed motor-fan suction creating unit is provided to increase the suction pressure when the tools are attached for off-the-floor cleaning. The increased suction pressure is obtained by cooperable motor switch means mounted on the cleaner body adjacent the converter port and also upon the converter port cover. When the cover is attached to the cleaner the switch means are operated to decrease the motor speed to provide suction pressure suitable for on-the-floor cleaning, and removal of the cover operates the switch means to increase the motor speed and thus supply greater suction pressure to the cleaning tools when the latter are attached to the cleaner.

The dirt finder lamp circuit has cooperating contacts on the cleaner body adjacent the converter port and on the cover which are disconnected upon removal of the converter port cover to thereby disconnect the lamp from its circuit.

The dirt finder lamp, its socket and contacts, and part of the motor switch means are all mounted on the converter port cover for removable attachment as a unit to the cleaner body to effect control of the dirt finder lamp circuit and also the speed of the motor, the latter altering the amount of suction pressure produced by the suction creating fan.

Description of the drawings

One embodiment of the invention is shown in the following drawings, wherein:

FIGURE 1 is a broken side view partly in section of an upright suction cleaner embodying the invention,

FIGURE 2 is a partial front view of FIGURE 1 with the dirt finder lens broken away to disclose the dirt finder lamp and the actuator for the motor speed changing switch,

FIGURE 3 is a sectional view with the converter port cover removed and the converter hose attached for off-the-floor cleaning,

FIGURE 4 is a front view of FIGURE 3 with the hose removed and discloses the motor speed changing switch and dirt finder lamp female contacts mounted on the front wall of the suction air passageway,

FIGURE 5 is a section taken along the line 5—5 in FIGURE 6 showing the speed changing switch in the high speed position when the converter port cover is removed from the cleaner,

FIGURE 6 is a front elevational view of the speed changing switch and dirt finder lamp female contacts,

FIGURE 7 is a sectional view of the speed changing switch in low speed position when the converter port cover is attached to the cleaner,

FIGURE 8 is a bottom view taken along the line 8—8 in FIGURE 5,

FIGURE 9 is a top view, partly in section, of the support member removed from the converter port cover,

FIGURE 10 is a sectional view of the dirt finder lamp socket and switch actuator,

FIGURE 11 is an end view of the dirt finder lamp socket, and

FIGURE 12 is a schematic showing of the electrical circuits.

Description of the preferred embodiment

The embodiment of the invention herein disclosed comprises an upright suction cleaner having a body **10** including a rear portion **11** and a front portion **12** provided with a suction nozzle **13** connected by a suction air passageway **14** to the inlet **15** of a fan chamber **16** which is joined to an unshown air exhaust passageway discharging into a dirt filtering bag **17** supported on the cleaner body and on a handle **18** in a manner understood in the art. The suction air passageway **14** has a front wall which includes a portion **20** extending upwardly from the nozzle front lip **21** and then rearwardly as shown at **22** to an inclined wall portion **23** which terminates at the top wall **24** of the body **10**. The inclined wall **23** has a portion **25** projecting forwardly and is provided with a converter port **26**. The fan chamber inlet **15** is formed in the rear wall **27** of the air passageway **14** opposite the converter port **26**. Extending rearwardly of the fan chamber **16** is a motor housing **28**, only partially shown, in which is disposed a two-speed motor **29** operating a suction creating fan **30** in the fan chamber **16** and a belt pulley **31** projecting through the fan eye **15** into the air passageway **14**. Rotatably mounted in the nozzle **13** is an agitator **32** engageable with the floor covering to be cleaned. The agitator **32** is rotated by a belt **33** in the air passageway **14** and the belt is removably connected to the pulley **31** disposed rearwardly of the converter port **26**. The cleaner is supported on suitable wheels **34**.

Removably attached to the inclined front wall portion **23** of the air passageway **14** is a converter port cover **35** including a housing **36** and a member **37** for supporting a dirt finder lamp **38** and a motor switch actuator **39**. The converter cover housing **36** has a top wall **40** and opposed side walls **41** which project forwardly from corresponding walls on the front portion of the cleaner body **10**. A dirt finder lens **42** is seated in a U-shaped recess **43** in the walls **40** and **41** of the cover housing **36**, the lower edge **44** of the lens resting on the front wall portion **22** of the air passageway **14**.

The support member **37** is provided with a plurality of offsets **46**, two or which are shown in FIGURE 9, which receive screws **47** threaded into bosses **48** on the cover housing **36** to secure the support member **37** thereto. The lens **42** is retained in the U-shaped recess **43** by screws **50** secured to the lower edge **49** of the support member **37**, as shown in FIGURE 1, whereby the lens may be initially attached to the support member **37** and assembled with the latter as a unit to the housing **36** by the screws **47**.

A portion of the upper edge of the support member **37** is provided with an offset tongue **51** adapted to pass through the converter port **26** and engage the inner surface of the upper marginal edge thereof as shown in FIGURE 1. A resilient latch **52** for the converter port cover is provided with a U-shaped body **53** suitably secured by unshown rivets in a recessed portion **54** of the support member **37**. The opposite ends of the latch body **53** are each provided with a resilient finger **55** having an inclined surface **56** adapted to engage the inner surface of the air passageway front wall portion **23** adjacent the marginal edge of the converter port **26**.

When it is desired to attach the converter port cover **35** to the cleaner, the tongue **51** is inserted through the converter port **26** to engage the upper marginal edge thereof, as shown in FIGURE 1, and thereafter the cover is pivoted downwardly until the inclined surfaces **56** of the resilient latch **52** engage the inner surface of the marginal edge of the port **26**. In this position the cover is secured to the cleaner and the support member **37** seals the converter port **26** to prevent passage of air therethrough.

It will be noted in FIGURE 1 that the lower edge **44** of the lens **42** rests on the front wall portion **42** and the projecting surface **57** of the lens is spaced therefrom. When the converter port cover **35** is to be removed the operator's fingers engage the lens surface **57** and exerts an upward force to cause the inclined surfaces **56** to flex the resilient fingers **55** and release the latter from the marginal edge of the converter port **26** and permit removal of the converter port cover **35**.

The two-speed motor **29** is provided with a tapped split field winding which is controlled by a two-speed switch **59** enclosed in a housing **60** attached by screws **61** to the outer surface of the suction air passageway inclined front wall portion **23**. The switch **59** includes a mounting plate **62** attached by screws **63** to the housing **60**. Mounted on the plate **62** is a contact bracket **64** pivotally supporting a contact arm **65** provided with a contact **66** which engages a contact bracket **67** for connection to the tapped portion of the motor field winding for higher motor speed when the cleaner is conditioned for off-the-floor cleaning as shown in FIGURE 5. The movable contact **66** also engages a stationary contact bracket **68** connected as shown in FIGURE 7 to the complete motor field winding when the cleaner is prepared for on-the-floor low motor speed operation. The movable switch arm **65** is normally biased to the high motor speed position shown in FIGURE 5 by a toggle device including a spring **69** connected to the switch arm **65** and to one end of a lever **70** pivoted on the bracket **64**. The other end of the lever **70** is provided with an arcuate portion **71** which engages the inner end **72** of a plunger **73** slideably projecting through the top wall **74** of the housing **60**. Movement of the plunger **73** inwardly of the housing **60** causes the movable contact **66** to engage the contact bracket **67** to operate the motor at low speed for on-the-floor cleaning.

The housing **60** has an offset portion **76** provided with two recesses **77** in which are seated female electrical contacts **78** and **79** for reception respectively of male contacts **80** and **81** of the dirt finder lamp **38**. The female contact **78** is connected by a lead **82** to the contact bracket **64** mounted on the support plate **62** as shown in FIGURE 8.

The two-speed switch **59** and female contacts **78–79** for the dirt finder lamp **38** are controlled by the removable attachment of the converter port cover **35** to the cleaner. The left end of the converter port cover support **37**, as viewed in FIGURE 9, is provided with an upstanding lug **83** through which projects screws **84** to secure a housing **85** to the support member **37**. The housing **85** includes a dirt finder lamp socket **86** having an opening **87** for removable insertion of the dirt finder lamp **38** in a conventional manner such as by means of a bayonet connection. A reflector **88** for the lamp **38** is attached to the support member **37** by a plurality of suitable rivets. The male contacts **80** and **81** for the lamp socket **86** are secured by pins **89** in a recessed area **90** of the housing **85** and each contact includes a resilient end portion **91** for engagement with the dirt finder lamp **38**. The opposite ends of the contacts **80** and **81** project from the housing **85** for removable insertion into the female contacts **78** and **79**.

Projecting from an end of the housing **85** is the switch actuator **39** having a flat surface **93** which removably engages the two-speed switch plunger **73** to control operation of the motor **29**. The switch actuator **39** is formed on a panel **94** which is slidable in a U-shaped recess **95** in the housing **85** for attachment thereto. The panel **94** can be removed from the housing **85** to provide access to the recess **90** and the contact pins **89**.

An electrical conductor is provided at one end with a plug **97**, shown in FIGURE 1, for connection to a source of current, and the conductor includes two leads **98** and **99** of the electrical circuits disclosed schematically in FIGURE 12. A foot operated switch **100**, mounted on the cleaner body, is in the lead **98** which is connected to the contact bracket **64** of the two-speed switch **59**. The lead **82** extends from the contact bracket **64** to the lamp female contact **78** and the removable lamp male contact **80** then through the lamp **38** and its removable male contact **81** to the female contact **79** to the other lead **99**. Thus it is apparent the lamp **38** is connected across the leads **98** and **99**, and that removal of the converter port cover **35** from the cleaner disconnects the male contacts **80** and **81** of the lamp from the female contacts **78** and **79** respectively to interrupt the circuit to the lamp **38**.

The motor **29** is operable for low speed on-the-floor cleaning when the switch arm **65** is in its solid line position connected to the contact bracket **68** from which lead **101** is connected to one end **102** of the motor field coil **103** and passes completely therethrough and then the armature **104** to the other lead **99**. The switch arm **65** is maintained in this low motor speed position when the converter port cover **35** is latched to the cleaner and the switch actuator **39** moves the switch plunger **73** to the position shown in FIGURE 7.

The motor circuit for high speed operation is obtained when the switch arm **65** is in its dotted line position in engagement with the contact bracket **67** connected by a lead **105** to a tap **106** in the field winding **103** to cut out a portion of the latter and the circuit then passes through the armature **104** to the other lead **99**. The switch arm **65** is maintained in its dotted line high motor speed position when the converter port cover is removed from the cleaner and the switch actuator **39** is disconnected from the switch plunger **73** to allow the toggle device to move the plunger **73** outwardly of the housing **80** and shift the switch arm **65** to the position shown in FIGURE 5.

The conductors **98**, **101** and **105** from the switch **59**, and the conductor **99** from the lamp female contact **79** are enclosed in a flexible sleeve **107** of insulating material which extends from an opening **108** located in the inclined front wall portion **23** behind the housing **60** then across the suction air passageway **14** and through the opening **109** in the passageway rear wall **27** to thereby protect the conductors from dirt-laden air traveling from the nozzle **13** to the fan eye **15**. The foregoing four conductors are connected to an unshown terminal block mounted on the motor housing **28** for connection to the motor field coil and foot operated switch **100**.

From the foregoing it will be perceived that for on-the-floor cleaning the converter port cover **35** is attached to the cleaner and the support member **37** closes the converter port **26** whereby the suction created by the fan **30** draws the dirt-laden air upwardly through the nozzle **13**, suction air passageway **14**, fan eye **15** into the fan chamber **16** from which it is discharged into the filter

bag **17**. The switch actuator **39** engages the two-speed switch plunger **73** and maintains it in the position shown in FIGURE 7 to establish the previously described electrical circuit for operating the motor at low speed. In addition, the male contacts **80–81** of the dirt finder lamp **38** are engaged with the female contacts **78–79** to connect the lamp **38** in circuit. Under the foregoing conditions operation of the lamp **38** and the motor **29** is controlled by the foot operated switch **100**.

The cleaner is adapted for off-the-floor operation by removing the converter port cover **35** from the cleaner to thereby expose the converter port **26**, disconnect the lamp **38** from its circuit and remove the switch actuator **39** from the switch plunger **73** so that the toggle device automatically shifts the switch arm **65** to the position shown in FIGURE 5 to thereby complete the motor circuit for rotation of motor **29** at high speed. The motor **29** when operating at high speed is controlled by the foot operated switch **100** and rotates the fan **30** at increased speed to provide greater suction pressure for off-the-floor cleaning.

In order to connect the tools for off-the-floor cleaning the belt **33** is removed from the pulley **31** by a belt lifter **110**. The belt lifter **110** includes a member **111** seated in the converter port **26** and supports a rotatable tubular member **112** having a handle **113** and unshown hooks to lift the belt **33** from the pulley **31** to the position shown in FIGURE 3. The belt lifter **110** forms no part of this invention and accordingly it is not described in detail. The rigid end **114** of a hose **115** is inserted through the tubular member **112** into sealing engagement with the fan chamber inlet **15** so that all dirt-laden air passes through the hose into the fan chamber **16** and then to the dirt filter bag **17**. Suitable unshown tools are attached to the free end of the hose **115** for engagement with the surface to be cleaned.

I claim:

1. A suction cleaner, comprising:

(a) a body having a floor nozzle for on-the-floor cleaning,

(b) suction creating means including an electric motor having a plurality of circuits for multi-speed operation,

(c) a suction air passageway in said body extending from said nozzle to said suction creating means,

(d) a converter port in said body communicable with said suction creating means and adapted to be connected with a converter for off-the-floor cleaning,

(e) a removable converter port cover forming part of said cleaner body when attached thereto for closing said port for on-the-floor cleaning,

(f) a dirt finder lamp supported on said converter port cover,

(g) an electrical circuit on said body for said lamp and connectible to a source of current,

(h) cooperable switch means on said body and cover operable upon attachment of said cover for on-the-floor cleaning to effect connection of said motor into one of its said circuits for operation at one speed,

(i) cooperable contact means on said body and cover also operable upon said attachment of said cover to place said dirt finder lamp in its said circuit,

(j) removal of said cover uncovering said port for off-the-floor cleaning and operating said cooperable switch means to effect connection of said motor into another circuit for operation at a different speed,

(k) and said removal of said cover effecting operation of said cooperable contact means to disconnect said lamp from its circuit.

2. A suction cleaner as described in claim **1**, and said cooperable switch means including a contact portion and an actuator portion, one of said portions being on said body and the other portion on said converter port cover to effect said operations of said motor at different speeds upon removable attachment of said converter port cover relative to said body.

3. A suction cleaner as described in claim **1**, and said cooperable switch means including a contact portion on said body and an actuator portion on said converter port cover, said actuator portion forming a part of said lamp.

4. A suction cleaner as described in claim **1**, and said cooperable switch contact means including a portion combined with said lamp contact means.

5. A suction cleaner as described in claim **1**, and said converter port cover including a lens and a member spaced therefrom to accommodate said lamp therebetween, said member opening and closing said port upon removable attachment of said converter port cover to said cleaner body.

6. A suction cleaner as described in claim **1**, and said converter port cover including a support for a portion of said switch means and a portion of said lamp contact means.

7. A suction cleaner as described in claim **1**, and a reflector for said lamp mounted on said converter port cover for directing light rays forwardly of the cleaner.

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