Dec. 9, 1969 G. T. FILLERY 3,482,276

SUCTION CLEANERS

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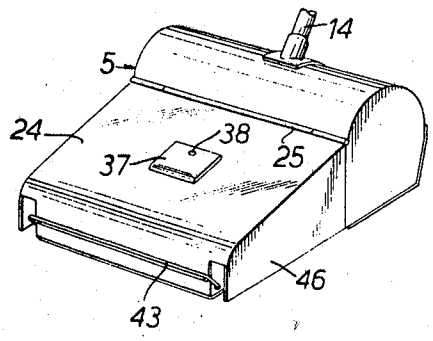
FIG. 1.



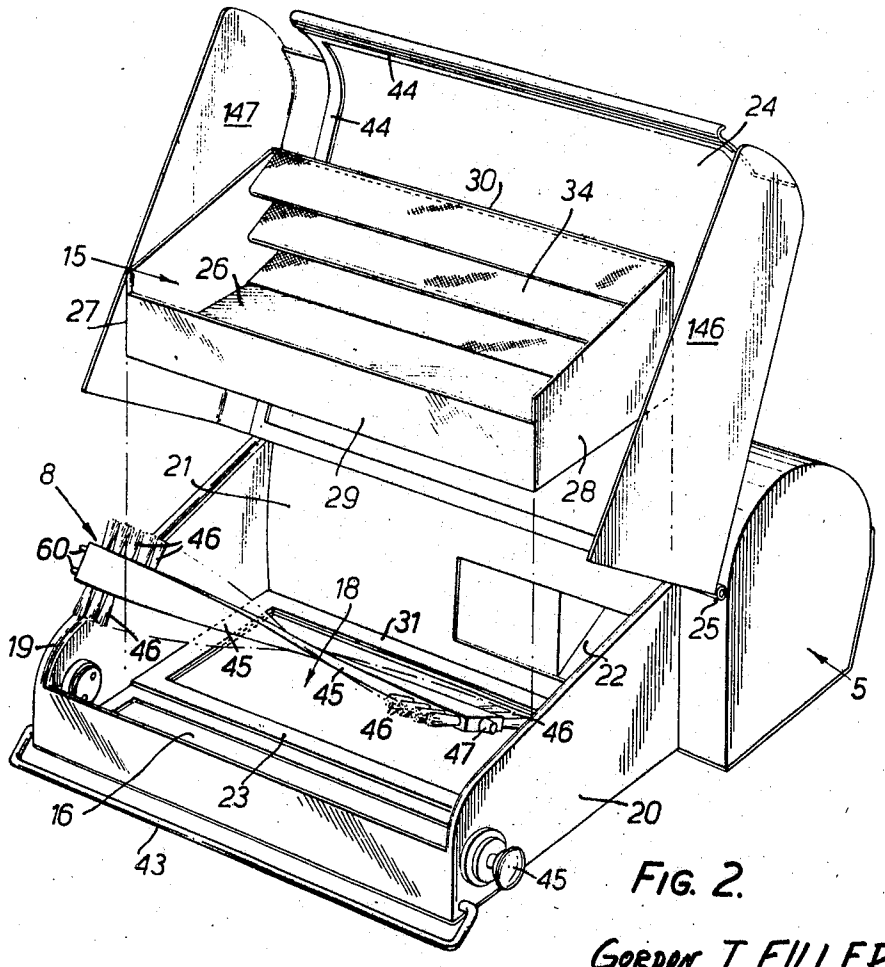


FIG. 2.

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SUCTION CLEANERS

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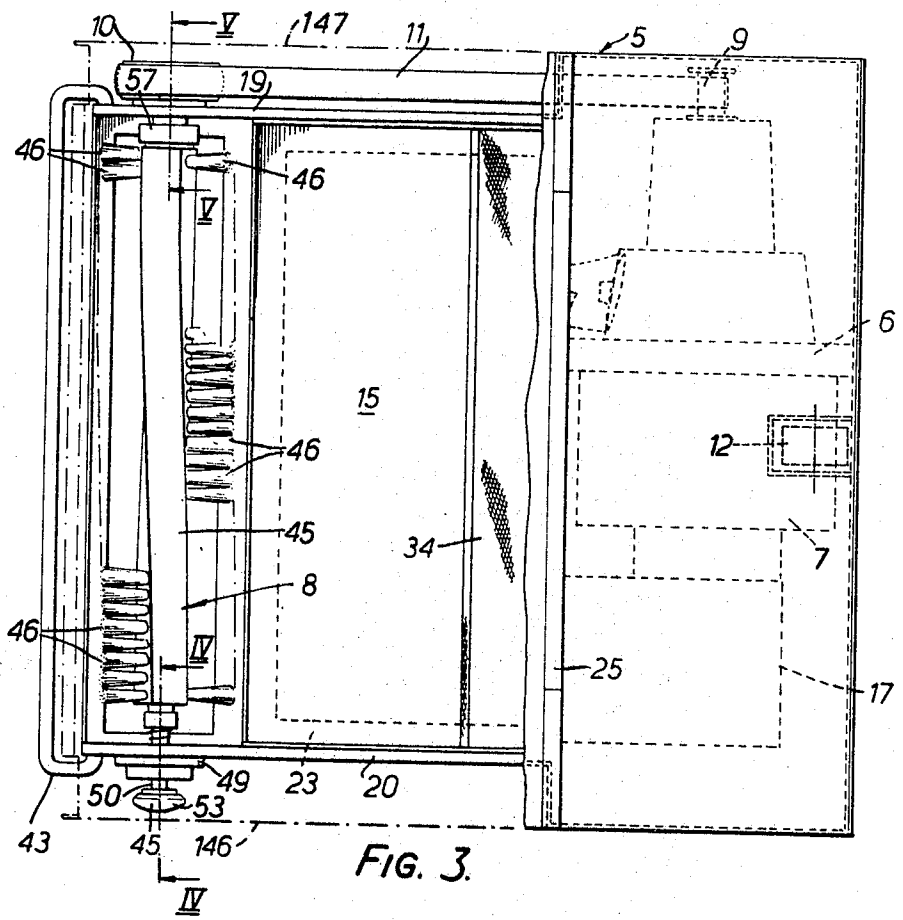

FIG. 3.

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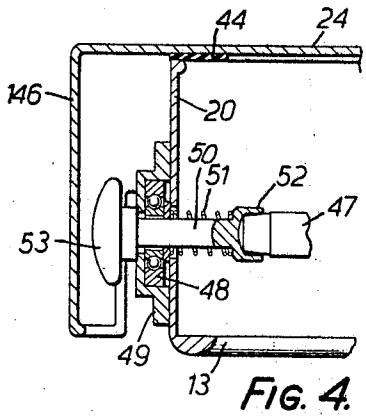

FIG. 4.

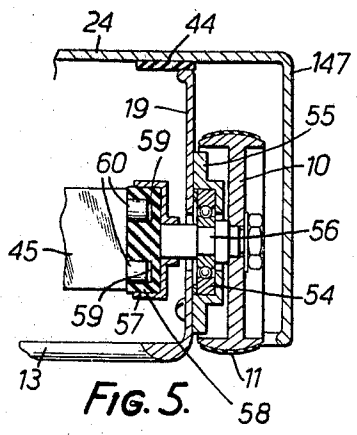

FIG. 5.

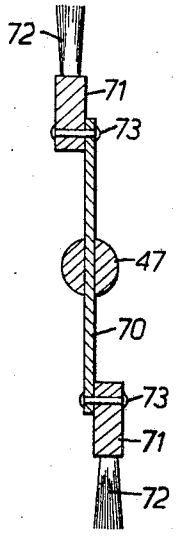

FIG. 6.

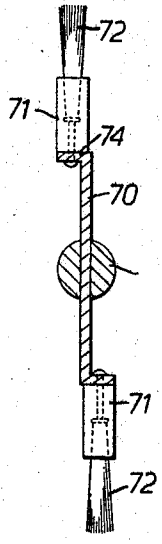

FIG. 7.

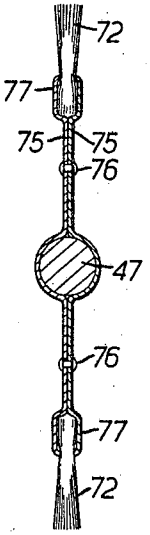

FIG. 8.

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3,482,276

SUCTION CLEANERS

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Int. Cl. A47l 9/20, 5/26, 5/10
U.S. Cl. 15—349 9 Claims

ABSTRACT OF THE DISCLOSURE

A suction cleaner has a casing with a door giving access to a rotary beater. The beater is removably mounted between separable end supports carried by the casing. The drive to the beater is outside the casing and is applied to the beater through one end support.

This invention concerns a suction cleaner, more particularly for cleaning carpets of the type comprising a casing, an electric motor within the casing, a suction fan driven by the motor, a rotary carpet beater assembly within the casing and extending partly through a suction opening in the casing and driven by the electric motor, a dirt receptacle removably mounted within the casing and a duct extending from within the casing to the suction fan, the suction of the fan creating a stream of air which flows through the suction opening, past the beater assembly, through the dirt receptacle for collection therein of dirt borne by the airstream and thence through the suction duct.

The present invention has for its main object to provide a suction cleaner of simple and cheap construction.

Today carpets are made from natural fibres (as wool and cotton) and from man-made fibres and also from mixtures of natural and artificial fibres. Furthermore, the nature of the pile of carpets nowadays takes many forms and it is found that a beater/brush suitable for one carpet is not satisfactory with another. The object of this invention is to provide a suction cleaner of the type set forth in which the beater/brush is readily removable and replaceable.

According to this invention a suction cleaner of the type set forth is characterised in that the casing has a door giving access to the interior of the casing and to the beater assembly therein and in that the beater assembly comprises a beater member extending between a pair of spaced-apart walls of the casing, a bearing carried by each wall of the casing and a readily disengageable coupling means rotatably supported by each bearing removably to receive one end of the beater member, at least one of said coupling means extending through a wall of the casing to a beater driving mechanism exteriorly of the casing.

Preferably, the driving coupling means resiliently drives the beater member.

A practical embodiment of this invention will now be described, by way of example only, with reference to the accompanying drawings, whereof:

FIG. 1 is a perspective view of a carpet suction cleaner according to this invention, the cleaner being shown in the in-use condition,

FIG. 2 is a view corresponding to FIG. 1 and to a larger size showing how the main parts to which the present invention relates are assembled ready for use,

FIG. 3 is a plan view of the cleaner of FIG. 1 to a larger size and partly in section,

FIG. 4 is a section on the line IV—IV of FIG. 3,

FIG. 5 is a section on the line V—V of FIG. 3 and

FIGS. 6. 7 and 8 are transverse cross sections of alternative constructions of beater assemblies to that of FIGS. 1 to 4.

Referring to the drawings: the suction cleaner comprises a casing **5**, an electric motor **6** within the casing, a suction fan **7** driven by the motor **6** and a rotary beater assembly **8** driven by motor **6** through pulleys **9**, **10** and belt **11**. The beater assembly **8** may comprise beater bars alone, or brushes alone (as shown) or a combination of beater bars and brushes, all of which are to be understood by the expression beater assembly as used throughout the specification and claims.

The casing **5** is mounted on wheels **12** and upon sliders **13** for movement over a carpet to be cleaned, the cleaner being moved to and fro over the carpet by a handle **14**.

A direct receptable **15** is removably mounted within casing **5** and the beater assembly extends in part through a suction opening **16** in casing **5** thereby to engage with the carpet over which the cleaner is moved. The fan **7** communicates with a duct **17** leading from the fan to a compartment **18** which receives receptacle **15**.

Compartment **18** is defined by sides **19**, **20**, a rear partition wall **21** (having opening **22** therethrough by which duct **17** communicates with the compartment) a skeletal base **23** and a door **24** hinged at **25** to the casing for opening and closing movement—compare FIGS. 1 and 2.

Receptacle **15** (see particularly FIG. 2) is a rigid, box-like structure preferably made of metal though it may alternatively be made of a synthetic resin plastic material, cardboard or the like. The receptacle comprises a floor **26**, side walls **27**, **28**, a front wall **29** and a rear wall **30**. Floor **26** rests upon skeletal base **23**, a sealing strip **31** (FIG. 2) being interposed between the floor and the base. As shown particularly in FIG. 2 the top edge of front wall **29** is lower than the side walls **27**, **28** so that said top edge is spaced from the undersurface of door **24**.

A sealing strip is provided between partition wall **21** and the rear wall **30**. The latter comprises a filter element **34** of zig-zag or concertina form and extending substantially over the entire rear wall so that a large filter area is available.

Air is drawn by fan **7** through duct **17** and opening **22** from compartment **18**, the air passing through dirt receptacle **15** from opening **16**. The airstream is constrained to pass over wall **29**. Consequently, the dirt carried along in the stream of air is drawn into receptable **15** and the filter element while allowing substantially unimpeded passage of air prevents passage of dirt which therefore collects in the receptable **15**.

The door **24** has an opening which is normally closed by a shutter **37** (FIG. 1) pivoted at **38** to door **24** for opening and closing movement. An end fitting of a hand tool (e.g., a flexible hose carrying an upholstery brush) is insertable in the opening when shutter is moved aside. The suction of the motor/fan units is then applied to the hand tool.

The door **24** is held closed by a catch rod **43** pivoted to casing **5**.

A sealing strip **44** secured to the undersurface of door **24** engages sides, **19** **20** of the casing and also with the walls **27**, **28** and **30** of receptacle **15**.

As shown more particularly in FIG. 2, the receptacle **15** constitutes a rigid, box-like structure which is readily introduced to, and removed from, the casing through the opening of door **24**. When the receptacle **15** is positioned within casing **5** the side **29** of the receptacle defines with the adjacent walls of the casing a chamber within which the beater assembly **8** is rotatably mounted. Again access

to the beater chamber is obtained through the opening of door **24**.

As also shown in FIG. 2 the beater assembly comprises a beater member or bar **45** (e.g., of aluminium) of rectangular cross-section twisted along its length to helical form. Tufts of bristles **46** are carried by the opposite edges of the bar **45**. One end of bar **45** has an axially-projecting spigot **47** and the opposite end has a pair of axially-projecting pins **60**.

Wall or support member **20**—see FIG. 4—carries a roller bearing **48**, e.g., within a housing **49** secured to the wall. A coupling means including a stub shaft **50** is rotatably mounted in the bearing and is axially adjustable against the action of spring **51**. The latter acts between wall **20** and cup **52** which is integral with shaft **50**. A manual knob **53** is on the outer end of shaft **50**—which as readily seen in FIG. 4 passes from within the beater assembly chamber to the outside of casing **5**.

Spigot **47** is received in cup **52** and is supported thereby.

Referring now to FIG. 5: wall or support member **19** carries roller bearing **54** in housing **55** and a coupling means including a stub shaft **56** is supported by the bearing. Shaft **56** extends from within the beater assembly chamber to outside casing **5**. The outer end of shaft **56** carries pulley **10** by which the shaft is driven.

The inner end of shaft **56** carries a cylindrical member **57** within which is a block **58** of rubber-like material. Block **58** may be secured to member **57** by adhesive, by bonding or otherwise. Block **58** has a pair of spaced axial holes **59** to receive, one each, the pins **60**. The latter are a close, squeeze fit in holes **59**.

The beater is driven from pulley **10** through stub shaft **56**, resilient block **58** and pins **60**.

By withdrawing knob **53** cup **52** is released from spigot **47** and bar **45** may be moved sideways to a small extent. The bar **45** may then be pulled lengthwise away from block **58** so that pins **60** disengage the block. The beater brush is then removable. It is equally easy to replace a beater brush. Ready access for removal and replacement of the beater brush is provided upon opening the door **24**. It is apparent that removal and replacement of the brush does not necessitate disconnection of the drive to the beater brush.

The block **58** provides a resilient drive to the beater and accommodates for non-alignment of the bearings, and manufacturing variations in the beater member. Also the resilient block accommodates in torsion the repeated impact as each row of tufts strikes the carpet and thereby provides a smoother drive.

With the arrangement described a range of beater brushes and/or beater bars may be provided for use in the cleaner to meet different operating conditions due, for instance, to different pile materials, pile depths and so on and the brushes and/or beaters are readily interchangeable so that a brush and/or beater appropriate to particular pile conditions may be selected and used.

The beater brush may be constructed in several other ways of which three are shown in FIGS. 6, 7 and 8.

In FIG. 6 a plate **70** carries along each of its opposite lengthwise-extending edges a stock **71** (e.g., of wood) carrying tufts of bristles **72**. Each stock is rivetted at **73** to the plate. A spigot **47** is secured to one end of the plate and a block (not shown) with projecting driving pins is secured to the other end. The plate **70** may be suitably stiffened, e.g., by integral ribs.

In FIG. 7 the edges of plate **70** are cranked at **74** and the cranked portions carry the stocks **71**.

In FIG. 8 a pair of plates **75** are rivetted (at **76**) together face to face. The confronting plates form pockets **77** for bristles **72** and the plates additionally grip the spigot **47** therebetween at one end of the plates. A block with projecting driving pins is also gripped between the plates at the other end.

By omission of the bristle tufts (and if need be the provision of suitably shaped rods or the like) the beater member of FIGS. 2, 3, 4 and 5 or of FIG. 6 or FIG. 7 or FIG. 8 may be used to beat a carpet instead of, or as well as, brushing the carpet.

The door **24** giving access to receptacle **15** and beater assembly **8** has, at each side, an integral cover piece or member **146, 147**. When door **24** is closed cover piece **146** overlies knob **45** and prevents the latter from being inadvertently withdrawn during use of the cleaner by engagement of the knob with furniture or the like. Such inadvertent withdrawal is to be avoided because the beater is thereby released from its bearings while it is driven. In use also (when the beater is driven by pulleys **9, 10** and belt **11**) it is undesirable that the belt drive be exposed and when door **24** is closed cover piece **147** overlies the belt and pulleys.

It may be arranged that initial opening of door **24** actuates a switch in the circuit of motor **6** so that the motor is rendered inoperative while the door is open.

In an alternative arrangement the pins **60** are dispensed with and the end of bar **45** (which is rectangular in cross-section) is closely received within a rectangular hole in block **58**. In another modification the cup **52** is enlarged to receive a resilient block having a hole (e.g., a rectangular hole) to receive the other end of bar **45**. It may thus be arranged that both ends of bar **45** are resiliently supported.

The beater bar **45** of FIG. 2 in an alternative arrangement may be straight along its length, i.e., is not twisted along its length to helical form.

I claim:

1. In a carpet or the like suction cleaner comprising:
- a casing having a pair of spaced apart support members;
- a motor mounted within said casing;
- a suction fan driven by said motor;
- a rotary beater assembly within said casing and extending partly through a suction opening in said casing and driven by said motor;
- a dirt receptacle removably mounted within said casing;
- a suction duct extending from within said casing to said suction fan; and
- a door in said casing giving access to the interior of said casing and to said beater assembly;

said beater assembly comprising:
- a beater member extending between said pair of spaced-apart support members;
- a bearing mounted to each of said spaced-apart support members;
- coupling means rotatably supported by each bearing for releasably coupling said beater member to said bearings, at least one of said beater coupling means extending through its respective support member and being rotatably driven by said motor, said extending coupling means including resilient driving means for lockingly coupling one end of said beater member to said extending coupling means to impart rotation to said beater member, the other of said coupling means including means for supporting said beater member for axial displacement of said beater member to enable said beater member to be readily released from said beater coupling means.

2. A suction cleaner as claimed in claim **1** wherein said resilient coupling means comprises a block of rubber-like material through which rotation is imparted to the beater member.

3. A suction cleaner according to claim **2** wherein said one end of the beater member abuts a face of the block of rubber-like material, a pair of spaced apart axial holes in the block removably receiving a corresponding pair of pins projecting from said end of the beater member.

4. A suction cleaner as claimed in claim **3** wherein the resilient block is received within and drivingly secured (e.g., bonded) to a cylindrical member carried by one end of said extended coupling means, a portion of said

extended coupling means extending through the casing to the driving means.

5. A suction cleaner according to claim 1, in which the beater member is resiliently held (in the axial direction of the beater member) between the pair of beater coupling means.

6. A suction cleaner as claimed in claim 5 wherein one of the beater coupling means comprises a stub shaft supported by a bearing for rotation and for axial adjustment, the stub shaft receiving and supporting one end of the beater member and being spring urged towards said one end of the beater member.

7. A suction cleaner as claimed in claim 6 comprising manual means exteriorly of the casing for retracting the stub shaft from the beater member.

8. A suction cleaner as claimed in claim 7 in which the door has a member to enclose the manual retracting means when the door is closed preventing access to the interior of the casing.

9. A suction cleaner as claimed in claim 1 wherein the door has a member to enclose the driving means when the door is closed preventing access to the interior of the casing.

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ROBERT W. MICHELL, Primary Examiner

U.S. Cl. X.R.

15—391, 392