Oct. 1, 1935. A. D. WASSALL 2,015,772

VACUUM CLEANER

Filed May 22, 1933 2 Sheets-Sheet 1

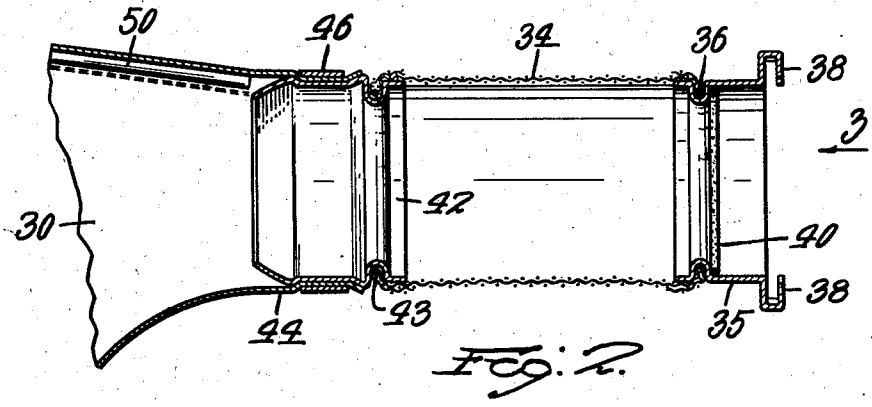


Fig. 2.

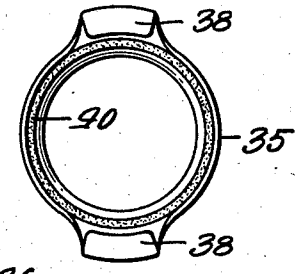


Fig. 3.

Fig. 1.

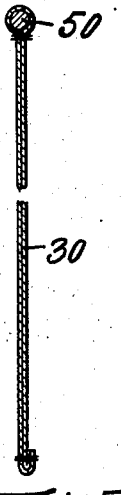


Fig. 5.

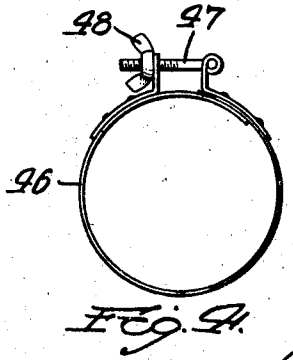


Fig. 4.

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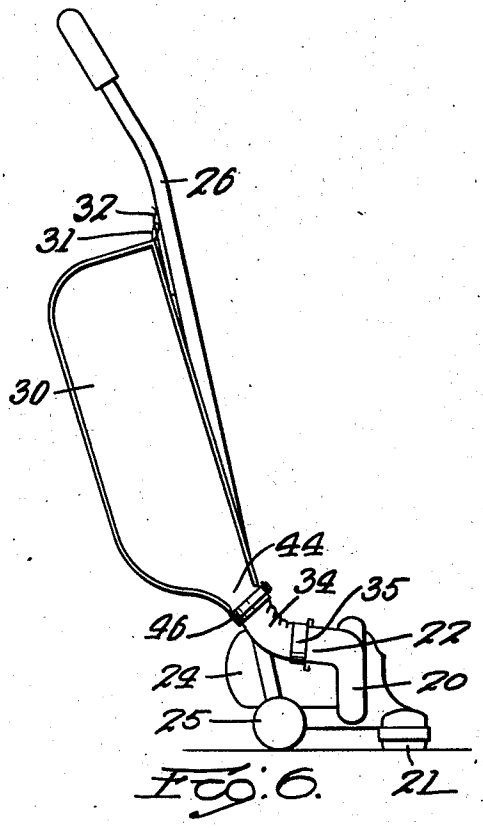


Fig. 6.

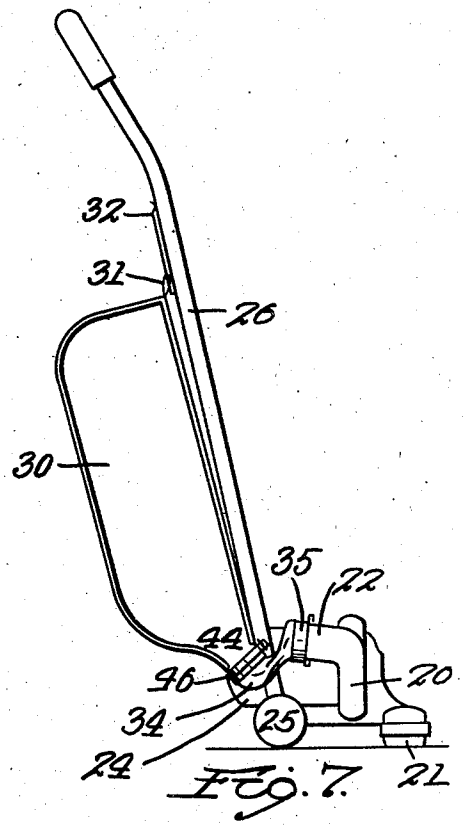


Fig. 7.

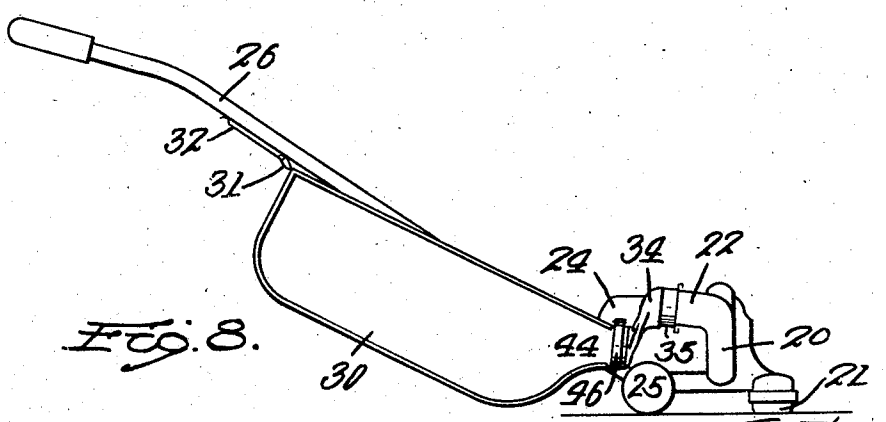


Fig. 8.

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UNITED STATES PATENT OFFICE

2,015,772

VACUUM CLEANER

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Application May 22, 1933, Serial No. 672,109

1 Claim. (Cl. 183—36)

This invention relates to vacuum cleaners, and more particularly to a machine having a porous filter bag arranged to collect dust which is delivered thereto in an air blast.

It has been proposed heretofore to form the bag for such a machine from some cheap material, such as paper, so that the bag can be burned or otherwise disposed of after use without the necessity of emptying the dust therefrom. However, these prior constructions have not proven satisfactory in all respects. With certain arrangements the bag frequently cracks open and allows the dust to escape during the operation of the machine. Certain other constructions are complicated and expensive, and still others lack a satisfactory means to prevent the accumulated dust from dropping back into the fan casing of the machine and thus clogging the operation.

It is accordingly one object of the invention to provide a simple and inexpensive construction for a vacuum cleaner, which is so arranged that the filter bag may be formed of a comparatively cheap and weak material such as paper, and yet the bag may be used for a considerable length of time without breaking.

It is a further object of the invention to provide a simple and inexpensive construction which will automatically prevent the dust accumulated in the filter bag of a vacuum cleaner from dropping back into the fan casing of the machine.

With these and other objects in view, as will be apparent to those skilled in the art, my invention resides in the combination of parts set forth in the specification and covered by the claim appended hereto.

The household vacuum cleaner as ordinarily constructed is provided with a hinged operating handle which can be swung through a considerable angle in a vertical plane, and this handle serves to support a filter bag which is connected to the fan discharge nozzle of the machine. I have discovered that the frequent cracking of the bag when the latter is formed of weak material is caused primarily by the repeated flexing of the bag as the handle is moved up and down, and I have overcome this difficulty by providing a comparatively short flexible tube between the fan nozzle and the open end of the bag. The parts are so arranged that when the handle is moved the tube will bend and thus prevent any flexing or buckling of the bag. If desired the bag may be reinforced by a stiff wire or any other suitable means to prevent it from bending. The flexible tube is preferably so constructed that it will collapse when the machine is stopped and the weight of the bag will cause the rear or discharge end of the tube to drop down below the fan discharge nozzle, thus automatically forming a trap which prevents the return of dust to the fan casing.

Referring now to the drawings illustrating one embodiment of the invention and in which like reference numerals indicate like parts,

Fig. 1 is a side elevation of a vacuum cleaner, with the handle lowered and the motor running;

Fig. 2 is an enlarged longitudinal section through the flexible connecting tube;

Fig. 3 is an elevation of the inlet end of the connecting tube;

Fig. 4 is a detail of a clamping ring;

Fig. 5 is a transverse section through the filter bag, shown deflated, the section being taken on the line 5—5 of Fig. 1;

Fig. 6 is a view similar to Fig. 1, with the handle raised and the motor running;

Fig. 7 is a view similar to Fig. 1, with the handle raised and the motor stopped; and

Fig. 8 is a view similar to Fig. 1, with the handle lowered and the motor stopped.

The embodiment illustrated in the drawings comprises a fan casing 20 provided with the usual laterally flared suction nozzle 21 which extends downwardly at the front of the machine, and the usual discharge nozzle 22 which is directed rearwardly and at a slight upward inclination at one side of the machine. An electric motor 24 is fastened to the rear of the fan casing, and a suitable fan (not shown) is mounted on the front end of the motor shaft and arranged to revolve at high speed within the fan casing. Wheels 25 are shown beneath the motor to support a portion of the weight thereof. An operating handle 26 is hinged to the motor and fan casing assembly and extends rearwardly therefrom, being free to swing up and down in a vertical plane as is customary in machines of this type. These various parts are all well known in the art, and hence do not require detailed description or illustration.

In order to collect the dust which is discharged from the nozzle 22 during the operation of the machine I utilize a filter bag 30 which is located in substantial axial alignment with the nozzle. The bag 30 is supported by the handle 26, and for this purpose the bag may be provided with a loop 31 at its rear or closed end which engages a hook 32 on the handle. The bag 30 is preferably formed of some suitable material, such as a porous paper, which is cheap enough to be destroyed without emptying the dust therefrom, but it will be apparent to those skilled in the art that my

invention has certain desirable features irrespective of the material from which the bag is made.

I have discovered that if a filter bag formed of paper or a similar fragile material is connected directly to the discharge nozzle **22**, the wall of the bag will crack open after a comparatively short period of use. I have furthermore discovered that this difficulty is caused by the bending or flexing of the bag as the handle **26** is swung up and down during the operation of the machine. In order to avoid this bending action, I provide a comparatively short flexible tube **34** which connects the discharge nozzle **22** with the front or inlet end of the bag, the various parts being so arranged that during the movement of the handle **26** the tube **34** will bend and the bag will remain substantially rigid. This tube may be formed of any material having the required strength and flexibility. For example, a suitable cloth may be used, and this cloth may be rubberized or otherwise rendered non-porous, although this is not essential.

The tube **34** may be permanently attached to the nozzle **22**, but I prefer to make these parts separable and to provide a construction so arranged that it may be readily applied to vacuum cleaners of the ordinary type which are already in use. For this purpose I secure the rear end of the tube **34** to a collar **35** by any suitable means, such as a wire **36**. This collar is provided with a pair of opposed hooks **38** which engage lugs **39** on the nozzle **22**. An annular gasket **40** is preferably utilized to prevent leakage between the nozzle **22** and the collar **35**.

A suitable means is provided for releasably connecting the rear end of the tube **34** to the bag **30**. For this purpose the tube is secured to a sleeve **42** by a wire **43**. This sleeve is inserted in an inlet neck **44** formed on the front end of the bag **30**, and the neck is clamped tightly against the sleeve by means of a clamping ring **46**. As shown in Fig. 4, this ring is provided with overlapping ends which can be drawn together by means of a bolt **47** and wing nut **48**.

In order to ensure that all transverse bending action will be taken up by the tube **34** rather than by the filter bag **30**, I propose to reinforce the bag by some suitable means. For this purpose I have shown a stiff wire or rod **50** (Fig. 5) sewed into the bag and extending along the upper margin thereof.

Vacuum cleaner filter bags as heretofore constructed have frequently included a tube connected to the inlet of the bag and extending into the interior of the bag for the purpose of forming a trap to prevent the dropping back of accumulated dust when the cleaner motor is stopped. Such a trap adds to the cost of the bag, and hence is particularly undesirable if the bag is to be destroyed after use. With my improved construction it is not necessary to form a trap in the filter bag, since the flexible tube **34** performs the function of such a trap. Whenever the motor is stopped the tube **34** will collapse, and the weight of the bag and accumulated dirt will cause the outlet end of the tube to drop below the nozzle **22**. In order to facilitate this action, I preferably elongate the hook **32** or provide some other simple construction which will allow the bag to move downwardly a slight distance toward the nozzle **22** when the motor is stopped and the air pressure in the bag is relieved.

The operation of the invention will now be apparent from the above disclosure. The motor **24** is started, the fan draws dust laden air through the nozzle **21** and discharges it through the nozzle **22** and tube **34** into the bag **30**. The dust remains in the bag and the air passes through the porous walls of the bag, there being sufficient resistance to the air flow to create a slight back pressure on the fan. This back pressure inflates and distends the bag and the tube **34**, so that in normal operation these parts will assume the positions shown in Fig. 1. If now the handle **26** is swung upwardly as shown in Fig. 6, the tube **34** will bend and there will be no buckling of the bag. If the motor is stopped the air pressure in the bag and tube will be relieved, so that the tube will collapse and the bag will drop into the position shown in Fig. 7. If the handle **26** is lowered, the parts will assume the positions shown in Fig. 8. At no time will there be any buckling or flexing of the bag, and whenever the motor is stopped the tube **34** will form a trap and prevent dropping back of the dust irrespective of the handle position. When considerable dust has accumulated in the bag, the bag can be disconnected from the tube **34** by loosening the clamping ring **46**, and the bag and dust can then be burned or otherwise disposed of.

The construction is simple and inexpensive, and has been found of great practical value, particularly in connection with filter bags of paper or similar weak materials.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

A vacuum cleaner comprising a motor and fan casing assembly having a rearwardly directed discharge nozzle, a handle hinged to the assembly and extending rearwardly therefrom, the handle being movable in a vertical plane, a filter bag arranged in substantial axial alignment with the discharge nozzle, connecting means between the handle and the rear end of the bag which supports the bag and yet allows a limited axial movement thereof, a comparatively short flexible tube secured at one end to the discharge nozzle, and means to secure the other end of the tube to the front end of the bag, the parts being so constructed and arranged that upon stopping of the motor the bag will move toward the discharge nozzle and the tube will collapse, thus forming a trap which will prevent the return of dust to the fan casing.

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