Sept. 14, 1937. F. RIEBEL, JR 2,092,778

VACUUM CLEANER

Filed Sept. 18, 1936

Fig. 1

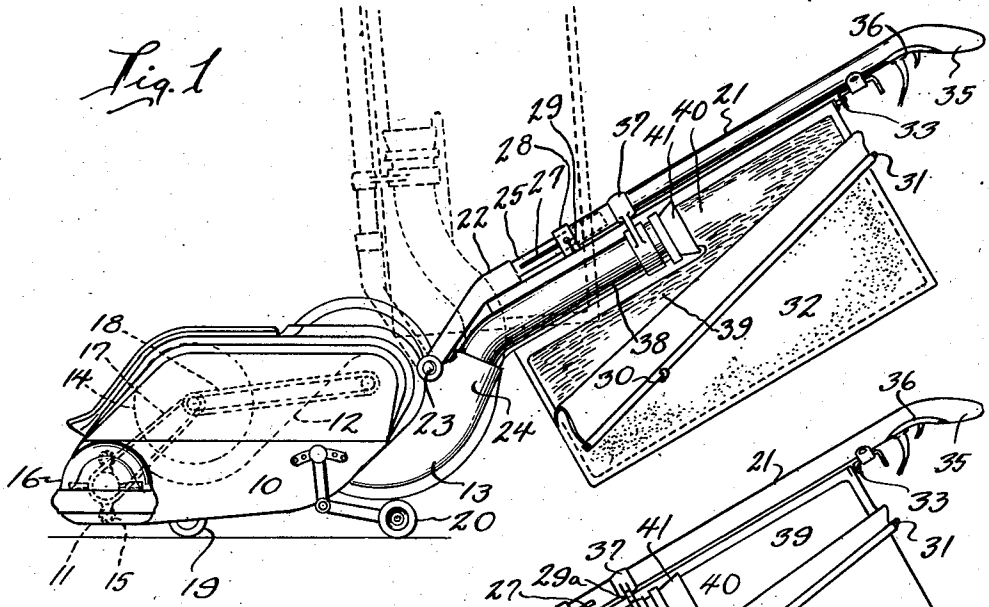


Fig. 3

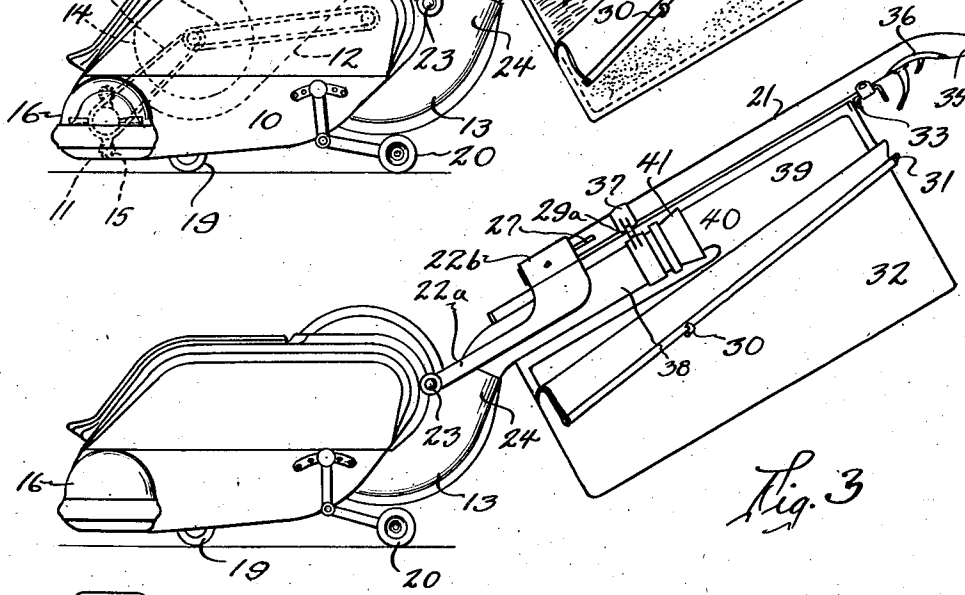
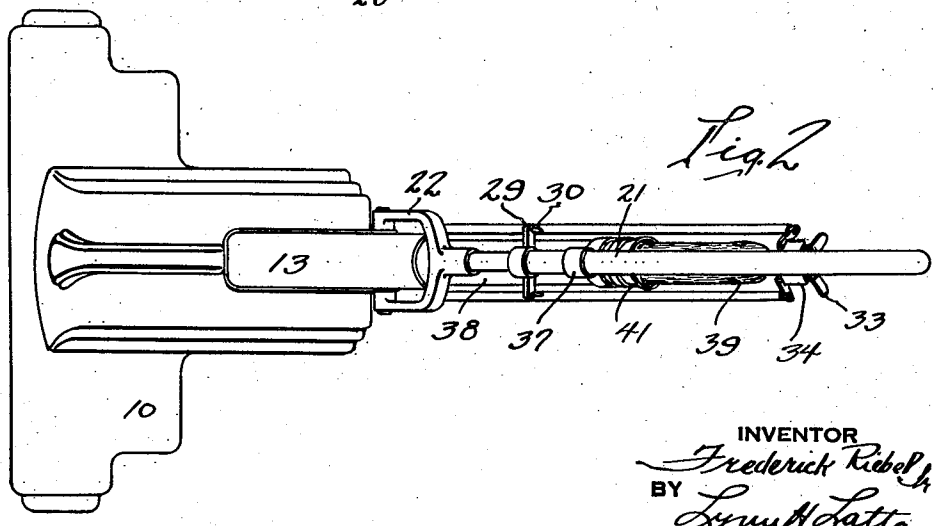


Fig. 2



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VACUUM CLEANER

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7 Claims. (Cl. 183—51)

This invention relates to vacuum cleaners of the type in which a paper dust collecting and air filtering bag, carried by the cleaner handle which is hingedly attached to the body of the cleaner, has its neck coupled to the fan case outlet by means of a flexible tube delivery end of which is constrained to move in unison with the handle so as not to impose strains upon the bag. This general construction is shown in my pending application Serial Number 626,682, filed July 30, 1932, of which application the present application constitutes a continuation in part.

The primary object of the present invention is to improve upon this type of construction so that the handle may be moved through a range of ninety degrees without being interfered with by the flexible tube connection. The object is attained generally by providing a sliding joint in the handle between the axis of hinging movement and the point where the flexible tube is attached to the handle.

A further object of the invention is to provide an arrangement in which the flexible tube connecting the bag neck to the fan case is of such length as to allow a normal range of movement of the handle through substantially ninety degrees and wherein the entrance to the bag is located at such a point that normally the large majority of the bag lies below such entrance point so that the entrance will not be clogged by the accumulation of refuse in the bag.

Further objects will appear in the perusal of the following detailed description of the invention in connection with the accompanying drawing in which:

Fig. 1 is a side elevation of a vaccum cleaner embodying the invention,

Fig. 2 is a plan view of the same, and

Fig. 3 is a side elevation of a modification of the invention.

I have used the reference character 10 to indicate a suction chamber which begins with a suction mouth 11 and terminates in a pair of elbows 12 communicating with the opposed inlets of the dual fan 13. A motor 14 drives a rotary agitator 15 in the agitator chamber 16 by means of a belt 17, and drives the impeller of the fan 13 by means of a belt 18.

The foregoing elements constitute the body of the cleaner which is supported upon front wheels 19 and adjustable rear wheels 20.

The handle comprises a handle shaft 21 and a bail 22, the latter being hinged at 23 to the body of the cleaner near but not necessarily directly at the outlet 24 of the fan 13.

The handle shaft 21 is slidably attached to the bail 22 by means of the shank 25 of the bail, which shank extends into the lower end of the handle shaft 21, the latter being tubular. A pin 26 mounted in the shaft 21 extends through a slot 27 in the shank 25 whereby the shaft 21 is held against rotation relative to the bail 22 while being allowed to slide longitudinally relative to said bail.

The lower end of the shaft 21 carries a fitting 28 which includes a pair of laterally projecting ears 29, the outer ends of which have sockets to receive hooks 30 mounted in the bag supporting rods 31 of the paper bag enclosing envelope 32.

The envelope 32 may be of cloth, knitted fabric, or perforated composition material. The upper ends of the rods 31 are received in keepers 33 slidably mounted in brackets 34 in the handle shaft. The handle proper 35 has the conventional switch and conductor assembly 36.

A bracket 37 rigidly attached to the handle 21, secures the free end of a flexible tube 38 which at its lower end is attached to the outlet 24 of the fan 13. The paper bag 39 is supported in the envelope 32 and has in one side an off-set forming a neck 40 which is secured in a coupling 41 carried by the bracket 37 on the upper end of the tube 38 and communicates with the latter.

If desired, a substantial length of tube 38 could be allowed to project between the bracket 37 and the coupling 41. An important feature of the construction is that the bracket 37 be attached to the tube 38 between the coupling 41 and the outlet 24 so as to constrain the upper end of the tube to move in unison with the handle. As a matter of practical construction it is preferable to attach the coupling 41 directly to the bracket 37, and, if desired, the coupling 41 could be allowed to project entirely through the bracket 37 and the tube 38 receive its connection to the handle through the medium of the coupling 41.

The upper ends of the side walls of the envelope 32 are detached from each other to form an openable mouth in the envelope and to allow the tube 38 to freely project into the envelope, and to flex as the handle is moved to the upstanding position shown in dotted lines. As the handle is moved to such upstanding position the shaft 21 will telescope on the shank 25 until the fitting 28 reaches the shoulder of the bail 22. This allows the entire assembly to move to the upstanding position without forcing the tube 38 to buckle unnecessarily. The parts are so arranged that the tube may assume the natural curvature which is demanded by the rigid attachment of its respective ends to the outlet 24 and bracket 37 respectively without being placed under longitudinal distension.

Thus it is possible to place the axis of the hinge 23 forwardly of the outlet 24 so as to facilitate steering of the cleaner by the handle and to allow the tube 38 to lie entirely below the handle.

The arrangement also allows the handle to be lowered to a horizontal position. The inlet 40 of

the paper bag is located approximately halfway between the upper and lower ends of the bag. Sufficient space is left between the neck and the upper end of the bag to allow the discharge from the tube **38** to freely enter the bag without choking, and yet the entrance is at such a position that more than three-fourths of the area of the bag lies below the level of the inlet neck. Thus while the cleaner is operating in normal position, the dirt will drop into the pocket which is formed by the lower region of the bag and the accumulated refuse will in no way interfere with the entrance of new dirt into the bag unless the bag becomes almost completely filled, which, of course, is a condition that is not supposed to be allowed to attain. When the handle and bag assembly are raised to the upstanding position shown in dotted lines sufficient area of the bag will still remain below the level of the inlet so that under normal conditions the collected refuse will not fall back down the tube **38** into the fan case, a condition which is to be avoided.

The arrangement of the inlet neck **40** parallel to the longitudinal axis of the bag makes it possible for the handle and bag assembly to reach the upstanding position shown in dotted lines without distortion of parts.

In the modified form shown in Fig. 3 the bail **22***a* embraces the lower region of the tube **38** and its upper end forms a sleeve **22***b* in which the lower end of the handle shaft **21** is slidably mounted.

I claim as my invention:

1. In a vacuum cleaner, a body unit including a fan case, a handle hinged to the body unit, a filtering and collecting bag carried by the handle and having an inlet neck, a flexible tube connecting the fan case outlet to the inlet of the bag, means rigidly connecting the upper end of the tube to the handle, constraining it to move in unison with the handle, and a longitudinally slidable joint in the handle located between the point of attachment of the upper end of the tube to the handle and the axis of a hinged connection of the handle with the body unit.

2. In a vacuum cleaner, a body unit including a fan case, a handle hinged to the body unit, a filtering and collecting bag carried by the handle and having an inlet neck, a flexible tube connecting the fan case outlet to the inlet of the bag, means rigidly connecting the upper end of the tube to the handle, constraining it to move in unison with the handle, and a longitudinally slidable and non-rotatable joint in the handle located between the point of attachment of the upper end of the tube to the handle and the axis of hinged connection of the handle with the body unit.

3. In a vacuum cleaner, a body unit including a fan case, a handle hinged to the body unit, a filtering and collecting bag carried by the handle and having an inlet neck, a flexible tube connecting the fan case outlet to the inlet of the bag, means rigidly connecting the upper end of the tube to the handle, constraining it to move in unison with the handle, and a longitudinally slidable joint in the handle located between the point of attachment of the upper end of the tube to the handle and the axis of hinged connection of the handle with the body unit, said collecting bag being of porous paper, and a reenforcing envelope enclosing said paper bag, the upper region of said envelope being rigidly attached to the handle.

4. In a vacuum cleaner, a body unit including a fan case, a handle hinged to the body unit, a filtering and collecting bag carried by the handle and having an inlet neck, a flexible tube connecting the fan case outlet to the inlet of the bag, means rigidly connecting the upper end of the tube to the handle, constraining it to move in unison with the handle, and a longitudinally slidable joint in the handle located between the point of attachment of the upper end of the tube to the handle and the axis of hinged connection of the handle with the body unit, said inlet neck being located substantially halfway between the upper and lower ends of the bag, whereby said flexible tube is of sufficient length to allow the handle to move through an arc of ninety degrees and whereby a major portion of the bag normally lies below said inlet neck.

5. In a vacuum cleaner, a body unit including a fan case, a handle hinged to the body unit, a filtering and collecting bag carried by the handle and having an inlet neck, a flexible tube connecting the fan case outlet to the inlet of the bag, means rigidly connecting the upper end of the tube to the handle, constraining it to move in unison with the handle, and a longitudinally slidable and non-rotatable joint in the handle located between the point of attachment of the upper end of the tube to the handle and the axis of hinged connection of the handle with the body unit, said envelope having side walls the upper regions of which are detached to provide an openable mouth to receive the paper bag.

6. In a vacuum cleaner, a body unit including a fan case, a handle hinged to the body unit, a filtering and collecting bag carried by the handle and having an inlet neck, a flexible tube connecting the fan case outlet to the inlet of the bag, means rigidly connecting the upper end of the tube to the handle, constraining it to move in unison with the handle, and a longitudinally slidable and non-rotatable joint in the handle located between the point of attachment of the upper end of the tube to the handle and the axis of hinged connection of the handle with the body unit, said envelope having side walls the upper regions of which are detached to provide an openable mouth to receive the paper bag, said side walls being at the lower end of the bag detached to a sufficient depth to allow said flexible tube to freely flex when the handle is raised to an upstanding position.

7. In a vacuum cleaner, a fan case having an upwardly and rearwardly inclined outlet, a handle pivoted with respect to the fan case and extending normally upwardly and rearwardly, a porous paper dust collecting bag carried by the handle, said bag having a neck located intermediate its forward and rear ends, a flexible tube connected at one end to said outlet and at its other end to said neck, and means attaching said other end to the handle so as to constrain the tube to move in unison with the handle and to relieve strain upon the bag, said tube being of such length as to allow the handle to move through a conventional range of movement.

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