

Feb. 1, 1944.

T. A. STONER

2,340,437

SUCTION CLEANER

Filed Dec. 30, 1940

2 Sheets-Sheet 1

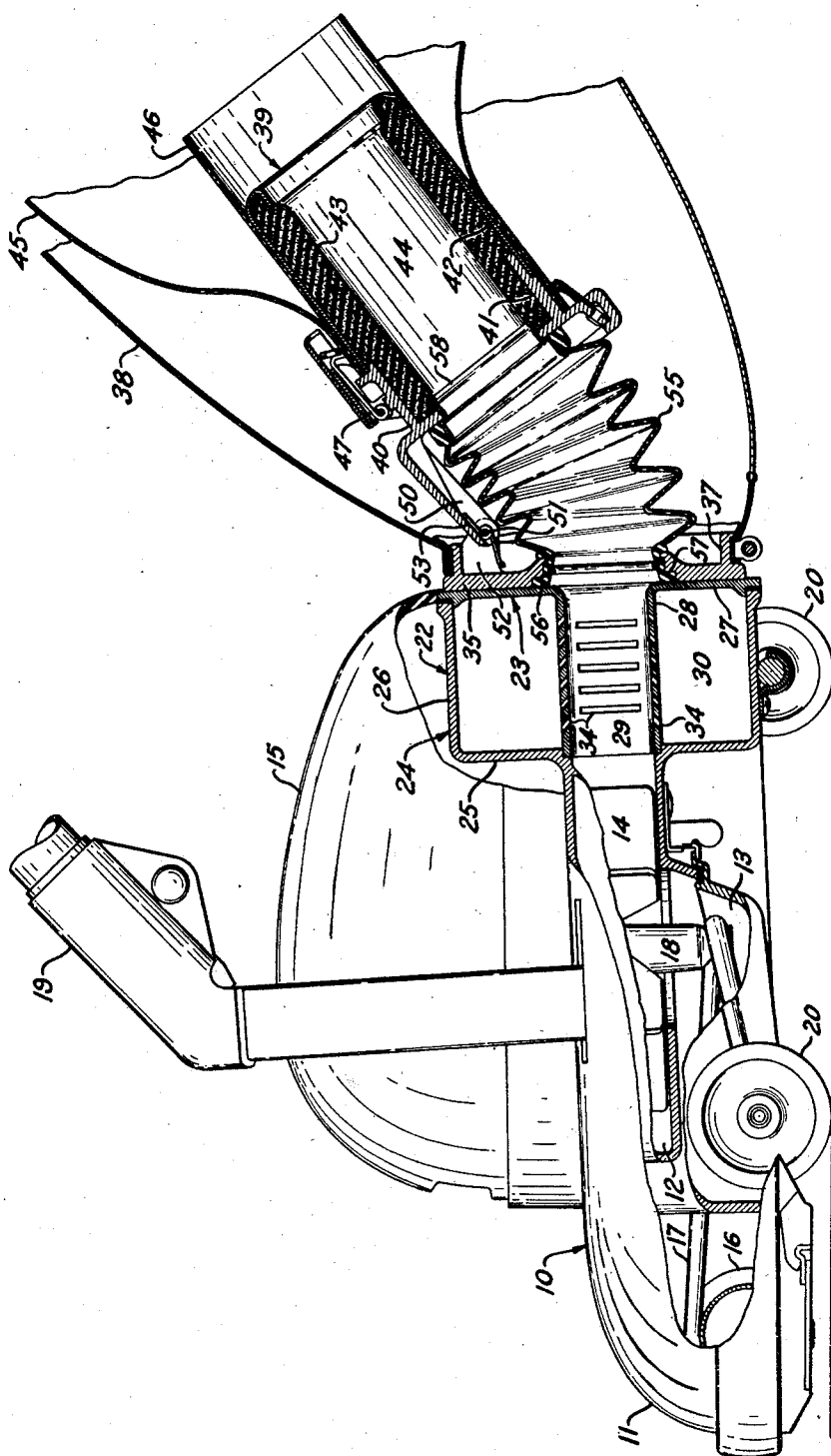


Fig. 1

INVENTOR

Thomas A. Stoner

BY

BY
Harry J. Demaree
ATTORNEY

ATTORNEY

Feb. 1, 1944.

T. A. STONER

2,340,437

SUCTION CLEANER

Filed Dec. 30, 1940

2 Sheets-Sheet 2

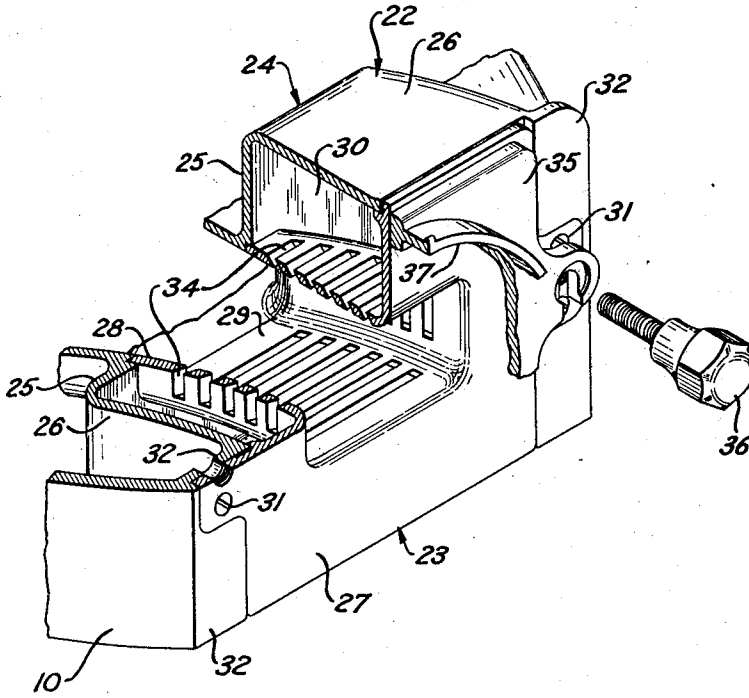


Fig. 2

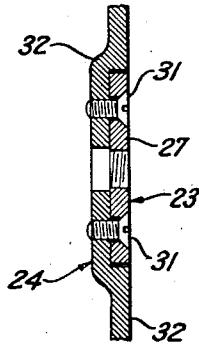


Fig.3

INVENTOR

Thomas A. Stoner

BY

BY
Harry S. Demasse
ATTORNEYS

ATTORNEYS

UNITED STATES PATENT OFFICE

2,340,437

SUCTION CLEANER

Thomas A. Stoner, Beloit, Wis., assignor to The Hoover Company, North Canton, Ohio, a corporation of Ohio

Application December 30, 1940, Serial No. 372,249

7 Claims. (Cl. 15—16)

This invention relates to new and novel improvements in suction cleaners and more particularly to an improved form of muffler which functions to reduce the operating noise of the cleaner.

An object of the invention is to provide a new and improved suction cleaner. Another object is to provide a new and improved muffler for suction cleaners. A further object is to provide a resonant muffler which is disposed in the body of the suction cleaner. Another object is to provide a resonant muffler wherein the cleaner casing forms part of the muffler construction. A further object is to provide a combination resonant-absorption muffler in a suction cleaner, wherein the resonant portion of the muffler attenuates certain undesirable sound waves, and the absorption portion reduces noise throughout the audible range. Other objects and advantages of the invention will be apparent from the specification and drawings, wherein:

Figure 1 is a side elevational view of a suction cleaner with parts broken away to illustrate the invention;

Figure 2 is a fragmentary perspective view of the resonant portion of the muffler, and

Figure 3 is a sectional view illustrating the manner of assembling the two parts of the resonant muffler.

The embodiment of the invention disclosed in the drawing comprises a suction cleaner having a casing 10 provided with a nozzle 11 communicating with a fan chamber 12 through a suction passageway 13. Disposed in the fan chamber 12 is a fan 14 driven by an unshown motor enclosed in a housing 15 removably supported on a casing 10. An agitator 16 is rotatably mounted in the nozzle 11 and is driven by a belt 17 extending through the suction passageway 13 and having driving connection with a pulley 18 rigidly mounted on the motor armature shaft. A handle 19 is pivotally mounted on the cleaner casing 10 for moving the cleaner on its wheels 20 over the surface to be cleaned.

A resonant muffler 22 is formed within the cleaner casing 10 and the motor housing 15 and is composed of two casing sections 23 and 24, the latter being formed integrally with the cleaner casing 10 and comprising a vertically extending end wall 25 and an annular wall 26 which extends rearwardly to the rearmost end of the motor housing 15. The muffler casing section 23 comprises an end wall 27 provided with a conduit 28 which projects inwardly of the suction cleaner casing 10 and the muffler casing section 24, the

conduit 28 forming the exhaust passageway 29 from the fan chamber 12. The cleaner casing end wall 25, annular wall 26 and the extreme end wall 27 and inwardly extending conduit 28 cooperate to define an annular resonant chamber 30 which is concentric with the exhaust passageway 29. The muffler casing section 23 is removably secured to the main casing 10, as illustrated in Figures 2 and 3, by means of screws 31 threaded into a flange 32 formed at the extreme end of the main casing 10. The exhaust passageway 29 is provided in each of its four side walls with elongated openings 34 which are inclined toward the front end of the cleaner and in a direction opposite to the movement of the dirt-laden air through the exhaust passageway. The openings 34 communicate with the resonant chamber 30 and their cumulative area is predetermined with respect to the volume of the resonant chamber 30 so as to attenuate sound waves over a certain range of frequency.

A bag flange 35 is removably secured to the rear flange 32 on the main casing 10 by means of screws 36 and is provided with an annular shoulder 37 on which is removably secured the lower end of an exterior bag 38, the upper end of which is supported from the cleaner handle in any well-known manner.

Disposed within the bag 38 is a resonant-absorption type muffler indicated generally at 39 and comprises a frame member 40 having an annular flange 41 to which is secured a metal shell 42 which is lined with sponge rubber 43, or the like, to form a sound-absorbing muffler and to define a discharge passageway 44 from the fan chamber.

Disposed within the bag 38 is a dust-filtering bag 45 composed of paper, or the like, and has a re-entrant portion 46 which snugly fits over the metal shell 42 of the absorption muffler and projects beyond the upper end thereof to form a deflector to prevent dirt from dropping back into the passageway 44. A clamp 47 removably secures the paper bag to the frame member 40. The outer bag 38 is provided with an unshown opening for removing the paper bag 45 and to disconnect the latter from the muffler 39.

The absorption muffler member 40 is provided with a pair of spaced arms 50 which are pivotally mounted by a pin 51 to a pair of arms 52 extending rearwardly from the bag supporting member 35. A torsion spring 53 about the pin 51 acts to support the muffler to prevent the full weight of the latter from resting on the lower wall of the bag when the handle is moved to the conven-

tionally substantially vertical storage position. In order to connect the absorption muffler 39 to the exhaust passageway 29, a flexible bellows 55 has its lower end 56 provided with a flange supported in an annular recess 57 in the bag supporting member 35 to form an air-tight seal between the bag supporting member 35 and the rear end of the cleaner casing adjacent the exhaust passageway 29, while the upper end of the bellows 55 is removably supported on a collar 58 carried by the absorption muffler.

In the operation of the cleaner sound waves are produced over the entire audible range, and some of these sound waves are of such frequency as to be sensitive to the operator. In order to eliminate, for example, the fan noise which is in a relatively limited range of frequency, the resonant chamber 30 is constructed to a predetermined volume with respect to the cumulative area of the entrance openings 34. Upon discharge of dirt-laden air into the exhaust passageway 29, the sound waves pass through the openings 34 into the concentric annular resonant chamber 30 and are attenuated in the enclosed resonant chamber 30 to reduce the undesirable fan noise. The energy of the sound waves passing through the passageway 29 into the resonant muffler is also reduced by the absorption effect of the sound-absorbing material 43 and its metallic shell 42. Finally, the sound waves that escape into the filter bag 45 have been attenuated and absorbed to such a degree that the resulting noise is negligible.

When it is desired to clean the resonant chamber, the screws 31 are removed and the resonant muffler casing section 23 is removed from the interior of the cleaner casing 10 to expose the resonant chamber 30, whereby the latter may be cleaned.

I claim:

1. In a suction cleaner, a cleaner body, an exhaust passageway in said body, a motor driven fan to remove dirt from the surface being cleaned and to discharge it through said exhaust passageway, a dust bag for receiving the dirt discharged by said fan, a hollow flexible member connecting said bag with said exhaust passageway, said bag being removably connected to said flexible member, and an adaptor removably mounted on said body and having means for receiving an extreme end of said flexible member, said extreme end contacting said body to form an air-tight seal around said exhaust passageway when said adaptor is attached to said body, and said bag being removable without disconnecting said flexible member and adaptor from said cleaner body.

2. A suction cleaner, comprising a cleaner body having a nozzle engaging the surface to be cleaned, an exhaust passageway, a fan chamber between said nozzle and exhaust passageway, and a suction creating fan in said fan chamber for drawing dirt-laden air from the surface being cleaned through said nozzle and to discharge the dirt-laden air through said exhaust passageway, a removable member telescoped with respect to said cleaner body to form with said cleaner body a resonant chamber, the walls of said resonant chamber forming a part of said exhaust passageway, means defining an opening connecting said resonant chamber with said exhaust passageway, said resonant chamber attenuating the sound waves in the dirt-laden air as the latter passes said openings to said resonant chamber.

3. A suction cleaner, comprising a cleaner body having a nozzle engaging the surface to be

cleaned, an exhaust passageway, a fan chamber between said nozzle and exhaust passageway, and a suction-creating fan in said fan chamber for drawing dirt-laden air from the surface being cleaned through said nozzle and to discharge the dirt-laden air through said exhaust passageway, a removable member having a first portion inserted within said cleaner body and having a second portion forming an exterior wall of said cleaner body, said cleaner body and member cooperating to define a resonant chamber, said inserted first portion of said member forming a continuation of said exhaust passageway, openings in said inserted first portion connecting said resonant chamber with said exhaust passageway, said resonant chamber attenuating the sound waves in the dirt-laden air as the latter passes said openings to said resonant chamber.

4. A suction cleaner comprising a cleaner body having a nozzle engaging the surface to be cleaned, an exhaust passageway, a fan chamber between said nozzle and exhaust passageway, and a suction creating fan in said fan chamber for drawing dirt-laden air from the surface being cleaned through said nozzle and to discharge the dirt-laden air through said exhaust passageway, a removable member telescoped with respect to said cleaner body to form with said body a resonant chamber, the walls of said resonant chamber forming a part of said exhaust passageway, means defining an opening connecting said resonant chamber with said exhaust passageway, a sound absorbing muffler carried by said removable member and forming a continuation of said exhaust passageway for the dirt-laden air, said resonant chamber attenuating the sound waves in the dirt-laden air as the latter passes said openings to said resonant chamber, and said absorption muffler absorbing the energy of the sound waves in the dirt-laden air as said absorption muffler conveys the dirt-laden air from said exhaust passageway.

5. A suction cleaner, comprising a cleaner body having a nozzle engaging the surface to be cleaned, an exhaust passageway, a fan chamber between said nozzle and exhaust passageway, and a suction creating fan in said fan chamber for drawing dirt-laden air from the surface being cleaned through said nozzle and to discharge the dirt-laden air through said exhaust passageway, a removable member having a first portion inserted within said cleaner body and having a second portion forming an exterior wall of said body, said cleaner body and member cooperating to define a resonant chamber, said inserted first portion of said member forming a continuation of said exhaust passageway, openings in said inserted first portion connecting said resonant chamber with said exhaust passageway, a sound-absorbing muffler carried by said second portion of said removable member forming the exterior wall of said cleaner body, said absorption muffler forming a continuation of said exhaust passageway exteriorly of said body for carrying the dirt-laden air, said resonant chamber attenuating the sound waves in the dirt-laden air as the latter passes said openings to said resonant chamber, and said absorption muffler absorbing the energy of the sound waves in the dirt-laden air as said absorption muffler conveys the dirt-laden air from said exhaust passageway.

6. A suction cleaner, comprising a cleaner body having a nozzle engaging the surface to be cleaned, an exhaust passageway, a fan chamber between said nozzle and said exhaust passageway,

and a suction creating fan in said fan chamber for drawing dirt-laden air from the surface being cleaned through said nozzle and discharging the dirt-laden air through said exhaust passageway, said cleaner body having an open ended walled area enlarged with respect to said exhaust passageway, a removable member having a first portion inserted in said area and forming a continuation of said exhaust passageway, said removable member having a second portion closing said open ended walled area, said first and said second portions of said removable member cooperating with said cleaner body enlarged walled area to form a resonant chamber, openings in said first portion of said removable member connecting said resonant chamber with said exhaust passageway, said resonant chamber attenuating the sound waves in the dirt-laden air as the latter passes said openings to said resonant chamber.

7. In a suction cleaner, a cleaner body having an exhaust passageway, an adaptor removably mounted on said body and having an opening connected to said exhaust passageway, said opening being larger than said exhaust passageway, and a hollow flexible member having an extreme end removably secured to said adaptor in said opening, said hollow flexible member forming a flexible extension of said exhaust passageway beyond said adaptor, said extreme end lining said opening in said adaptor to conform substantially to the area of said exhaust passageway, said extreme end of said hollow flexible member contacting the cleaner body to form an air-tight seal around the outlet of said exhaust passageway when said adaptor is attached to said body.

THOMAS A. STONER.