

March 24, 1931.

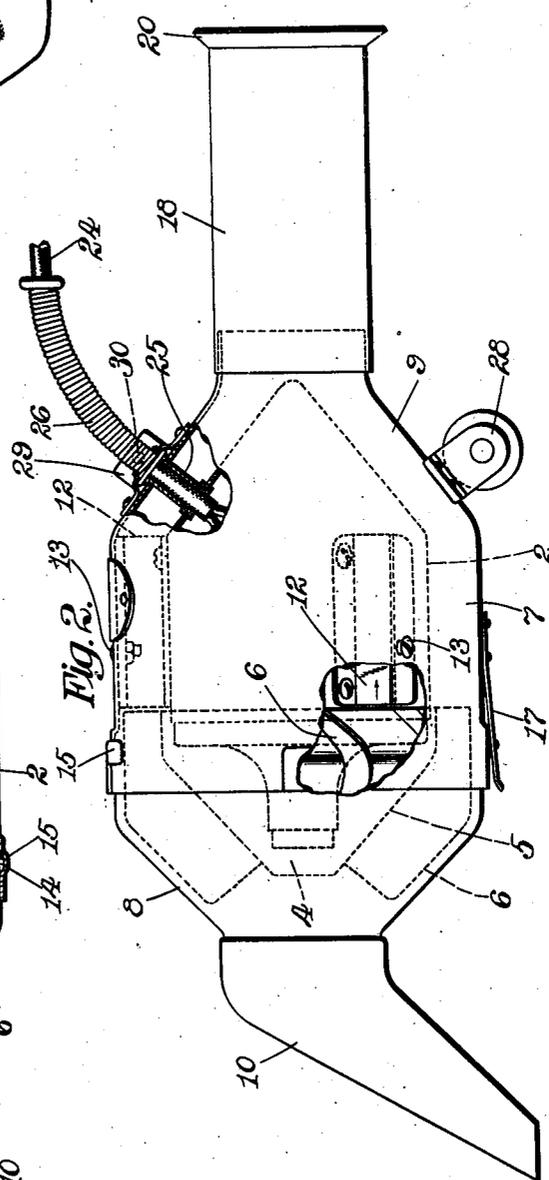
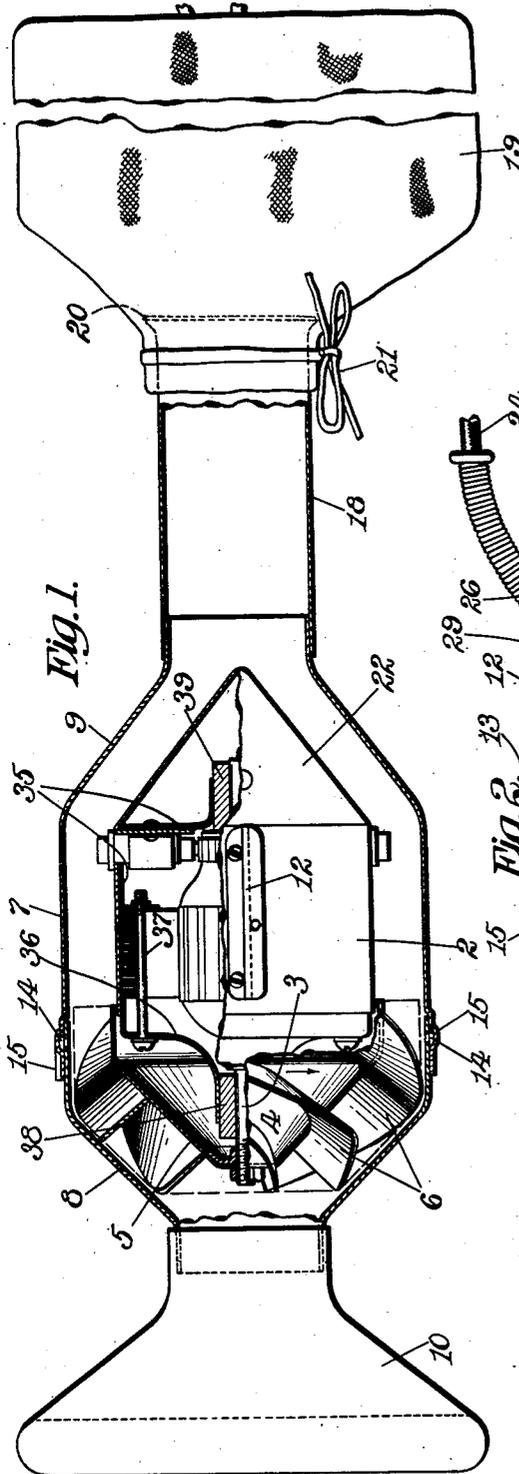
E. W. VOSE

1,797,455

VACUUM CLEANER

Filed June 10, 1925

2 Sheets-Sheet 1



Inventor.
Edwin W. Vose
by J. H. McCurdy
his Atty.

March 24, 1931.

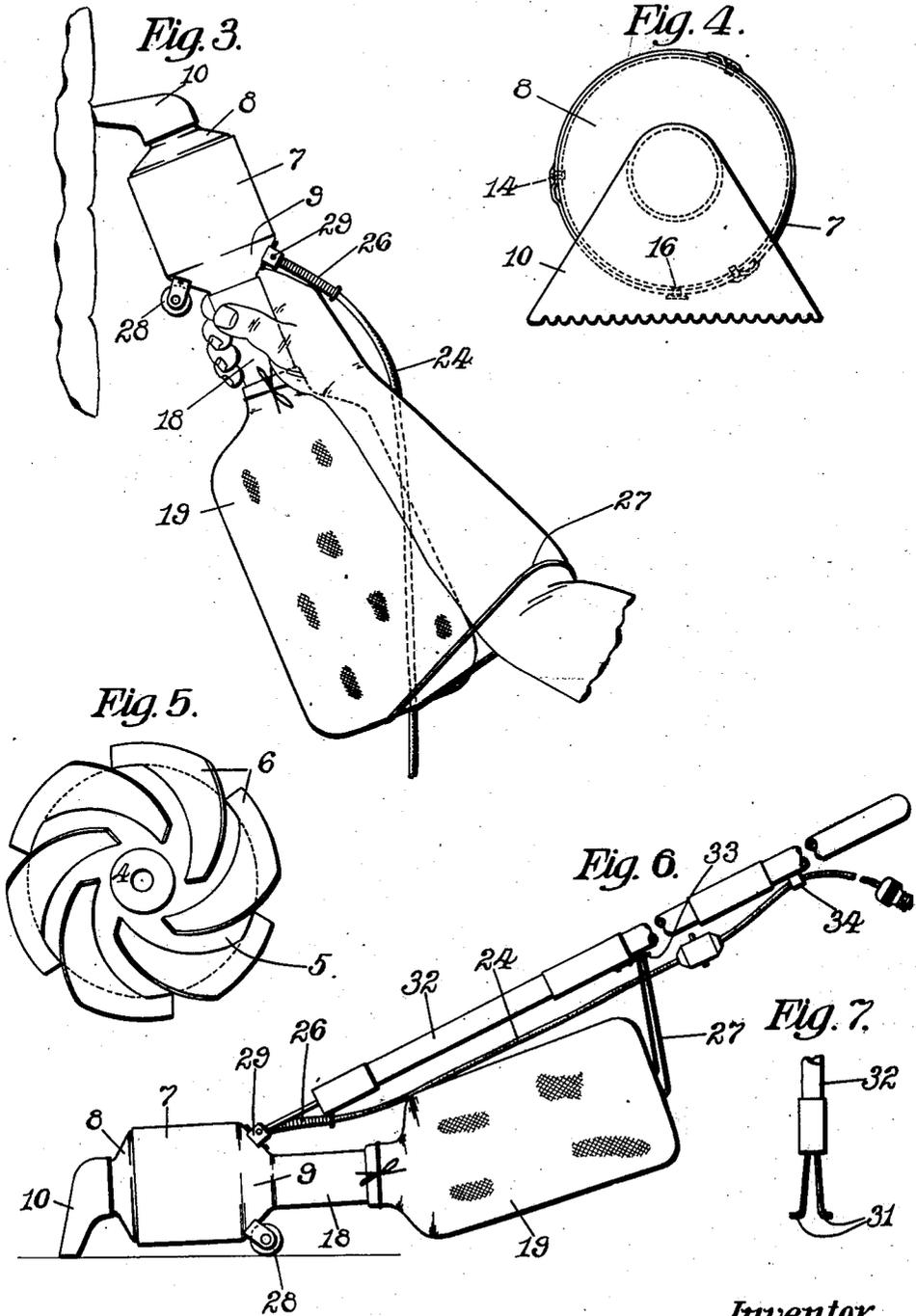
E. W. VOSE

1,797,455

VACUUM CLEANER

Filed June 10, 1925

2 Sheets-Sheet 2



Inventor:
Edwin W. Vose
by *J. H. McCord*
his Atty.

UNITED STATES PATENT OFFICE

EDWIN W. VOSE, OF WORCESTER, MASSACHUSETTS

VACUUM CLEANER

Application filed June 10, 1925. Serial No. 36,112.

This invention relates to vacuum cleaners, and is especially concerned with a vacuum cleaner of the hand type intended for cleaning upholstery, the interior of automobiles, stairs, draperies and the like.

It is the chief object of the invention to devise a cleaner which shall be so small and light in weight that it can be easily supported and used entirely in one hand, and at the same time shall have the necessary suction and air volume to enable it to clean quickly and thoroughly. I am aware that cleaners of this type have been proposed heretofore, but the prior machines of which I have been able to learn have not proved successful due largely to the fact that they either have been too heavy for a woman to handle, or else because they lacked the suction or air handling capacity necessary to clean effectually. The present invention provides an apparatus which is not open to these objections.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

Referring now to the drawings,

Figure 1 is a plan view, partly in cross section, showing a cleaner embodying this invention;

Fig. 2 is a side elevation of the cleaner shown in Fig. 1;

Fig. 3 is a perspective view showing one method of using the cleaner;

Fig. 4 is an end view of the nozzle and casing construction of the cleaner shown in Figs. 1 and 2;

Fig. 5 is a front elevation of the fan used in the cleaner shown in Figs. 1 and 2;

Fig. 6 is a side elevation showing the method of using the cleaner on rugs and the like; and

Fig. 7 is a front elevation of a part of an auxiliary handle which may be used with the cleaner.

Referring first to Figs. 1 and 2, the construction there shown comprises an electric motor 2 which preferably is of a light weight

high speed type adapted to run at about 10,000 or 12,000 revolutions per minute.

Secured on the shaft 3 of this motor is a fan 4 of novel construction. This fan is of approximately conical form and comprises a hollow body 5 of conical shape provided with a central hub and having a series of spiral blades 6 projecting from its outer surface, as best shown in Figs. 1 and 5. Both the motor and the fan are enclosed in a casing which comprises a central body portion 7 of approximately cylindrical form with tapered end sections 8 and 9, respectively, at opposite ends of said body portion. The forward tapered section 8 closely encircles the fan 4, only a comfortable running clearance being provided between this section and the fan. A nozzle 10 is secured to the intake end of the casing section 8. This nozzle turns or bends abruptly away from the intake opening and extends downwardly, terminating in an open mouth adapted to rest on the carpet, rug, or other surface to be cleaned. This abrupt turning or bending of the nozzle provides a substantially direct passage from the fan to the nozzle opening and forms by means of the nozzle a continuation of the tapered section 8, thus permitting the same to exert a direct pull upon the article to be cleaned.

The motor is spaced from the inner wall of the casing by a series, preferably three, of plates 12, the inner edges of these plates being bolted or riveted to the motor frame or housing, while their outer edges are secured, as by bolts 13, to the body portion 7 of the casing. For convenience in assembling the parts and also in order to permit access to the interior of the casing, I prefer to make the tapered section 8 removable from the body section 7, and for this purpose the part 8 is provided with three pins or lugs 14, Figs. 1 and 4, which fit into bayonet slots or grooves 15 formed in the body section 7. Another pin 16, Fig. 4, mounted on the end of a spring 17, Fig. 2, which is riveted to the part 7, normally fits in a hole in the section 8 and prevents the relative rotation of the casing sections 7 and 8 which is necessary to release the lugs 14 from the bayonet

slots. By springing the pin 16 out of its hole, the casing member 8 may be rotated far enough to free the pins 14 from the bayonet slots.

5 When the motor 2 is running it revolves the fan 4 at a high speed and the current of air created by this fan is forced backwardly around the motor 2 and flows through the space between the motor housing and the casing 7, thence through the tapered section 9, and finally through a discharge tube 18 into a bag or dust catcher 19.

10 The tube 18 is rigidly secured to the casing section 9, and it performs both the functions of a discharge tube and also of a handle. 15 The rearward end of this tube is enlarged or flanged, as shown at 20, and the mouth of the bag may be conveniently fastened to this tube by a draw spring 21.

20 Attention is particularly directed to the construction of the fan and its relationship to the adjacent parts of the apparatus. When this fan is driven rapidly by the motor the inclined blades 6 force the air both backwardly and also outwardly away from the 25 axis of the fan, the fan in this respect combining the functions of both the centrifugal and propeller types. At the same time the fact that this fan is closely encircled by the tapered casing section 8 enables it to exert 30 an unusually positive action on the air, and hence produces a relatively high vacuum and handles a big volume of air. The body 5 of the fan preferably is tapered at an angle 35 of approximately 45° , and the end of the motor housing projects into and is overlapped and closely encircled by this body so that the end of the motor lies within the path of revolution of the blades 6. This arrangement is of advantage in producing a 40 compact construction; preventing the entrance of hair, threads, or the like, into the space around the forward end of the motor shaft; and also reduces the air friction on the motor frame or housing. It should also 45 be noted that the rearward ends of the blades 6 extend backwardly substantially to the rearward edge of the body 5 and terminate just in front of the baffle plates 12, a running clearance only being provided between the 50 blades 6 and the plates 12. These baffle plates perform the double function of supporting the motor 2 in its spaced position inside the casing 7, and also of dividing the air space between the motor and the casing into a series of 55 air channels that extend longitudinally of the motor and prevent rotation of the air around the motor. If it were not for these plates the effectiveness of the fan would be 60 partially lost in circumferential rotation of the air inside the casing. The baffle plates, however, prevent such rotation, direct the air backwardly, and are especially useful in 65 preventing sand, pins and other heavy mate-

rials from circulating within the casing and resisting ejection by the air currents.

The tendency of the air to eddy around the rearward end of the motor is prevented by 70 securing a shell 22, Fig. 1, over the rearward end of the motor where it forms part of the housing for the motor, the rearward end of this shell being of conical form, as clearly 75 shown in the drawings, so that its surfaces are substantially parallel to the inner wall of the rearward section 9 of the casing. The taper of this section, also, like that of the section 8, preferably is not greater than 45° so 80 that a smooth, easy path is provided through the entire casing for the flow of the air, sharp turns in the air stream are avoided and frictional losses are reduced. I prefer to make the motor housing as tight as possible so that 85 it will be dust proof. The motor is effectually cooled by the stream of air which is flowing past it in contact with the motor housing.

It will be observed that this entire construction is of very light weight, the casing and housing members preferably being of 90 sheet metal construction, and the fan 4 being made either by pressed metal operations and the proper assembly, or by a die casting of light weight. The bag or dust catcher 19 95 may be made of a fleeced fabric of which such bags are commonly made. The electrical conductors 24 leading to the motor 2 are preferably brought into the motor housing through a bushing 25, Fig. 2, a coiled spring 100 guard 26 being secured to the part 9 to protect the conductor.

While the motor used may be of any suitable type, the motor shown has unique features. It is of the so-called "universal" type, 105 that is, designed to run on either alternating or direct current. Instead of using the usual cast metal housing I have provided a housing of sheet metal comprising two members 35 and 36, Fig. 1, which are secured together by 110 bolts, one of which is shown at 37. The bolts clamp the two housing sections to the field. The outside housing section 22 telescopes over the parts 35 and 36. The bearings 38 and 39 for the motor shaft are mounted in the 115 respective housing sections 36 and 35. These bearings may be of any suitable type, but, as shown, consist simply of bushings. Since the motor runs at a relatively high speed, it is desirable to select the bearings with some 120 care, and I have obtained good results by using self-lubricating bushings, and also by using ball bearings.

It is contemplated that in using the cleaner for most purposes the entire apparatus will 125 be held in and manipulated by the hand, as shown in Fig. 3, the tube 18 being utilized as a handle, and the dust bag 19 being supported on the arm of the user by means of a loop 27 which is connected to the bag. This 130

is the manner in which the cleaner is used, for example, in cleaning draperies, upholstery, stair carpets, mattresses, the interior of automobiles, and the like. The cleaner may, however, be used for cleaning rugs or carpets, and for this purpose I prefer to attach a caster or roll 28 to the casing section 9, as best shown in Figs. 2, 3 and 6. A small U-shaped bracket 29 is also riveted to the upper side of this casing section, and the two legs of this bracket have holes formed there-through, one of which is shown at 30, Fig. 2, to receive the wire ends 31, Fig. 7, projecting from a long handle 32. The ends 31 tend to spring apart and they snap into the holes 30 in the bracket 29. This handle is provided with a clip 33, Fig. 6 to receive the loop 27 for supporting the bag, and with another clip 34 holds the cord or electrical conductor 24. When equipped with this long handle, as shown in Fig. 6, the cleaner may be used as a sweeper in a manner similar to that in which the ordinary commercial types of cleaners are used.

The cleaner provided by this invention, therefore, is capable of an unusually wide variety of use. It has proved in practice to be so light in weight that it can easily be handled by a woman while using it in the manner shown in Fig. 3, and it has a very high suction for a fan type of cleaner as well as an uncommonly high air handling capacity. It therefore cleans very quickly and thoroughly. The design also is such that the cleaner can be manufactured economically. Obviously the apparatus can be used as a blower by removing the dust catcher or bag.

While I have herein shown and described the best embodiment of my invention that I have so far devised, it will be evident that the invention may be embodied in other forms without departing from the spirit or scope thereof.

Having thus described my invention, what I desire to claim as new is:

1. A vacuum cleaner having a casing tapering smoothly on opposite sides to reduced and substantially aligned openings one of which serves as an air inlet and the other as an air outlet with the inner wall of the casing forming an uninterrupted air guiding surface, and a fan and housed-in motor forming a unitary assembly tapering to conform generally to the inner shape of the casing, the body of said fan forming one tapering wall of the assembly, said assembly being substantially aligned axially with said inlet and outlet openings and being spaced from the inner wall of the casing to form an air passage between said assembly and said inner wall.

2. A vacuum cleaner having a casing tapering on opposite sides to reduced openings one of which serves as an air inlet and the other

as an air outlet the inner wall of the casing presenting a smooth uninterrupted air guiding surface between the inlet and outlet, a fan and housed-in motor forming a unitary assembly within and conforming generally to the tapered shape of the casing, the body of said fan forming one tapering wall of the assembly, said assembly being spaced from the casing wall to form an air passage between the said assembly and wall, and baffles at intervals between the said assembly and casing wall disposed to lessen eddying of the air current.

3. A vacuum cleaner having a casing tapering on opposite sides to reduced openings one of which serves as an air inlet and the other as an air outlet the inner wall of the casing presenting a smooth uninterrupted air guiding surface between the inlet and outlet, a fan and housed-in motor forming a unitary assembly within and conforming generally to the tapered shape of the casing, the body of said fan forming one tapering wall of the assembly, said assembly being spaced from the casing wall to form an air passage between the said assembly and wall, and baffles at intervals between the said assembly and casing wall to prevent eddying air currents and serving also as supports for the said assembly.

4. A vacuum cleaner having a casing tapering at opposite sides to reduced openings one of which serves as an air inlet and the other as an air outlet said casing having a smooth uninterrupted inner surface to guide the air, and a fan and housed-in motor forming a unitary assembly spaced within and conforming generally to the inner shape of the casing, with the body of the fan forming one tapering wall of said assembly.

5. A vacuum cleaner having a casing tapering at opposite sides to reduced openings one of which serves as an air inlet and the other as an air outlet, and a fan and housed-in motor forming a unitary assembly spaced within and conforming generally to the inner shape of the casing thereby making an airway between the unitary assembly and the casing wall with the fan body forming one tapering end of said assembly and with the fan blades discharging in the plane of and directly into the aforesaid airway.

EDWIN W. VOSE.