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C. F. QUEISSER

1,571,735

IMPELLER

Filed Sept. 28, 1923

Fig. 1.

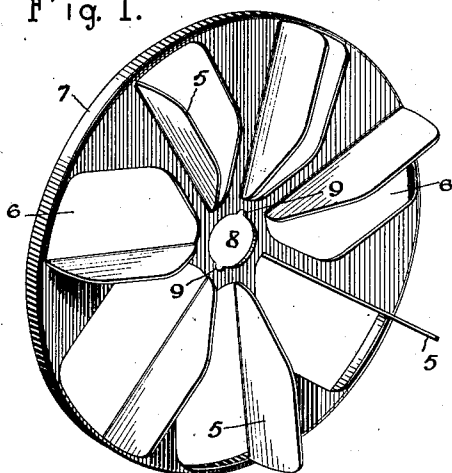


Fig. 2.

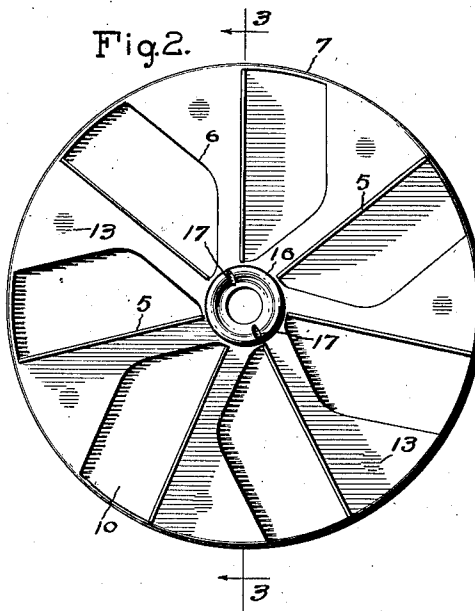


Fig. 3.

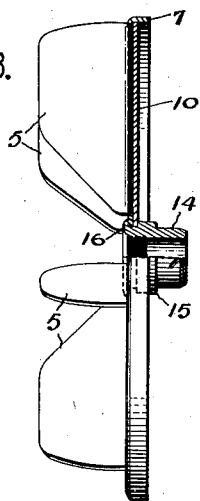


Fig. 5.

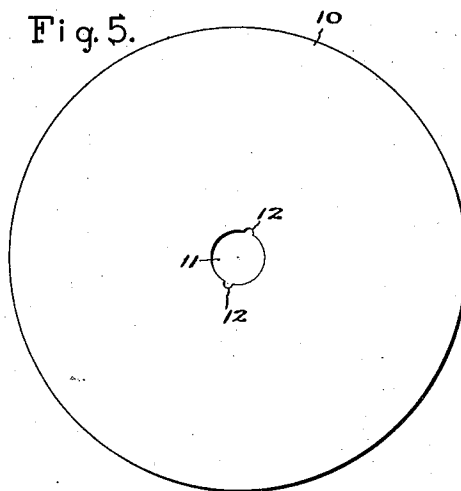
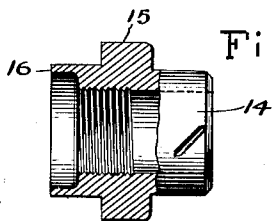


Fig. 4.



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UNITED STATES PATENT OFFICE

CHARLES F. QUEISSER, OF CLEVELAND HEIGHTS, OHIO, ASSIGNOR TO ELECTRIC VACUUM CLEANER COMPANY, INC., OF CLEVELAND, OHIO, A CORPORATION OF NEW YORK.

IMPELLER.

Application filed September 28, 1923. Serial No. 665,469.

To all whom it may concern:

Be it known that I, CHARLES F. QUEISSER, a citizen of the United States, residing at Cleveland Heights, county of Cuyahoga, State of Ohio, have invented certain new and useful Improvements in Impellers, of which the following is a specification.

The present invention relates to small, high-speed impellers such as are employed in suction cleaners either to cause a suction through the nozzle to raise dust or dirt from the surface being cleaned and deliver it to the dust bag, or to deliver a substantial volume of clean air at low pressure for cleaning, drying or other purposes.

In a device of this character, revolving as it does at very high shaft speeds, 10000 R. P. M. not being unusual, and being used chiefly in households, it is of the utmost importance that it be strong in construction, light in weight and have a long life.

My invention has for its object to provide an impeller or fan which will fulfill the above requirements and in addition be well balanced, simple and cheap to construct.

For a consideration of what I believe to be novel and my invention, attention is directed to the accompanying description and claims appended thereto.

In the drawing which illustrates one of the embodiments of my invention, Fig. 1 is a perspective view of the blade member of the impeller; Fig. 2 is a front view of the assembled impeller; Fig. 3 is a vertical section of the same, taken on line 3—3 of Fig. 2; Fig. 4 is a sectional detail view of the hub on an enlarged scale and Fig. 5 is a face view of the reinforcing member.

The impeller is made of three pieces, a member carrying the blades or vanes; a reinforcing member, and a hub. For the blade and reinforcing members sheet steel is used for the reason that it is substantially uniform in strength and weight at all points which simplifies the balancing and is also light for a given size. Further, such material lends itself readily to accuracy of manufacture, especially in quantity production.

In making the blade member I start with a thin, flat sheet of steel stamped or otherwise cut to disk form. By suitable dies the blades 5 are cut from the body, the cuts de-

fining one side and both ends of each blade. The partially formed blades are then bent outwardly from the body of the sheet so as to stand at a right angle thereto. The blades may be of any desired shape and size but care should be exercised not to unduly decrease the cross section of the metal in the vicinity of the hub where the strains are relatively high. The fact that the blades are radially disposed and extend at a right angle to the body of the carrier insures a very strong yet light construction. The cuts for the blades may be made by a single operation or by successive operations. The same dies which cut the material may be used to bend the blades outwardly or the bending may be done by separate operations.

Forming the blades in the manner specified means that openings 6 are left in the disk which correspond in shape and size to the blades. The blade-carrying member is also provided with a rim 7 which may be formed by the same dies which cut the blades or it may be done by a separate operation. It will be observed that the rim is integral with the disk and extends perpendicular therefrom. This has the effect of greatly stiffening the blade carrier against deflection from its normal plane. In the center of the disk is a hub-receiving opening 8 of suitable size. In the wall of this opening small notches 9 are cut to form means for anchoring the disk to the hub.

In order to reinforce the blade-carrying member and also to close up the openings 6 which are left when the blades are formed, a reinforcing member 10 is provided which comprises a thin sheet steel disk that snugly fits inside of the rim 7. Preferably this disk is made of the same kind of stock as the blade-carrying member. The member 10 is also provided with a hub-receiving opening 11 having small notches 12 which when the parts are assembled register with the notches 9 in the blade-carrying member. After these two members are formed they are suitably united by the fusion of metal as by spot-welding, for example. These welds are indicated in Fig. 2 by the cross-hatched portions marked 13 and by preference are made near the rim and between each two blades. The two members may be united

before or after the hub is fastened in place. By preference the welding is done afterwards.

The hub 14 is made of mild steel and is a screw machine job. It is provided with an external shoulder 15 against which the disk 10 abuts. On the front face of the hub is a rather thin, cylindrical extension 16 which is subsequently rolled or pressed over to engage the center portion of the blade member thereby firmly clamping the two members solidly on the hub between it and the shoulder 15. By a suitable tool the metal of the extension after being rolled over is forced or staked at 17, Fig. 2, into the registering notches 9 and 12 previously referred to. This serves to prevent the blade and reinforcing members from turning on the hub. Ordinarily one notch or set of notches is sufficient but by providing them in both members the hub can be riveted over from the front or the back of the impeller, as desired. The bore of the hub is screw-threaded to receive one end of the driving shaft, (not shown). Usually the latter forms an extension of the armature shaft of a high speed electric motor.

The member 10 in addition to reinforcing the blade-carrying member also serves to shut off the openings 6 therein and prevents dust and other foreign matter from reaching the back side of the fan, which is objectionable for various reasons.

The impeller shown is especially intended to run counter-clockwise but can of course run in either direction. When designed to run clockwise it is preferable to punch or stamp the blades from the left side of their final positions rather than from the right as shown. The reason for this is to present smooth, unbroken surfaces between the blades and the carrying member at their points of union. These smooth surfaces tend to prevent the collection of dust in the corners and reduces erosion due to friction of the rapidly-moving particles of grit received through the cleaner nozzle.

The fact that the blades are radial as distinguished from having curved inner or outer ends, means that the impeller can be driven in either direction. Being straight there is much less danger of injury to the blades due to small metal pieces and sticks which are sometimes picked up in using a cleaner. Reducing the danger of injury to the blades also reduces the liability of the impeller getting out of balance when in operation.

I have found by actual use that an impeller of the character described will move large volumes of air and create a satisfactory low pressure at the cleaner nozzle to produce effective suction cleaning.

Although designed especially to create a suction at the nozzle of a suction cleaner, it

is evident that the impeller may be used for various purposes, such for example as delivering a large volume of air at low pressure for cleaning, drying or other purposes.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. An impeller comprising a sheet metal disk having integral radial blades cut from the disk and bent outwardly, an integral rim, a reinforcing disk which closes the openings in the blade disk and fits the inside of the rim, and means for uniting the web of the reinforcing disk with those portions of the web of the blade disk which are situated between the blades.

2. An impeller comprising a sheet metal disk having integral blades cut from the body thereof and bent outwardly along one side, and a reinforcing plate on the back side of the disk which covers the openings between the blades, said disks being united by spot welds located between the blades.

3. An impeller comprising a sheet metal blade carrying member having a flat, disk-shaped body portion and a plurality of impeller blades integral therewith, a sheet metal disk-shaped reinforcing member united with said carrying member in face-to-face engagement with said body portion, the reinforcing member and body portion of the first-named member being of substantially the same diameter, and a hub upon which said members are coaxially mounted.

4. An impeller comprising a sheet metal blade carrier, a plurality of impeller blades integral therewith, a sheet metal reinforcing disk which is situated on the back side of the carrier, is secured thereto, and covers the openings in the carrier between the blades, and a hub to which both the carrier and disk are secured.

5. An impeller comprising a sheet metal carrier having blades formed integral therewith on one side and extending outwardly therefrom and a stiffening rim, a sheet metal reinforcing disk located on the back side of the carrier and closing the openings therein between the blades, said carrier and disk being united by fusion of metal, a shouldered hub on which the carrier and disk are mounted, and means integral with the hub for holding said latter parts against the shoulder.

6. An impeller comprising a sheet metal disk having a short cylindrical rim integral therewith, a second disk of sheet metal

seated against the first-named disk in peripheral engagement with the rim thereof, said disks being united by fusion of metal, and a plurality of impeller blades integral with one of said disks.

7. An impeller comprising a sheet metal disk having a short cylindrical rim integral therewith, a reinforcing disk of sheet metal seated against one face of the first-named disk in peripheral engagement with the rim thereof, the adjacent faces of the

disks being united by fusion of metal, a plurality of spaced radial impeller blades integral with the first-named disk extending from the opposite face thereof, a shouldered hub on which the disks are coaxially mounted, and means including a pair of oppositely disposed notches in the disks for locking the latter on the hub.

In witness whereof, I have hereunto set my hand this 22nd day of September, 1923.

CHARLES F. QUEISSER.