Dec. 14, 1948. R. H. BROWN 2,456,488

CENTRIFUGAL BLOWER HOUSING

Filed March 15, 1945

FIG. 1.

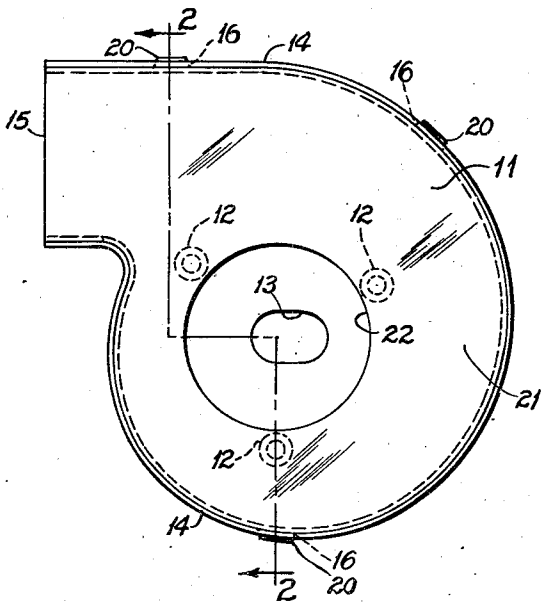


FIG. 2.

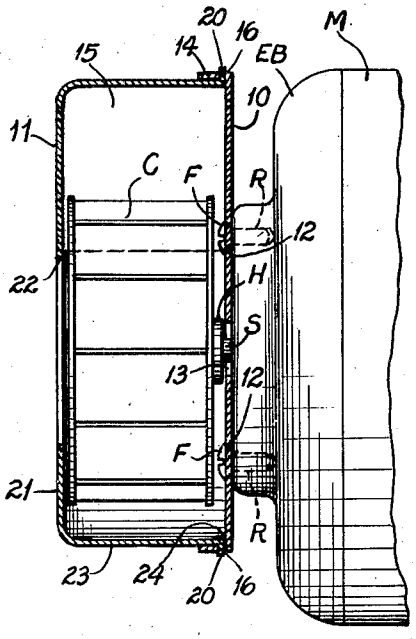


FIG. 3.

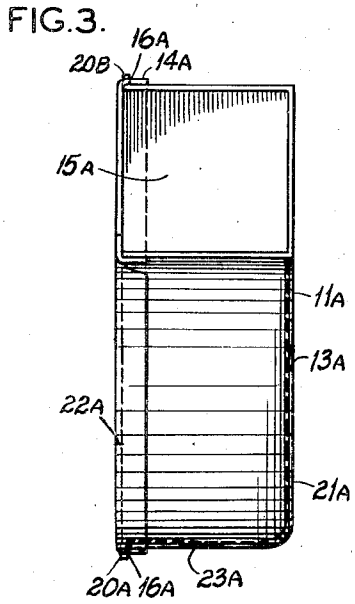
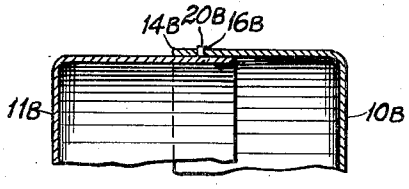


FIG. 4.



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CENTRIFUGAL BLOWER HOUSING

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2 Claims. (Cl. 230—133)

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This invention relates to improvements in centrifugal blower housings, and more particularly to improve provisions for assembly of the component parts of the volute and closure portions of casings or housing structures for air displacement rotors.

Due to the rapid extension of the fields of usage of centrifugal blower wheels, particularly those of smaller sizes, an increasing proportion thereof are employed in so-called direct connected assembly with electric motors. In the course of assembly, first, of the housing structure to a motor frame, and secondly, the assembly of the component housing sections to each other, a difficulty of access by screwdriver, wrench and other tools is prevalently experienced due to frequent space restrictions. Obviously too, an arrangement which avoids the requirement of even small tools for the purposes noted, will effect a marked saving in time required for initial assembly, as well as for any subsequent assembly operation. Accordingly, the present invention seeks to obviate the difficulties of access heretofore experienced, and has as its principal objective the attainment of an improved housing structure which does not, of necessity, require the use of tools of any kind in bringing into operative relation the component parts of a blower wheel housing, and hence an arrangement of structure which requires no more clearance about the housing than is necessary to accommodate the fingers of the assembly operator or servicemen.

Yet another object of the invention is attained in an improved arrangement of fastening means identified with the component elements of the housing as integral parts thereof, in a manner to obviate any necessity for the use of nuts, bolts, screws or the like, and yet which is of such design that parts of the housing may be assembled and disassembled at will, and practically instantly as desired.

A still further and important object of the invention is attained in an improved housing structure for centrifugal blower wheels in which the component closure elements of the housing may be readily interfittedly assembled and disassembled without in any way impairing the substantial perfection of air seal along the parting zone of the housing elements.

A still further objective of the present invention is attained in a novel provision for the several purposes aforesaid, and which introduces no expensive tooling or production difficulties, and

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if the housing be die formed, does not materially increase the die or tooling costs.

Yet another and very important feature of the invention is attained in an arrangement of the component closure elements of a blower wheel housing, such that in a blower wheel assembly directly attached to or otherwise associated with an electric motor, for example, one of the housing portions may be quickly and easily atached say to the motor, and after shaft-mounting the blower wheel, the component housing portion may be instantly attached to its mating closure portion.

The foregoing and numerous other objects and advantages of the present improvements will more clearly appear from the following detailed description of certain presently preferred exemplary embodiments of the invention, particularly when considered in connection with the accompanying drawing, in which:

Fig. 1 is a side elevation as viewed from the inlet side of a centrifugal blower assembly constructed to embody the present improvements;

Fig. 2 is a vertical sectional elevation of the blower assembly of Fig. 1 shown attached to an electric motor, the sectional portion of this figure being taken along line 2—2 of Fig. 1;

Fig. 3 is an end elevation of the housing structure of Figs. 1 and 2 with certain minor modifications; and

Fig. 4 is a fragmentary sectional view showing a minor modification of the housing assembly elements to provide a somewhat different plane of parting of the housing components.

Referring now by characters of reference to the drawing and first particularly to Figs. 1 and 2, the assembly is seen to include a centrifugal blower wheel C which is carried on and powered by the usual extension S of a motor driven shaft, through securement of the hub H on wheel C operatively to the shaft. The motor M is shown as provided with the usual frame, including an end bell EB which, in this case is provided with a plurality of tapped recesses R to receive fastening elements F which may conveniently consist of large screws. Three or so of these are in most cases sufficient to support the blower wheel housing, hereinafter described.

In a prefered form of housing structure, the housing is formed of component or companion, mating closure portions, such as 10 and 11, the portion 10 consisting primarily of a planar or plate-like structure usually of sheet metal, which in the smaller sizes may be of a moderate gauge, and which is provided with say three openings 12 for reception of screws F. Additionally, an open-

ing 13 is provided to accommodate the shaft S, this opening being, as shown, somewhat elongated and slightly larger than the usual shaft sizes in order to avoid niceties of fit and accommodation of the housing to slightly different motors. The closure element 10 is provided peripherally with a continuous narrow flange 14 which extends preferably at a right angle to the planar or wall portion 10 of this element. The flange is of somewhat volute form, as will appear from Fig. 1, in that it extends from the top of the air discharge or outlet zone 15 of the housing continuously along the outer margin of the enclosure portion 10, and terminating in the lower margin of discharge portion 15.

In Figs. 1 and 2, the flange 14 is provided with a series, shown as three, of spaced slots 16. As will appear, these slots correspond in number, location, shape and areal extent to a series of tongues 20, one of which extends through each of the slotted apertures 16.

Referring now more particularly to the structure of the companion housing section 11, this is, in the showing of Figs. 1 and 2, formed of metal in the nature of a deep drawn cup including a planar vertical wall portion 21, provided with a relatively large air inlet opening or eye 22. The wall 21 is continued integrally into a peripheral portion 23, which as will appear from Fig. 2, is not materially less in width than the depth of the assembled housing. It will now have appeared that in the housing or closure section 11, there will be presented, prior to assembly of the housing components, a free margin or edge 24, along and projecting from which are the several tongues 20 heretofore referred to. The tongues are extended at substantially a right angle to the portion 23 by which they are carried, and so project in a direction which for convenience may be referred to as radially of the housing proper.

Further with reference to the preferred form of tongues 20, it is preferred to form each of these with its opposite end margins slightly diverging toward the base of the tongue, hence toward the portion 23. As will now be obvious, this conformity of the tongues 20 serves, as the tongues are inserted in the respective apertures, to produce a tightening effect as the tongues approach a final seating position.

It is a further preference in the construction of the tongues to form them of not much greater length than is represented by the thickness or gauge of the material in the flange 14. Although this length is somewhat exaggerated in the accompanying drawing, for clarity of illustration, it is necessary only that the tongue project a reasonable distance into the aperture therefor, and preferably not appreciably outwardly of the apertured flange. This makes for exterior smoothness and freedom of undesirable protuberances exteriorly of the assembled housing.

The arrangement of parts as shown by Fig. 3 is essentially the same, both in principal and construction, as in Figs. 1 and 2. The modification characterizing this figure is seen in a reversal of the two sides of the structure. In the modification, the tongued margin is located on the air-inlet side of the assembly, rather than on the drive side as shown by Figs. 1 and 2. In the slightly further modification of Fig. 4, essentially the same features obtain, except that provision is made for constructing the two component housing closure elements of substantially the same depth, and to locate the tongue and slot connection in or near a median plane through the assembly normal to the wheel axis.

In the modification of Fig. 3 reference numerals are employed similar to Figs. 1 and 2, except for the addition of suffix A, and so far as applicable or needed, corresponding reference characters are also employed in Fig. 4, but with the addition, to each, of the suffix letter B.

In parts of the foregoing description reference is made to certain elements of the housing as being vertical or horizontal. These terms are employed solely in the interest of brevity of description of present drawing, and without any intended limitation to actual space relations of the parts or assembly. In most installations the shaft S of the motor M will obviously be horizontal, as shown.

It is thought that the foregoing description of parts will have strongly suggested a preferred mode of assembly, and will have revealed the many advantages in ease of assembling the components of the housing as well as in disassembly thereof. It may, however, be noted for completeness that in a typical installation using the present improvements, there will first be applied to motor M the plate closure 10, prior to assembly of the wheel housing C to the shaft S. The end or bell of the motor frame having previously been tapped to receive the screws F, these are inserted through the openings 12, three of which are shown. The wheel C may now be applied to shaft S as by a set screw or the like (not shown) in the hub H. Obviously now, completion of housing assembly requires only the telescopic insertion of the closure portion such as 11, to bring its free margin preferably within flange 14, but with the portion 23 or its equivalent in other forms, somewhat constricted in the region of its free margin so as to keep the tongues 20 inwardly of their final positions. When the housing portion such as 11 thus handled, is forced fully home so that its margin 24 abuts the inner surface of plate 10, finger pressure is released, permitting the tongues 20 to be extended into or perhaps through the slotted openings 16. It will doubtless already have been observed that due to the non-circular yet conforming shaping of the housing portions, no problem of correct angular registration is presented. It is of course impossible to telescope the housing sections in any other than a relative position, such that the tongues 20 will register with the slots 16. Upon completion of external connection, such as an air discharge duct, if same be required, as to outlet neck 15, the unit is operatively assembled.

The usual function and operation of blower wheel assembly obtains, air being drawn through the inlet eye 22, thence is centrifugally impelled outwardly by the blades of the wheel with the usual effect of discharging the air in a rapidly moving stream through region 15.

It should be noted that the present wheel housing is a result of numerous and extended experiments with a great variety of interfitting connections between component housing parts, to provide a fully satisfactory, self-securing, snap connection of such parts. It has been found with certain other forms of connection that even a slight deformation of either or both of the housing components will result in failure to attain a non-rattling, permanently quiet and rugged connection of the parts. Aside from the fact that these difficulties with formation result in unwanted noises and in stability of physical connection, an inferior fastening results in some loss

of air in the region of parting of the housing sections. This air loss is likely to induce still further unwanted noises, apart from metal resonance effects, and will materially impair efficiency of the assembly. These difficulties have been overcome without exception in the present design, which serves also fully to attain each of the several objectives hereinabove stated.

The detail of description is understood solely in an instructive sense, numerous variants being possible within the scope and intended spirit of the claims hereunto appended.

I claim as my invention:

1. In a housing adapted as an enclosure for a centrifugal blower wheel, a pair of interfitting companion closure portions arranged to be separated and asembled along a plane at a right angle to the axis of the wheel accommodated by the housing, said portions being formed of a sheet material and flexible construction, and one of the closure portions being provided with a plurality of spaced projecting tongues not materially greater in length and extent of projection than the gauge or thickness of the material of the other housing portion, each of said tongues being substantially flat and having its opposite end margins diverging toward the base of the tongue, and said other closure portion being provided with slots adapted for wedge-reception of the tongues, with the tongues projecting not materially beyond, and yet fully closing the slots, so as to present a smooth and substantially unobstructed housing exterior.

2. A housing adapted to enclose and coact with a blower wheel, the housing being formed of a pair of component closure portions one of which is a substantially planar element for attachment to a motor frame or the like, and provided with an intermediate shaft opening, the planar element being provided with a narrow, continuous, peripheral flange provided with rectangular slots immediately adjacent the planar plate portion, the companion closure portion of the housing consisting of a drawn metal cup, the cup portion

being formed with short integral right angular outstanding tongues corresponding in number to the slots therefor in the flange of the first said housing portion, the tongues being so formed that the base of each fills and seals the slot it occupies, the tongues being spaced along the free margin of the cup-like element and being extended radially outwardly of such margin said tongues each having its opposite end margins diverging toward the base of the tongue, thereby adapting the tongues for wedge-seating in said slots, the location of tongues in assembly further being such that they lie along and parallel to the planar portion of the first said housing element, and the length of the tongues being such that they extend through to interlock with, and seal, yet do not project substantially outwardly of the slots therefor, when the parts are in assembly, the material of the cup-like housing portion being sufficiently flexible to enable depression of the peripheral areas thereof adjacent the tongues to permit withdrawal of the tongues from and their insertion in the slots.

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