

Jan. 14, 1947.

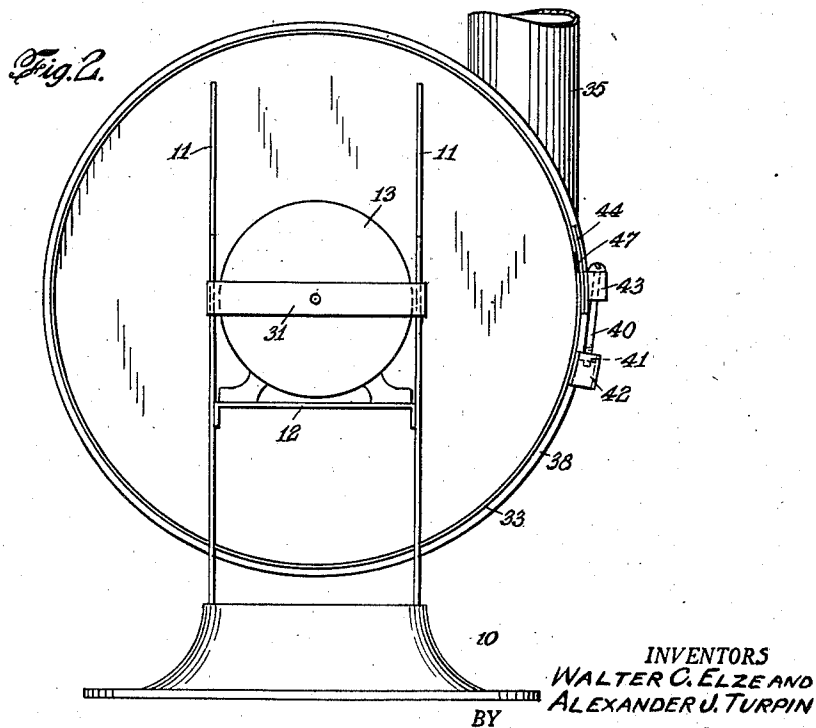
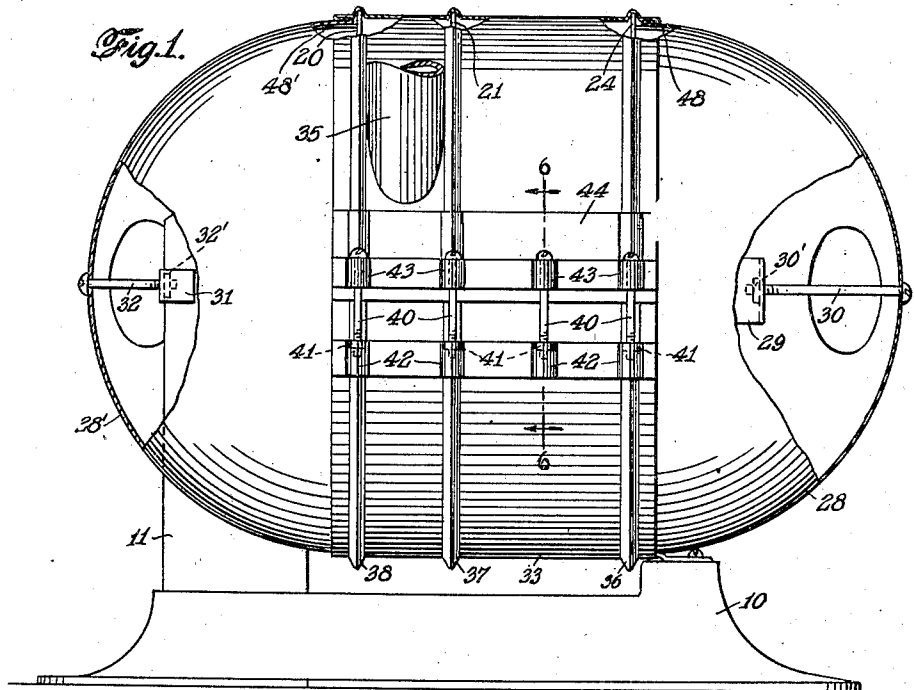
W. C. ELZE ET AL

2,414,366

TURBO BLOWER

Filed Jan. 20, 1945

3 Sheets-Sheet 1



INVENTORS  
WALTER C. ELZE AND  
ALEXANDER U. TURPIN  
BY *Wm. C. Elze*  
ATTORNEY.

Jan. 14, 1947.

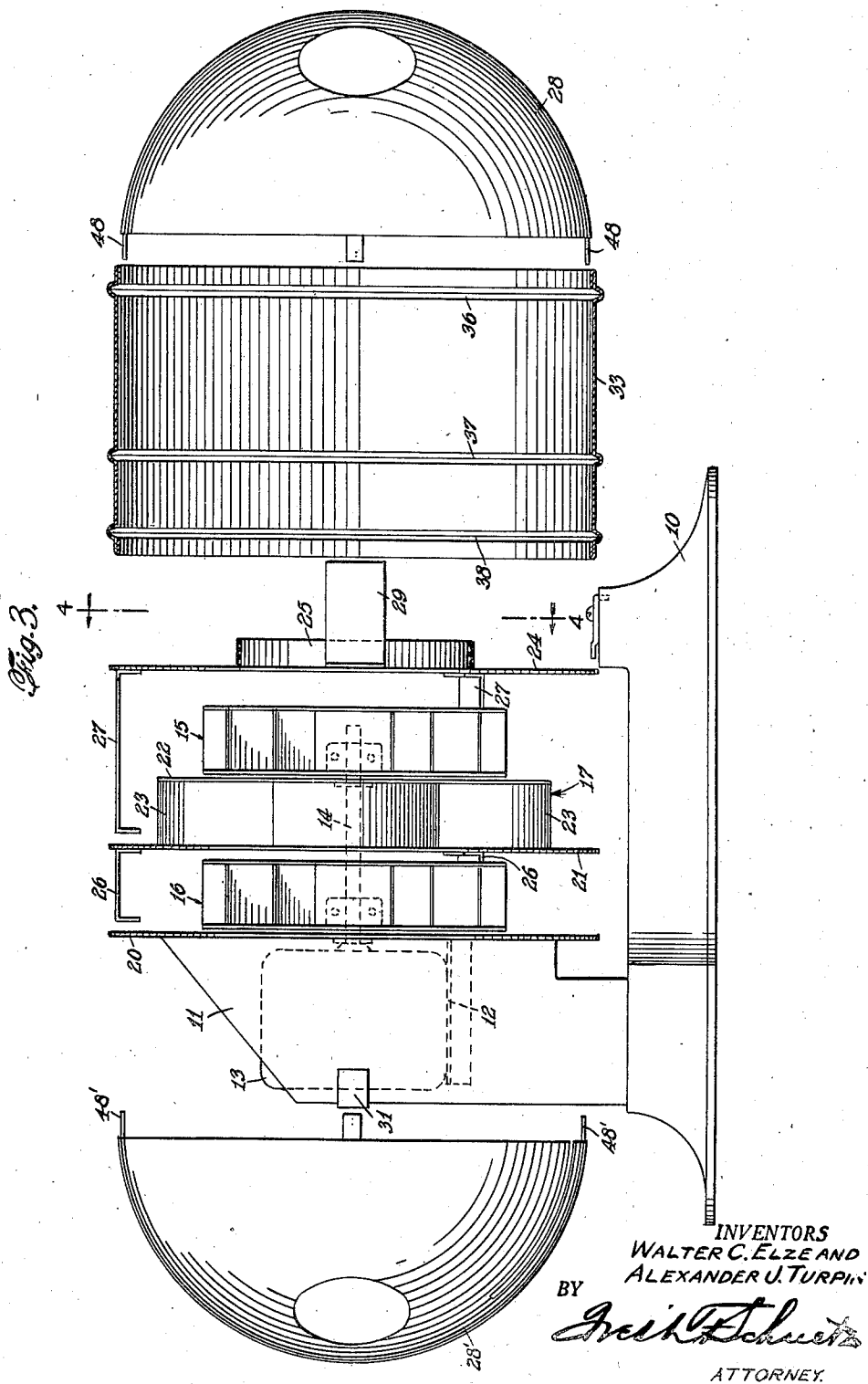
W. C. ELZE ET AL

2,414,366

TURBO BLOWER

Filed Jan. 20, 1945

3 Sheets-Sheet 2



**Jan. 14, 1947.**

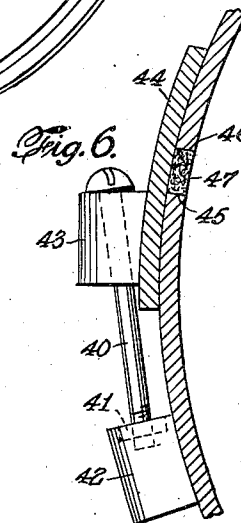
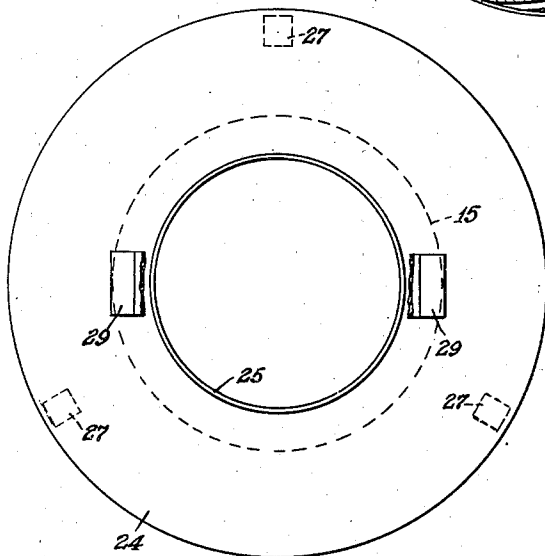
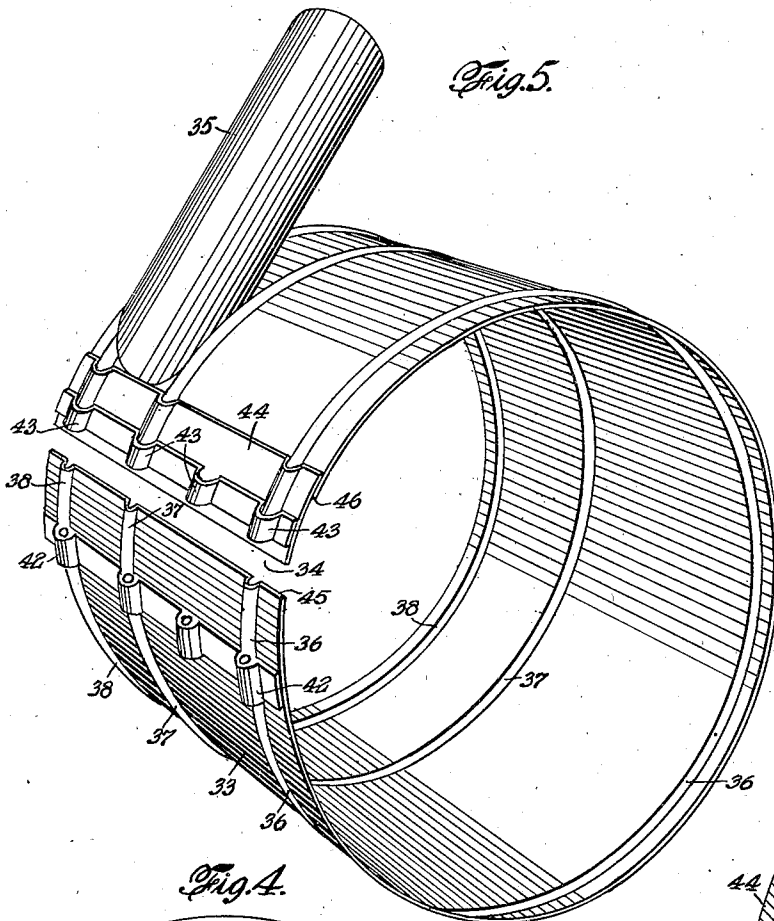
W. C. ELZE ET AL

**2,414,366**

TURBO BLOWER

Filed Jan. 20, 1945

3 Sheets-Sheet 3



INVENTORS  
WALTER C. ELZE AND  
ALEXANDER J. TURPIN

**BY**

51  
Fred Schuetz

**ATTORNEY.**

## UNITED STATES PATENT OFFICE

2,414,366

## TURBOBLOWER

Walter C. Elze, Forest Hills Gardens, and Alexander J. Turpin, Stewart Manor, N. Y., assignors to Hauck Manufacturing Company, Brooklyn, N. Y., a corporation of New York

Application January 20, 1945, Serial No. 573,670

7 Claims. (Cl. 230-133)

1

The invention relates to turbocompressors or centrifugal types of blowers utilizing an impeller element or elements, and the novel blower may be of the single- or multi-stage construction. The blower construction forming the subject of the present invention is directed more especially to low-pressure blowers.

In the installation of blowers, a problem is frequently met in connection with the location of the discharge or delivery outlet for direction of discharge of gaseous medium from the blower, in the case of constructions wherein the outlet is fixed. In constructions wherein the discharge outlet is adjustable angularly about the axis of rotation of the impeller element or elements of the blower, it is generally necessary to remove a large number of fastening bolts from the surrounding casing and detach said casing in order to effect the adjustment, and then to replace the same—all of which involves considerable effort as well as loss of time, and does not admit of close adjustment, being restricted to the spacing of the bolt holes.

It is an object of the present invention to simplify such angular adjustment of the casing as well as to allow of adjustment to practically an infinite number of positions over a range of approximately 270°.

A further object of the invention is to provide a novel construction not only of the casing surrounding the impeller unit of the blower, but to provide a novel arrangement of these elements.

A still further object of the invention is to provide a relatively lightweight blower which is simple and inexpensive in construction, and to afford a construction which will admit of ready assembly as well as access to the interior when necessary.

In carrying out the invention, an impeller unit, which includes at least one rotatable impeller element located between end plates or heads, is encased in a flexible, longitudinally-slit, cylindrical casing or shell designed to be wrapped about the unit to contact the peripheries of the end plates to seal the unit thereat. This shell, more especially in the provision therein of transverse, outwardly-directed, circular and parallel grooves, serves to seal the impeller unit when the shell is contracted to juxtapose its separated edges, as by suitable clamping means or the like. To adjust the shell, with its discharge outlet, angularly with respect to the axis of rotation of the impeller element or elements, it is then necessary merely to release the clamping means sufficiently to admit of manually effecting the rela-

2

tive angular movement between the shell and the unit to the extent required for locating said outlet in the desired position, whereupon the clamping means are again caused to contract the shell and juxtapose its edges for sealing the unit.

The nature of the invention, however, will best be understood when described in connection with the accompanying drawings, in which:

Fig. 1 is a front elevation of the novel turbo-blower, with portions of its enclosing casing and end caps broken away.

Fig. 2 is an end view of the motor end of the blower, with corresponding cap removed.

Fig. 3 is an exploded view illustrating the arrangement of the members of a multi-stage embodiment of the novel blower.

Fig. 4 is a transverse section, taken on the line 4-4, Fig. 3 of the drawings, and looking in the direction of the arrows.

Fig. 5 is a perspective view of the enclosing shell for the impeller unit.

Fig. 6 is a fragmentary, transverse section, on an enlarged scale, taken on the line 6-6, Fig. 1 of the drawings.

Referring to the drawings, more particularly Fig. 1 thereof, the novel impeller unit is shown as mounted upon a suitable base 10 through a pair of vertically disposed plates 11 extending upwardly from the top of the base and united intermediate their ends by means of a channel or like structural member 12. This member affords a shelf or the like for supporting the motor 13 which operates the impeller unit through a shaft 14.

The impeller unit operated by motor 13 includes one or more impeller elements, in the present embodiment two elements 15 and 16, the unit being of the multi-stage type. In this type of blower, all but the final impeller elements usually have associated therewith a diffuser element, as the element 17 associated with the impeller element 15. These diffuser and impeller elements are of the usual well-known construction and form no particular part of the present invention which resides more especially in the assembly of such elements into an impeller unit and the sealing of the unit by a casing member common to all of these elements rather than by individual casings for each impeller element as has been the practice heretofore, more especially in the multi-stage type of blower.

This novel unit construction of blower is indicated more clearly in Fig. 3 of the drawings, which is an exploded view of the blower. As indicated therein, the frame plates 11 support a

fixed circular disk 20 forming an end plate of the final stage of the blower and through which disk the driving shaft 14 passes centrally. The impeller 16 is clamped to said shaft in the usual manner to rotate therewith, and it is of lesser diameter than the said disk 20 to which it is juxtaposed. There is mounted about said shaft and adjacent the impeller 16 a diffuser element 17 constituted of the circular end plate 21, of the same diameter as end plate 20, a distributor plate 22, and guide vanes 23. The first-stage impeller element 15 is clamped to the shaft 14 to rotate therewith and is followed by a circular end plate 24 provided with a central opening or intake 25 for admitting the gaseous medium axially to the blower unit.

To secure conveniently the desired spacing arrangements of the impeller and diffuser elements, axially of the shaft 14, in assembling a unit, the plates 21 and 24 have attached thereto inwardly directed spacing brackets 26 and 27, respectively, extending parallel to the axis of rotation of shaft 14 from the respective inner faces of the plates upon which a number of the spacing brackets are circularly disposed below the corresponding peripheries. By this expedient, the impeller unit elements may be conveniently withdrawn as for cleaning and inspection and the various elements then properly relocated in their assembled relationship.

For convenience in withdrawing the end plate 24, as well as to afford a support for an end cap 28 for the blower, a bracket 29 is attached to the outer face of the plate and provides a cross portion drilled to pass a holding bolt or screw 30, Fig. 1, for the cap, said screw at the opposite end fitting a nut 30' of the bracket. Similarly, a cap 28' may be attached at the motor end of the blower by means of a cross-bar or strap 31 secured over the frame plates 11 and drilled to receive a holding bolt or screw 32 fitting a nut 32' of the strap.

The hereinbefore described elements constituting the impeller unit, namely: end plates 20, 21 and 24, together with the impeller elements 15, 16, and the diffuser element 17, and the driving shaft 14, are, in accordance with the invention, designed to be encased in a cylindrical shell or casing member 33 of thin, more or less flexible, metal and slit longitudinally as at 34, said shell being designed to be wrapped about the unit and the peripheries of the said end plates 20, 21 and 24 to seal the unit thereat. The shell carries also a tangential outlet pipe 35 for discharge of gaseous medium from the blower.

To accommodate the peripheries of the said end plates and provide a suitable seal thereat, the shell is provided with outwardly directed grooves or depressions 36, 37, and 38 disposed transversely of the cylinder and axially displaced thereon parallel to one another to register with said end plates 20, 21, and 24 so that the latter may be accurately fitted and fixed in said grooves and the proper relative locations in assembling the impeller unit secured. Provision is made for tightening the shell over the plates to seal the unit, for example by contracting the same by means of screws 40. These are designed to fit in corresponding nuts 41 anchored in sockets 42 secured at one side of the slit to the outer surface of the shell, the head ends of the respective screws passing through perforated lugs 43 also attached at the opposite side of the slit to the outer surface of the shell 33, or rather to a strip 44 which is secured to said outer surface

and projects over the end of the same. This will allow of juxtaposing the separated ends 45 and 46 of the shell, in drawing the same together by contracting the shell through the aforesaid clamping means, with a portion of strip 44 overlapping.

A strip of sealing material or gasket 47 such as of felt or the like is to be introduced between the juxtaposed ends 45 and 46, as shown in Fig. 6, to provide for effective sealing between stages and also along the slit in the cylinder. Of course, other well-known expedients may be utilized for drawing up or contracting the shell to fit it over the said end plates, this at the same time fixing the latter in the predetermined positions.

After the impeller unit has been thus assembled, the extreme end plates 20 and 24 thereof may be stiffened by the end caps 28, 28' through contact lugs 48 and 48' thereof extending outwardly from the respective edges of said caps. These lugs are designed to contact respectively the outer faces of the plates 24 and 20, the edges of the caps fitting beneath the corresponding ends of shell 33. By taking up on the securing screws 30 and 32 for the caps in attaching the same, the said end plates are rendered substantially rigid and free from vibration. This admits of reducing materially the thickness of these end plates. The said caps, also, afford protection with respect to the enclosed members and cause the blower as a whole to present a finished appearance.

We claim:

1. Blower construction, comprising an impeller unit including a rotatable impeller element and stationary end plates, means to rotate the impeller element, a support for the unit and rotation means, a longitudinally slit flexible casing adapted to be wrapped entirely about the unit and peripheries of the end plates thereof and having an intermediate tangential opening for discharge, an integral outlet pipe connection fitted to said opening, and cooperating means located along the respective casing edges to draw said edges into juxtaposed relationship for holding the casing to the unit to seal the latter and to admit of relative angular movement of said casing with respect to the unit for adjustment of the location of its said discharge opening with outlet pipe connection angularly about the axis of rotation of the impeller element.

2. The blower construction of claim 1, in which end caps fit respectively over the opposite ends of the blower and have lugs extending outwardly from their edges adapted to contact respectively the extreme end plates of the impeller unit, and means are provided for securing the caps to the corresponding extreme ends of the blower.

3. The blower construction of claim 1, in which end caps fit respectively over the opposite ends of the blower with their edges beneath the corresponding ends of the flexible casing.

4. The blower construction of claim 1, in which end caps fit respectively over the opposite ends of the blower with their edges beneath the corresponding ends of the flexible casing, the respective caps being provided with lugs extending outwardly from their edges adapted to contact respectively the extreme end plates of the impeller unit, and means are provided for securing the caps to the said plates.

5. The blower construction of claim 1, in which a sealing member is provided between the juxtaposed edges throughout the length of the slit,

5

and one of the juxtaposed edges is provided with a portion overlapping the sealing member.

6. Blower construction, comprising an impeller unit including a circular fixed end plate, an axially removable and normally stationary circular end plate, a rotatable impeller element between said end plates, a diffuser element adjacent and attached to the removable end plate, a second axially removable and normally stationary circular end plate and a second rotatable impeller element located between the diffuser element and the second axially removable end plate, the plates, diffuser element and impeller elements being located coaxially with respect to one another, and the diameters of the end plates being the same and greater than the respective diameters of the diffuser element and of the impeller elements, a shaft to which the impeller

6

elements are secured, means to rotate the shaft, a support for the unit and rotation means, a flexible casing adapted to be wrapped about the unit and peripheries of the end plates thereof and having a tangential opening for discharge, and means for holding the casing to the unit to seal the latter and to admit of relative angular movement of said casing with respect to the unit for adjustment of the location of its said discharge opening angularly about the axis of rotation of the impeller elements.

7. The blower construction of claim 6, in which spacing brackets are provided on the inner face of a removable end plate and extend therefrom parallel to the axis of rotation of the impeller elements.

WALTER C. ELZE.  
ALEXANDER J. TURPIN.