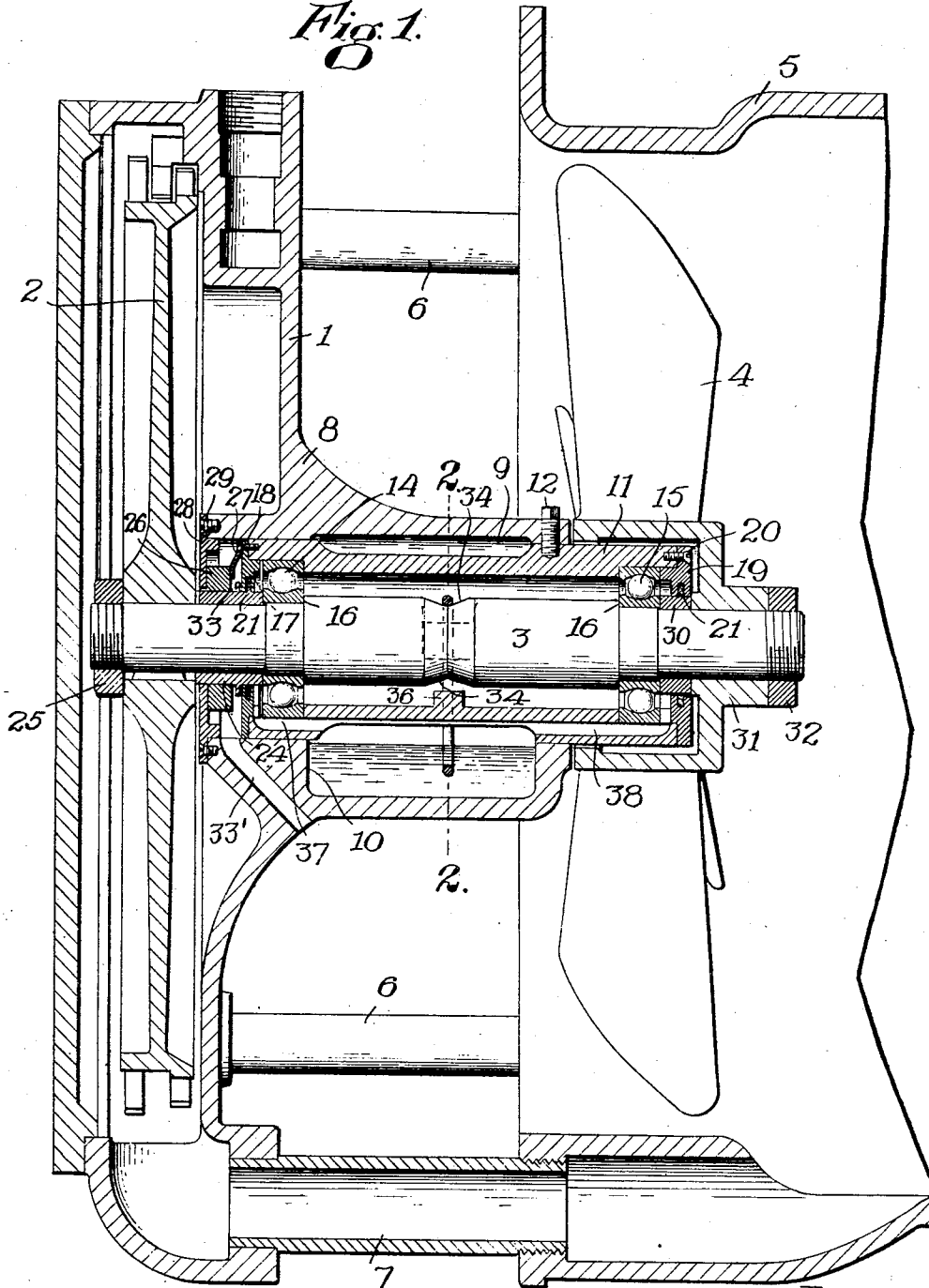


F. H. C. COPPUS AND W. H. VARNEY.
 BEARING FOR TURBINE DRIVEN BLOWERS.
 APPLICATION FILED JULY 18, 1917.

1,355,652.

Patented Oct. 12, 1920.
 2 SHEETS—SHEET 1.

Fig. 1.



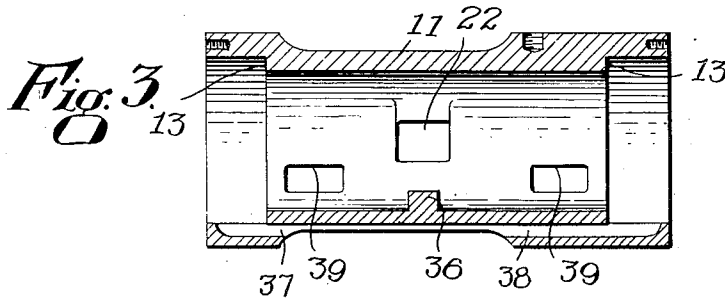
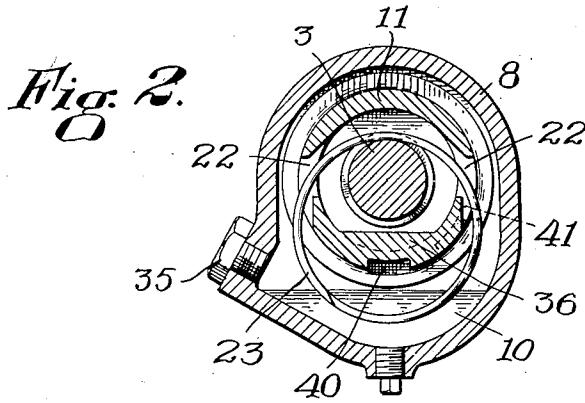
Inventors.
 Frans H. Coppus.
 Wyman H. Varney.
 By Attorneys Fowler & Kennedy

F. H. C. COPPUS AND W. H. VARNEY.
 BEARING FOR TURBINE DRIVEN BLOWERS.
 APPLICATION FILED JULY 18, 1917.

1,355,652.

Patented Oct. 12, 1920.

2 SHEETS—SHEET 2.



Inventors
 Franz H. C. Coppus
 Wyman H. Varney
By Attorneys
 Fowler & Kennedy

UNITED STATES PATENT OFFICE.

FRANS H. C. COPPUS AND WYMAN H. VARNEY, OF WORCESTER, MASSACHUSETTS,
ASSIGNORS TO COPPUS ENGINEERING AND EQUIPMENT COMPANY, OF WORCES-
TER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

BEARING FOR TURBINE-DRIVEN BLOWERS.

1,355,652.

Specification of Letters Patent.

Patented Oct. 12, 1920.

Application filed July 18, 1917. Serial No. 181,412.

To all whom it may concern:

Be it known that we, FRANS H. C. COPPUS and WYMAN H. VARNEY, both citizens of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in Bearings for Turbine-Driven Blowers, of which the following, together with the accompanying drawings, is a specification.

The present invention relates to turbine driven blowers, sometimes known as turbo-blowers, in which a steam turbine has mounted on its shaft the fan or blades of a blower such as is used for creating forced draft for boilers or for ventilating purposes.

The invention resides in certain novel improvements in the construction of devices of this class, whereby the blowing unit, consisting of the turbine and the blower driven thereby, may be readily and cheaply assembled, and with equal facility may be taken down for purposes of replacement or repair. The invention further resides in the provision of novel means for securing the constant and uniform lubrication of the moving parts, from a suitable source of lubricant supply which is incorporated in the casing of the machine, in conjunction with means for preventing the escape and waste of lubricant, and for preventing the leakage of steam and water from the turbine into the rotating lubricated parts.

Other and further objects of the invention will be apparent as the following description proceeds, reference being had in this connection to the accompanying drawings, in which—

Figure 1 is a vertical sectional view of a unit consisting of the turbine and a blower, constructed in accordance with our invention.

Fig. 2 is a transverse sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view, showing the bearing housing in detail, and detached from the remainder of the machine.

Like reference characters refer to like parts in the different figures.

Referring particularly to Fig. 1, the usual arrangement of parts in devices of this class is shown by a turbine casing 1, containing a steam turbine 2, of any well known construction, on the shaft 3 of which is carried a fan 4, whose blades rotate in the mouth of a

blower casing 5. The latter is ordinarily connected by struts 6 to the turbine casing 1, whereby the unit construction of the turbine and blower is secured, and if desired, the exhaust steam from the turbine casing may be discharged through a connection 7 longitudinally into the blower casing 5, where it commingles with air which is forced lengthwise of said casing by the fan 4.

It is the usual practice in devices of this class to provide a forwardly extending axial hub on the turbine casing 1 for supporting the entire length of the turbine shaft, on the end of which the fan of the blower is secured. In previous constructions however, difficulty has been experienced in preventing the leakage of steam and water from the turbine proper into this integral extension of its housing; furthermore, the necessity for disposing the shaft bearings wholly within this integral hub, and providing for their effective lubrication, has presented numerous difficulties in the machining of the inside of said hub for these purposes. The assemblage of the shaft bearings and packings under these circumstances is exceedingly difficult, and it will be clear that in case of wear or breakage of the parts, it is frequently necessary to supply an entire new turbine casing.

According to the present invention, the foregoing difficulties are overcome by a construction which permits the bearings and packings to be assembled on the turbine shaft beforehand, and the whole then inserted bodily in the hub of the turbine casing. Said hub is thus relieved of its former functions, and all the moving parts of the machine may be removed therefrom at one time without disassembling the same. These results are obtained as shown in the accompanying drawings, by providing a hub 8 which has a bore 9 of considerably larger diameter than shaft 3, said bore 9 providing a downward extension 10 within the hub 8 to serve as an oil reservoir, as hereinafter described. The bore 9 at its ends is of a diameter to snugly receive a bearing housing or sleeve 11, shown detached in Fig. 3, which is secured in place by a set screw 12, or other equivalent means.

The bearing housing or sleeve 11 serves for the assemblage therein of the several bearings and packings for the shaft 3, which will shortly be described, this assemblage

taking place before said housing is inserted in the hub 8. At each end, said housing is suitably counterbored to provide shoulders 13, 13 for the outer raceways of annular ball bearings 14 and 15. The inner raceways of said ball bearings are held against similarly spaced shoulders 16, 16 on shaft 3. After the assemblage of the shaft and ball bearings within the housing 11, an annular ring or inclosure 17 is secured by screws 18 to its inner end, and a similar annular ring or inclosure 19 is secured by screws 20 to its outer end, said rings 17 and 19 securely retaining the outer races of ball bearings 14 and 15 respectively in place, as shown in Fig. 1. The rings 17 and 19 have internal grooves carrying packing material 21, 21, for a purpose hereinafter described.

As shown in Fig. 2, the walls of the housing 11 provide slots 22 on each side for the passage of a split ring 23 which hangs from the shaft 3, and passes down underneath the lower part of the housing outside of said slots. This ring, whose function and operation will be described hereinafter, is put in place before the housing, having the shaft and bearings assembled as before described, is put in place within the hub 8. When the assembled housing is so inserted, a spacing sleeve 24 is slipped over the rear end of the shaft 3, to space the bearing 14 from the hub of turbine 2, the latter being held in place by a nut 25 on the extreme inner end of the shaft, or in any other well known manner. Before the turbine 2 is thus attached however, a packing ring 26, and springs 27 to press the same inwardly, are inserted through the inner open end of hub 8, the latter being then closed by a ring 28 secured thereto by screws 29.

At the outer end of shaft 3, a spacing sleeve 30 is put in place, as shown in Fig. 1, to space the inner race of ball bearing 15 from the hub 31 of fan 4, the latter being thereafter secured in position by means of a nut 32, or in any other well known manner. The assembly of the structure shown in Fig. 1 is thus completed, and it will be noted that the spring pressed packing ring 26 and the packing material 21 at the inner end of the shaft 3 cooperate with the spacing sleeve 24 in preventing the escape of steam and water from the turbine 2 into the interior of housing 11. Furthermore, the spacing sleeve 24, which rotates with the shaft 3, provides a flange 33, which serves as a stop, and as a water throw, so that any steam or water traveling past the packing ring 26 will be prevented from traveling farther along the sleeve 24 and will therefore escape through passage 33' in the turbine casing. In addition, the packing material 21, 21, disposed just outside of ball bearings 14 and 15, prevents the escape of lubricant from said bearings, which lubri-

cant is fed thereto in a manner which will now be described.

The ring 23, above referred to, hangs by gravity from the shaft 3, and it seeks the bottom of a wide V-shaped groove 34 extending completely around said shaft near the center thereof. With the parts in place, the lower part of said ring, outside of housing 11, dips into a supply of liquid lubricant in the reservoir 10 of hub 8, which has a supply opening on the side that is closed by a screw plug 35, Fig. 2. The interior of housing 11 provides a transverse centrally disposed dam or wall 36, and at each end of the housing, beyond the ball bearings 14 and 15, provision is made for the return of lubricant through passages 37 and 38 in the lower side or wall of said housing.

When the mechanism is in operation, the ring 23 is rotated frictionally by the shaft 3, and continuously carries up lubricant from the reservoir 10 into the interior of housing 11. This oil is transferred to the shaft 3, and travels outwardly on both sides of the V-shaped groove 34, being thrown off therefrom in opposite directions, whence it runs down and collects in the bottom of housing 11. The dam 36 insures the access of this collected oil to both ball bearings 14 and 15; in the absence of this dam, all the oil might run to one ball bearing only, in case the mechanism were not set perfectly level. The oil thus continuously supplied to the interior of housing 11 runs freely to the two ball bearings 14 and 15, and after passing therethrough is returned to the reservoir by the passages 37 and 38. As a consequence, and due to the maintenance of a substantially fixed oil level in the housing 11, there is practically no waste of lubricant, all being returned to the reservoir for redistribution. In order to maintain the oil level constant in the housing 11 and to keep the oil from rising so high therein as to cause waste, it may be desirable to provide overflow outlets 39, 39, as shown in Fig. 3, whereby any excess oil beyond a predetermined height in the housing 11 is returned to the reservoir 10 without passing through the ball bearings. Obviously, if desired, the entrances to return passages 37 and 38, just beyond the ball bearings 14 and 15 respectively, may be at any desired height within the height to which the oil is allowed to rise in the housing 11. For instance, said return passages may take oil from a low level, as shown at 40, Fig. 2, in case the machine is kept running fairly constant, or if desired, said return passages may take oil from a higher level, as shown by dotted lines 41, Fig. 2, in case the machine is run only intermittently. In the latter case, the higher level insures a supply of oil to the bearings at the moment the machine is started, as will be readily understood.

By the construction above described, the hub of the turbine casing is made large, so that ready access may be had to its interior, for the purpose of cleaning the same.

5 The insertion of the bearing housing within said hub forms in the latter the oil reservoir, and at the same time perfectly seals said reservoir. In case of wear, or the necessity for repairs on any of the moving parts, every-
10 thing carried by the bearing housing can be removed at one time, and, if necessary, replaced, without any repair or work being done on the hub of the turbine casing.

The bearing housing itself constitutes an
15 oil chamber or distributing means, which is constantly being supplied with fresh oil, that is always in circulation therethrough. The oil after circulating through the bearings is returned, through passages in the housing
20 itself, to the main reservoir or storage chamber in the hub of the turbine casing, the same constituting, in effect, a settling chamber.

We claim,

25 1. In mechanism of the class described, the combination with the casing of a turbine provided with a hub having an open end, of a removable bearing member insertible end-
wise in the open end of said hub, spaced
30 bearings held in the ends of said bearing member, said bearing member having openings on opposite sides midway between said bearings, a lubricating chamber in said hub, a shaft journaled in said bearings, and
35 means carried by said shaft passing through the openings in said bearing member and extending into said lubricating chamber.

2. In mechanism of the class described, the combination with a casing and shaft, of
40 a removable bearing member, in which said shaft is journaled, insertible in said casing and coöperating with said casing to form a lubricant reservoir, and means for main-
taining a predetermined level of lubricant
45 from said reservoir in the interior of said bearing member.

3. In mechanism of the class described, the combination with a casing and shaft, of
50 a sleeve providing spaced bearings for said shaft, and insertible, with said shaft, in said casing, means for supplying oil to said sleeve, and means for insuring the distribu-
tion of said oil to said bearings.

4. In mechanism of the class described, the combination with a casing and shaft, of
55 a sleeve providing spaced bearings for said shaft, and insertible, with said shaft, in said casing, an oil supply, and an oil ring hang-
ing from said shaft, and passing through
60 openings in said sleeve, adapted to dip into said oil supply.

5. In mechanism of the class described, the combination with a casing and shaft, of
65 a sleeve providing spaced bearings for said shaft, and insertible, with said shaft, in said

casing, said shaft having a V-shaped groove, and a depending oil ring, seated in said groove and passing out of and below said sleeve, for supplying oil to the interior of
70 said sleeve, whereby the same is distributed in opposite directions from said groove.

6. In mechanism of the class described, the combination with a casing and shaft, of
75 a sleeve providing spaced bearings for said shaft, and insertible, with said shaft, in said casing, said shaft having a V-shaped groove, a depending oil ring, seated in said groove and passing out of and below said sleeve, for
supplying oil to the interior of said sleeve, whereby the same is distributed in opposite
80 directions from said groove, and means for maintaining a predetermined level of oil in said sleeve, on opposite sides of the groove in said shaft.

7. In mechanism of the class described, 85 the combination with a casing and shaft, of a sleeve providing spaced bearings for said shaft, and insertible, with said shaft, in said casing, said shaft having a V-shaped groove,
90 a depending oil ring, seated in said groove and passing out of and below said sleeve, for supplying oil to the interior of said sleeve, whereby the same is distributed in
opposite directions from said groove, and a
partition in said sleeve, below the groove in
95 said shaft, whereby the oil distributed in either direction from said groove is pre-
vented from flowing in the other direction.

8. In mechanism of the class described, the combination with a casing and shaft, of
100 a removable bearing member, in which said shaft is journaled, insertible in said casing, and means carried by said bearing member for preventing access of steam and water to
its interior from said turbine casing. 105

9. In mechanism of the class described, the combination with a casing and shaft, of
110 a removable bearing member, in which said shaft is journaled, insertible in said casing, said member inclosing a lubricant chamber, and means carried by said bearing member
for preventing escape of lubricant from said
chamber to said turbine casing.

10. In mechanism of the class described, the combination with a casing and shaft, of
115 spaced bearings for said shaft, said shaft having a V-shaped groove intermediate said bearings, a depending oil ring seated in said groove and dipping into an oil supply,
whereby the oil raised by said ring is distributed in opposite directions toward said
120 bearings from said groove, and means for insuring the flow of said oil to both of said bearings.

FRANS H. C. COPPUS.
WYMAN H. VARNEY.

Witnesses:

PENELOPE COMBERBACH,
NELLIE WHALEN.