

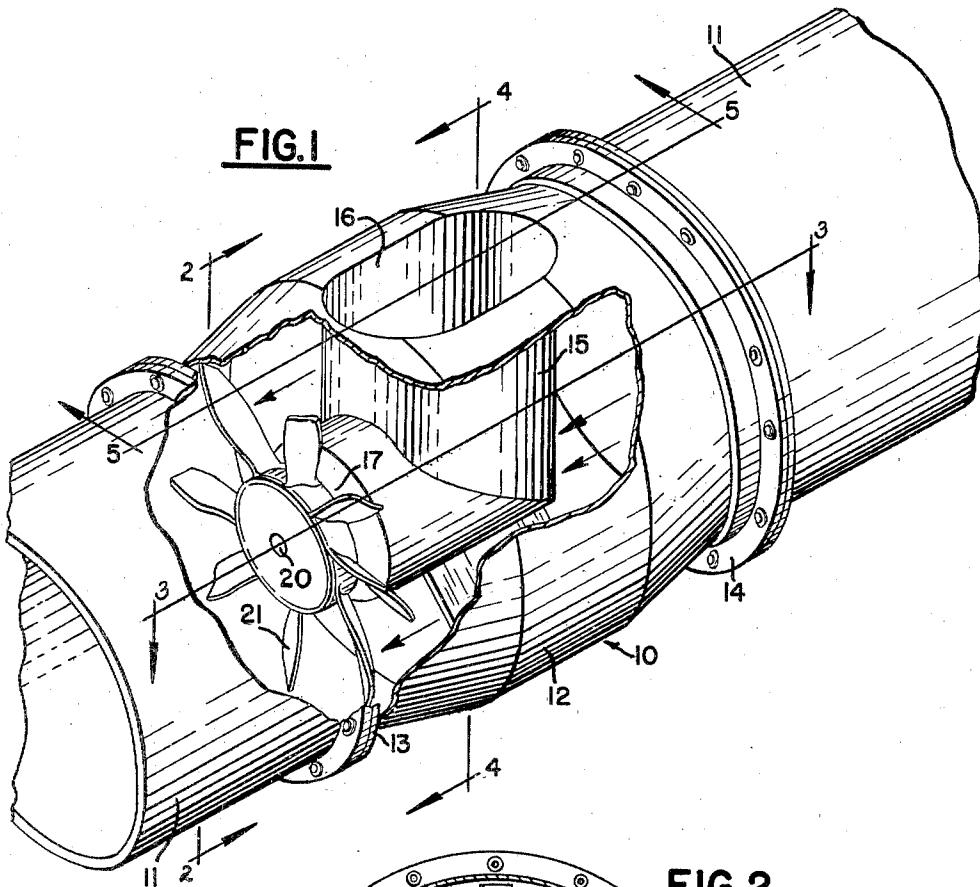
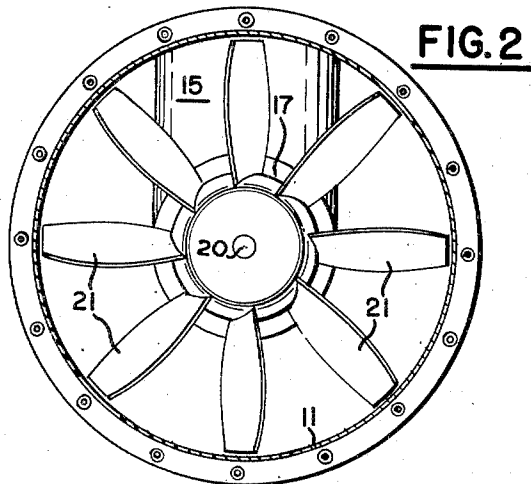
Jan. 17, 1950

R. H. McELROY
DUCT BOOSTER

2,494,772

Filed Jan. 9, 1947

3 Sheets-Sheet 1



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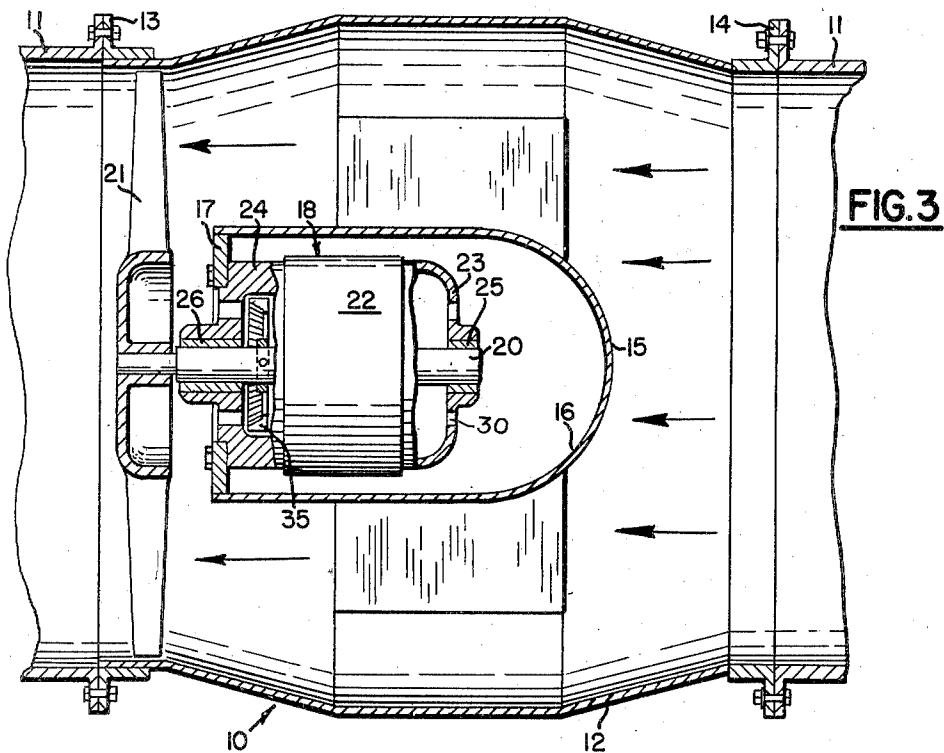
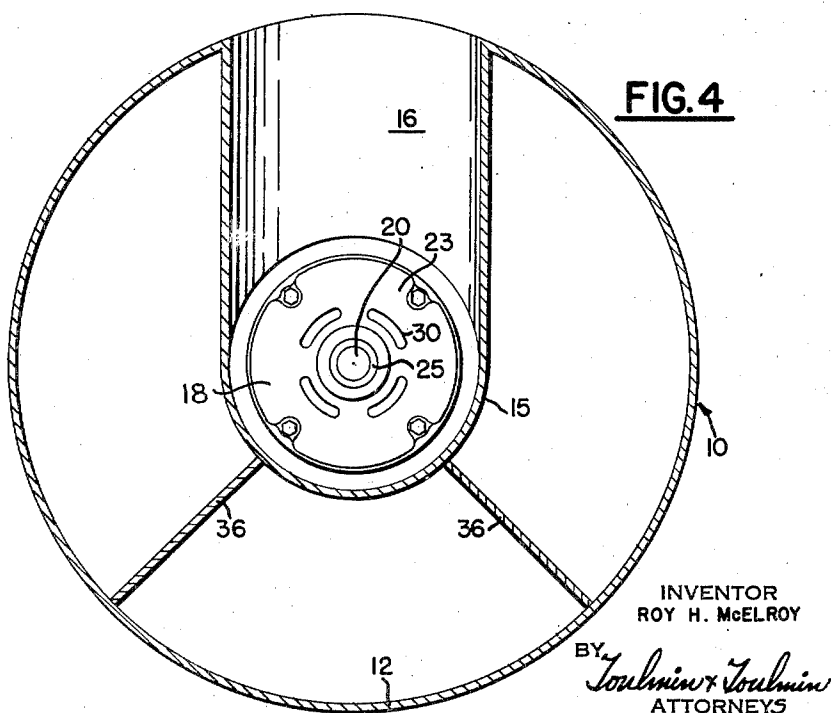
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FIG. 5

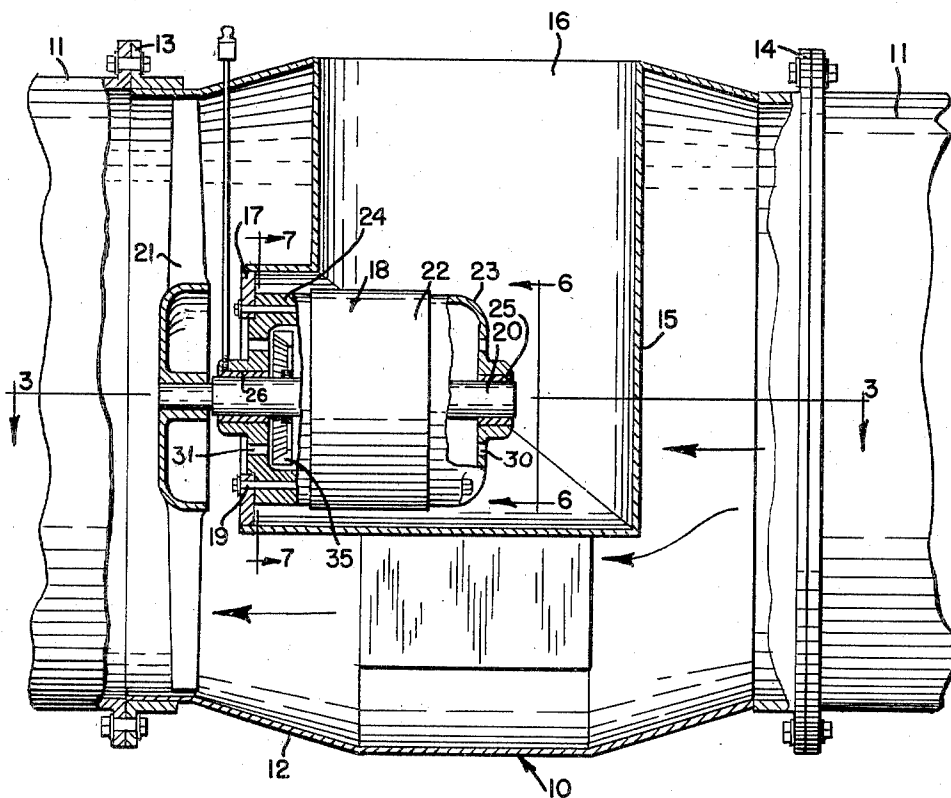


FIG. 7

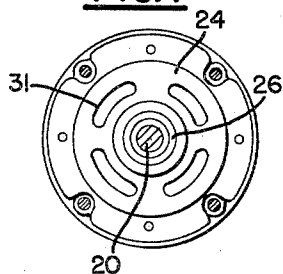
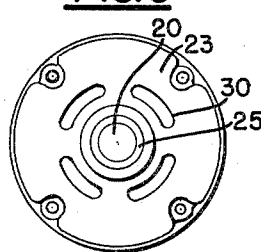


FIG. 6



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DUCT BOOSTER

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3 Claims. (Cl. 230-117)

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This invention relates to a gas circulating unit, and particularly relates to a circulating fan that is adapted to be placed in an air duct for boosting the movement of air or gas through the duct.

An object of the invention is to provide a duct fan or gas circulating unit wherein the prime mover for the fan is located in a housing to prevent contact of gases being handled by the fan with the prime mover, and wherein gases exteriorly of the duct in which the fan and prime mover is mounted are conducted through the prime mover and exhausted into the duct for cooling the prime mover.

Still another object of the invention is to provide a duct fan in accordance with the foregoing object wherein the fan disposed within the duct for moving the gas flow through the duct produces a movement of cooling gas through the prime mover.

Another object of the invention is to provide a duct fan in accordance with the foregoing objects wherein an auxiliary fan is disposed in operative relationship with the prime mover for aiding in the movement of cooling gas through the prime mover.

Still another object of the invention is to provide a duct fan in accordance with any of the foregoing objects wherein the prime mover consists of an electric motor having air passages through the motor to allow for passage of cooling gases through the motor, and also wherein the auxiliary fan is disposed within the motor for aiding the movement for cooling gas through the motor.

Further objects and advantages will become apparent from the drawings and the following description.

In the drawings:

Figure 1 is a perspective elevational view with a portion of the apparatus broken away to show the invention more clearly and illustrating the use of a duct fan of this invention within a duct through which gases pass.

Figure 2 is a vertical cross-sectional view taken transversely of the duct in front of the duct fan and substantially on line 2-2 of Figure 1.

Figure 3 is a horizontal cross-sectional view taken transversely of the duct substantially along line 3-3 of Figure 1.

Figure 4 is a vertical cross-sectional view taken transversely of the duct illustrating the well in which the prime mover is located and is taken substantially along line 4-4 of Figure 1.

Figure 5 is a vertical cross-sectional view taken

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longitudinally of the duct substantially along line 5-5 of Figure 1.

Figure 6 is an end view of the motor taken along line 6-6 of Figure 5.

Figure 7 is a vertical cross-sectional view of the opposite end of the motor taken along line 7-7 of Figure 5.

This invention relates to air circulating units or fans that are adapted to be placed within a duct for causing movement of gas through the duct. To provide for economy of manufacture of the unit the fans are usually carried directly on the end of the drive shaft of an electric motor, which motor and fan is installed within the duct for circulating gas through the duct. However, many times the gases circulated through the duct are harmful to an electric motor, and at other times the gases are at a quite high temperature. For these and other reasons it is therefore desirable that the prime mover or electric motor shall be positioned within the duct but out of contact with the gases passing through the duct and shall be cooled by movement of air or gases from outside the duct.

Duct fans, of the general type just referred to are usually installed within a housing that can be connected into and become a part of the duct system carrying the gases. Various proposals have been made and various arrangements used for cooling the prime mover of a duct fan which have met with various degrees of success. In this invention however the cooling gas for the prime mover, which as disclosed in this invention is an electric motor, is conducted through the prime mover primarily by the main duct fan which may be aided by an auxiliary fan in or adjacent to the prime mover for the purpose of removing the heat of the prime mover and for preventing overheating of it when high temperature gases are handled by the duct fan.

In this invention the air or gas circulating unit 10 is connected into and becomes a part of the duct 11 for moving gases through the duct.

The air circulating unit 10 consists of a housing 12 that is provided with flanged ends 13 and 14 adapted to be secured to the duct 11 in any suitable fashion. The housing 12 is provided with a well 15 that extends radially inwardly from the periphery of the housing 10.

The well 15 is suitably secured to the periphery of the housing 10 and has the upper end 16 thereof open for admission of air exteriorly of the housing 10 into the well 15. Normally, the opening 16 of the well 15 receives air from the room atmosphere through which the duct 11 passes. The well

15 is provided with a supporting plate 17 which is adapted to support the prime mover or electric motor 18.

The prime mover or electric motor 18 is introduced into the well 15 through the opening 16 and one end of the motor 18 is secured to the supporting plate 17 by means of bolts 19. It will thus be seen that when the motor 18 is placed in the well 15 and secured to the plate 17 that the motor is completely enclosed and separated from the interior of the housing 12 so that gases conducted through the housing 12 cannot contact the motor 18.

The drive shaft 20 of the motor 18 extends forwardly of the mounting plate 17 and has a main duct fan 21 secured thereon. This fan 21 causes movement of gases through the housing 12 and through the duct 11 connected at opposite ends of the housing 12.

The electric motor 18 is provided with a cylindrical housing 22 that carries the stator of the motor in conventional manner and has the end bells 23 and 24 secured to the member 22, also in conventional manner. The end bells 23 and 24 are provided with bearings 25 and 26 respectively which carry the drive shaft 20, the drive shaft 20 extending forwardly of the end bell 24 to carry the fan 21.

The end bell 23 of the motor 18 is provided with a plurality of openings 30 that are positioned in the end bell radially outwardly of the bearing 25 for the shaft 20. These openings 30 allow gas to pass into the interior of the motor 18.

As illustrated in Figure 7 the end bell 24 of the motor 18 is provided with similar openings 31 that are positioned radially outwardly of the bearing 26 which carries the shaft 20. These openings 31 in the end bell or wall 24 of the motor 18 are therefore positioned just rearwardly of the fan 21.

The fan 21 driven by the motor 18 causes movement of air through the housing 12 and around the well 15 in the direction of the arrows indicated in Figures 1, 3 and 5. Therefore, the low pressure side of the fan 21 is on the right hand side thereof, as viewed in Figures 3 and 5 and the high pressure side of the fan is on the left hand side thereof.

As is well-known in the conventional construction of electric motors, the rotor of the electric motor is spaced from the stator and the internal construction generally is such that gas or air can pass internally through the motor. Thus, with the end bells or walls 23 and 24 of the motor 18 provided with the openings 30 and 31 previously described it will be seen that air or gas can pass completely through the motor 18. With the low pressure side of the fan 21 being adjacent the end wall 24 of the motor 18, air will be drawn through the motor 18 by the fan 21, the air admitted into the motor being received from within the well 15. The well 15 receives its air through the opening 16 which in turn is supplied from the atmosphere around the housing 12 and the duct 11. Therefore, cooling gas will be circulated through the motor 18 by means of the main duct fan 21, this fan drawing the cooling gas or air from the well 15 through the openings 30 and 31 in the end walls 23 and 24 respectively of the motor 18. The cooling air passing internally through the motor 18 provides for more satisfactory cooling of the motor because of the intimate contact of the air with the motor at the source of heat therein. Also, since the air circulated through the motor 18 is drawn from

the well 15 it will be appreciated that the general movement of air through the well 15 will produce external cooling of the motor in addition to the aforementioned internal cooling.

It may be desirable to supplement the movement of air through the motor 18 as caused by the main duct fan 21, particularly under conditions wherein the duct fan is handling gas at relatively high temperatures. The main duct fan 21 can therefore be supplemented by the use of a fan 35 carried on the motor shaft 20 and positioned internally of the motor 18 at either end of the motor. Also, it will be appreciated that the fan 35 could be mounted upon an extension of the shaft 20 externally of the motor, such as at the right hand end of the motor, see Figure 5. The auxiliary fan 35 would therefore increase the quantity of air delivered through the motor 18 for cooling the same.

From the foregoing description it will be seen that the well 15 completely encloses the motor 18 and yet a highly efficient system is provided for delivering cooling gases through the motor by means of the main duct fan which can be supplemented by means of an auxiliary fan. The well 15 may have plates 36 extending between the well and the periphery of the housing 12 to more rigidly support the well within the housing.

While the apparatus disclosed and described herein constitutes a preferred form of the invention, yet it will be understood that it is capable of modification, and that all modifications of the apparatus that fall within the scope of the appended claims are intended to be included herein.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A gas circulating unit comprising, a housing through which gases may be conducted, a fan in the housing for moving gases through said housing, an enclosure within said housing on the low pressure side of said fan, means connecting the interior of said enclosure with the exterior of said housing whereby gases exteriorly of the housing can enter said enclosure, a motor within said enclosure and forming therewith a part of the wall of the enclosure adjacent said fan on the low pressure side thereof, said motor having the drive shaft thereof extending through said wall into the housing and carrying said fan, and passage means in said motor through which gas from said enclosure can be circulated, said passage means terminating in the wall of said motor that forms a part of the wall of said enclosure adjacent said fan on the low pressure side thereof whereby said fan draws gases through the housing and through said motor and said wall from said enclosure.

2. A gas circulating unit comprising a housing through which gases may be conducted, a fan in the housing for moving gases through said housing, an enclosure within said housing on the low pressure side of said fan and having an opening in a wall thereof adjacent said fan, means connecting the interior of said enclosure with the exterior of said housing whereby gases exteriorly of the housing can enter said enclosure, a motor within said enclosure having one end thereof closing said opening and forming a part of the wall of the enclosure adjacent said fan on the low pressure side thereof, said motor having the drive shaft thereof extending through said end into the housing and carrying said fan, and passage means in said motor through which gas from said enclosure can circulate, said passage means

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terminating in said end of said motor and within the area of said opening whereby said fan draws gases through the housing and through said motor and said wall from said enclosure.

3. A gas circulating unit comprising a housing through which gases may be conducted, a fan in the housing for moving gases through said housing, an enclosure within said housing on the low pressure side of said fan and having an opening in a wall thereof adjacent said fan, means connecting the interior of said enclosure with the exterior of said housing whereby gases exteriorly of the housing can enter said enclosure, a motor within said enclosure having one end thereof closing said opening and forming a part of the wall of the enclosure adjacent said fan on the low pressure side thereof, said motor having the drive shaft thereof extending through said end into the housing and carrying said fan, passage means in said motor through which gas from said enclosure can circulate, said passage means terminating in said end of said motor and within

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the area of said opening whereby said fan draws gases through the housing and through said motor and said wall from said enclosure, and a booster fan in said motor to boost gas movement through said motor.

ROY H. McELROY.

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