

June 26, 1923.

M. H. SPIELMAN

1,460,146

DEVICE FOR AIR COOLING DUSTPROOF FAN MOTORS

Filed Feb. 8, 1918

2 Sheets-Sheet 1

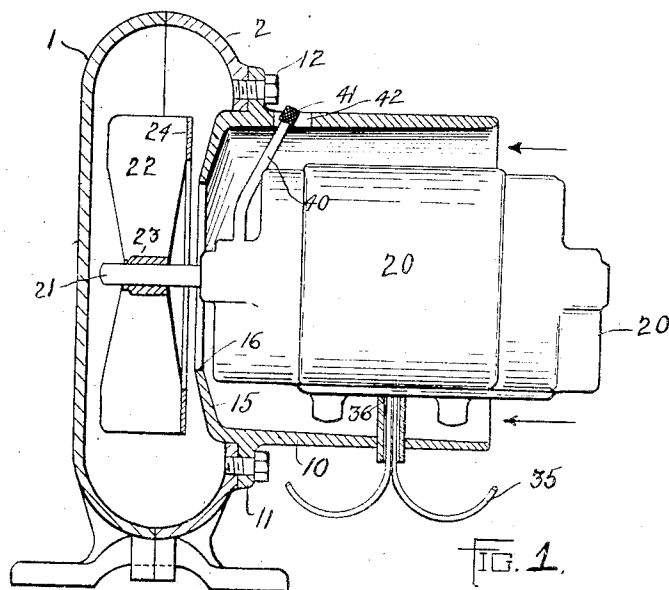


FIG. 1.

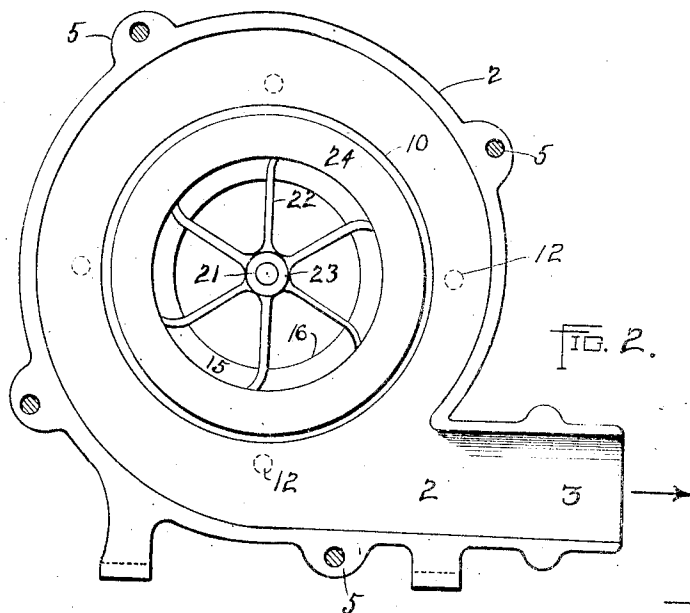


FIG. 2.

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By Walter Macklin, ATTORNEY.

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2 Sheets-Sheet 2

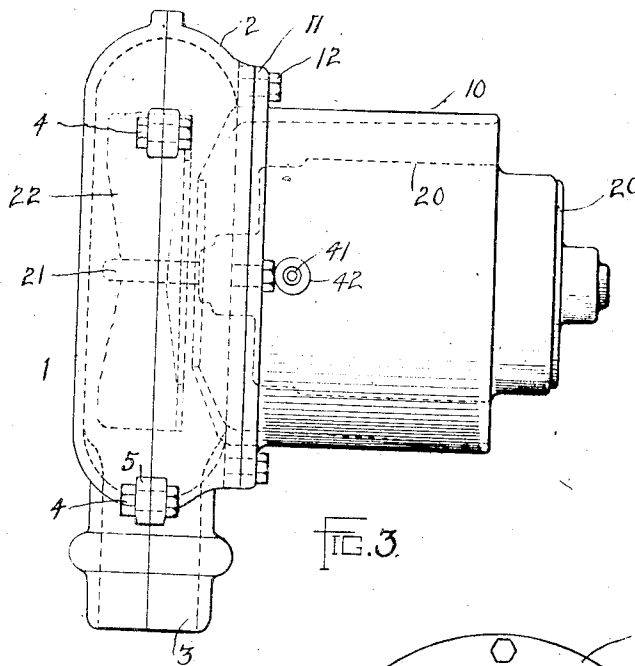


FIG. 3.

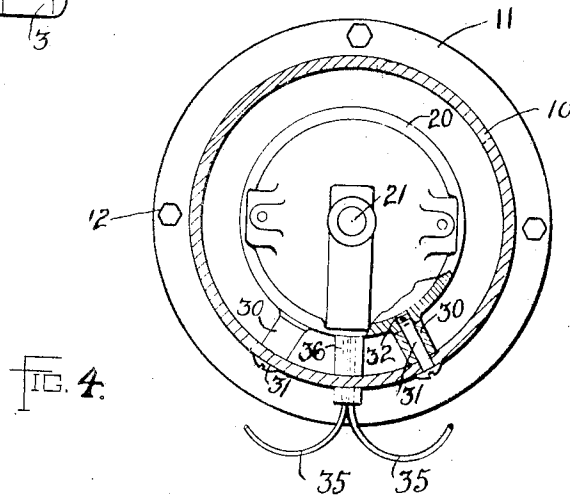


FIG. 4.

Inventor,
Milton H. Spielman
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Patented June 26, 1923.

1,460,146

UNITED STATES PATENT OFFICE.

MILTON H. SPIELMAN, OF CLEVELAND, OHIO.

DEVICE FOR AIR COOLING DUSTPROOF FAN MOTORS.

Application filed February 8, 1918. Serial No. 216,141.

To all whom it may concern:

Be it known that I, MILTON H. SPIELMAN, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in a Device for Air Cooling Dustproof Fan Motors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The purpose of this invention is to provide a simple and effective device for air cooling non-ventilated dust proof motors when used to drive fans or blowers, with the consequence that a much smaller motor may be used for a given result, thus greatly reducing the cost of such devices.

It has heretofore been the practice in a construction of motors for driving fans, blowers or the like, where the atmosphere in which the motor is working is laden with foreign particles likely to interfere with the effective operation of the motor or to injure its parts, to avoid such difficulties by entirely enclosing the motor in a thoroughly airtight casing. To so enclose a motor, however, renders it impractical to ventilate and cool the same by air passing through the interior thereof. Experience has demonstrated that the amount of air circulating around a motor is not ordinarily sufficient to cool a motor of a size otherwise suited to the work to be done. Various expedients have been tried with a view to overcoming this difficulty, such for example as making a motor comparatively large with relation to the fan or running the motor at a low speed at which it is not so subject to overheating. In fact it has been necessary to use a closed motor of twice the size of a well ventilated motor otherwise adapted for the work. By the use of my invention I may accomplish the moving of the desired volume of air with a comparatively small and much cheaper motor, and may attach the fan directly to the armature shaft, which is very desirable, and still accomplish the cooling of the motor to a temperature at which it may run safely and efficiently.

My method of accomplishing the above results is illustrated in a convenient embodiment shown in the drawings hereof and the essential characteristics of this invention are summarized in the claims.

In the drawings, Fig. 1 is a vertical substantially axial section through a blower casing showing the fan therein and the

motor in elevation and my special device surrounding the motor for causing the cooling thereof; Fig. 2 is an end elevation of the fan blower and motor with the outer half of the blower casing removed; Fig. 3 is a plan of the parts shown in Fig. 1; Fig. 4 is a transverse section through the secondary housing surrounding the motor showing the method of securing the motor in position.

Describing the parts by the use of reference numerals, 1 and 2 indicate the side wall members of a fan chamber for a blower of substantially the usual construction and formed to provide an air outlet at 3, the two side wall members being secured together in the usual manner by bolts through ears 5. The blower chamber wall member 2 is provided with the comparatively large central opening into which is fitted the inner end of a substantially cylindrical housing 10 provided with a flange 11 fitting a raised portion on the wall 2 and secured thereto by screws 12.

This cylindrical housing extends outwardly from the wall 2 for a considerable distance and contains a motor 20 having an armature shaft 21 on which may be mounted a fan 22 of any suitable construction. As shown the fan has a comparatively small hub 23 from which radiate the integral blades braced by an integral disk like ring 24.

The motor 20 as illustrated is a small high speed motor and is preferably provided with a substantially cylindrical casing. I prefer to mount the motor in the casing in a manner which will offer the least resistance to air passing through the annular passage around the motor, and accordingly I provide hollow distance blocks 30, between the housing 10 and suitable bosses on the wall of the motor, and through these distance blocks extend screws 31 passing through the housing 10 and threaded at 32 into the motor casing.

There are preferably four of these distance blocks and securing screws, arranged two on each side of the center at the lower side of the motor.

The feed wires 35 preferably lead through an insulating tube 36 extending through an opening in the housing 10 to the motor casing, as shown.

The inner end of the cylindrical housing 10 is provided with an integral inwardly

turned flange 15, sloping somewhat toward the fan, and shown as leaving an opening 16 for the passage of air, which opening is preferably slightly smaller in diameter than the exterior of the casing of the motor 20.

As a convenient means for oiling the inner ends of the motor I may provide a tube 40 leading upwardly from the motor and having a suitable cap 41 standing in an opening 42 through the housing 10.

The cooling is accomplished by reason of the large amount of air forced rapidly through the casing 10 around the motor and inwardly over the inner end of the motor by the deflecting flange 15 and into the central portion of the fan wheel within the bracing ring 24. The flange 15 serves the dual function of causing the air to be forced into close contact with the inner end of the motor and armature shaft as well as directing it properly to the central portion of the fan. This feature is important for the reason that the cooling of the parts at the inner end of the motor has the effect of absorbing the heat traveling along them from the interior of the motor. The area of the passage around the motor has a definite relation to the area of the opening within the flange. Owing to frictional losses the area of the passage is preferably slightly larger than that of this opening. The surface of the motor casing within the housing is determined according to the amount of air passing over it necessary to obtain a proper working temperature, and may be changed by varying the length of the housing 10.

The proportions shown in the drawings have been taken from a device embodying my invention, which device has been in practical use for sufficient length of time to demonstrate the practicability and utility of

this invention. A small high speed entirely enclosed motor is used and a fan relatively small in proportion to the volume of air to be discharged, the motor and fan being run at a high speed, and yet the motor remains at a proper low temperature suitable to effective operation and with no danger of injury from overheating.

Having thus described my invention, what I claim is:—

1. In combination, a motor having a projecting armature shaft, an airtight casing surrounding the motor and from which the armature shaft projects, a fan on the armature shaft, a tubular casing surrounding the airtight motor casing, the end of the casing adjacent the fan having an inwardly extending flange, and a housing secured to the second mentioned casing and surrounding the fan, a tangential outlet in the housing to provide a blower, said tubular casing fitting within the housing, said flange defining a central opening to the fan for all the air passing through the blower.

2. A fan blower comprising a fan housing having a single centrally positioned entrance opening, a sleeve extending from said entrance opening, said sleeve having a flange thereon inwardly turned toward the fan, and a non ventilated motor in said sleeve, said motor having an airtight casing supported within said sleeve in spaced relation thereto and having an armature shaft projecting through the entrance opening into the fan housing, a fan fixed on said shaft whereby all the air supplied to the fan passes around said motor and through the restricted opening defined by the flange.

In testimony whereof, I hereunto affix my signature.

MILTON H. SPIELMAN.