Sept. 30, 1958 R. D. WELLINGTON 2,853,766

METHOD OF MAKING ROTARY BLOWER

Original Filed April 22, 1950

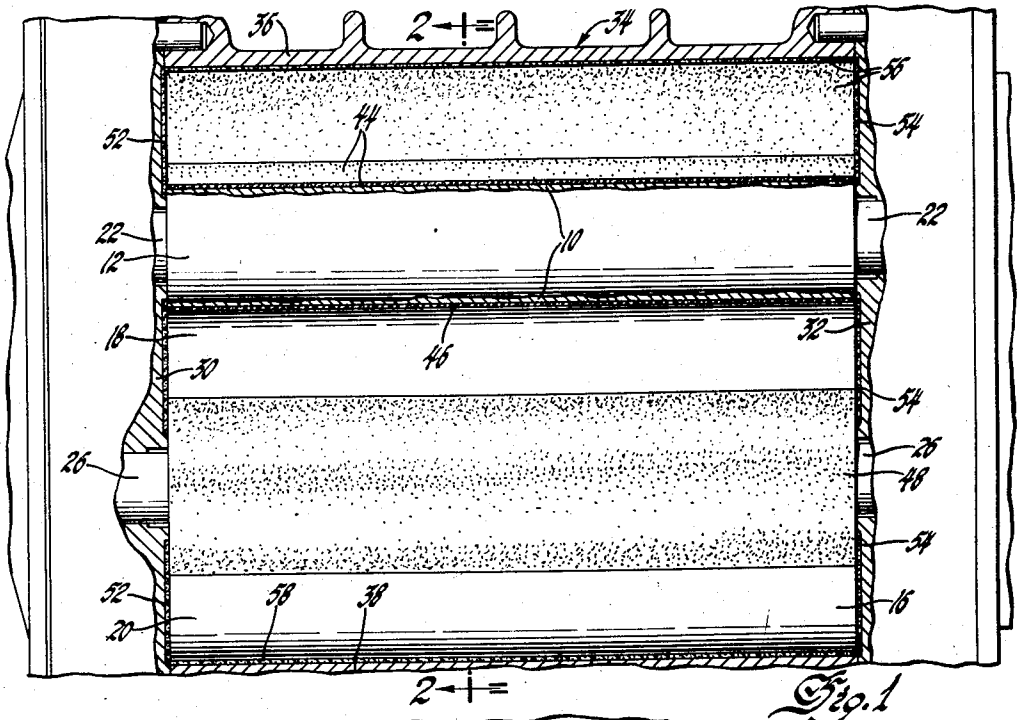


Fig. 1

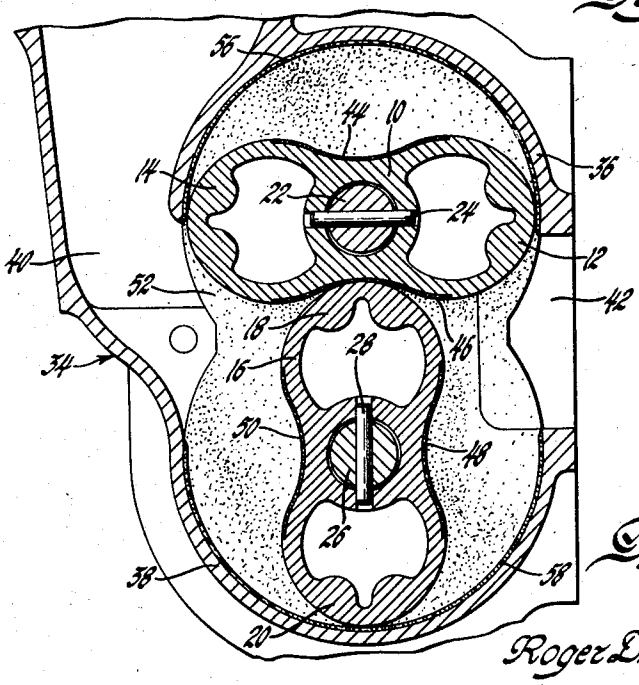


Fig. 2

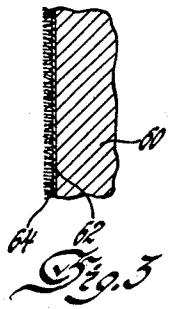


Fig. 3

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United States Patent Office 2,853,766 Patented Sept. 30, 1958

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METHOD OF MAKING ROTARY BLOWER

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Original application April 22, 1950, Serial No. 157,423, now Patent No. 2,754,050, dated July 10, 1956. Divided and this application November 21, 1955, Serial No. 548,127

2 Claims. (Cl. 29—156.4)

This invention relates to rotary blowers or pumps of the positive displacement type, and to a method and means of increasing their volumetric efficiency.

This is a division of my copending application Serial No. 157,423, filed April 22, 1950, now Patent No. 2,754,050 dated July 10, 1956.

It is well known that in order to obtain maximum volumetric efficiency, the clearance between the rotors and between the rotors and their housing should be a minimum. On the other hand, the clearances must be sufficiently large that there will be no actual contact between these parts, since otherwise the high relative rubbing velocity of the usual metal-to-metal surfaces, especially if of similar metals, will develop high temperatures followed by seizure, by welding, and galling of the surfaces. Moreover, it is difficult to maintain the clearances at the desired minimum in service, because of differential expansion of the various blower parts, elastic deformations from various causes, wear of the driving gear and bearings, and manufacturing and assembly errors. Blowers with metal-to-metal relatively moving surfaces are therefore designed with clearances sufficiently large to assure that there will be no actual contact made under all the foregoing conditions. Expensive machining operations have been required in order to obtain the necessary accuracy of the parts such that the clearances are large enough that no actual metal-to-metal contact takes place and at the same time no clearances are too large.

Among the objects of the invention are the following: to provide a new and improved and relatively inexpensive method of making a rotary blower having high volumetric efficiency, to provide an improved method of making a rotary blower having minimum clearance between the relatively moving parts, to provide an improved method of making a rotary blower having metal surfaces to which is adhesively bonded a coating of flock or fibers, to provide an improved method of making a blower having adjacent surfaces of its relatively moving parts of different materials, one of which is of metal and the other is a nonmetallic coating consisting of an adhesive and fine flock or fiber particles, to provide an improved method of making a blower having a coating on surface portions consisting of an adhesive and fine rayon or similar fibers, a substantial proportion of which project outward-from the surface; to provide an improved method of making a blower having minimum clearance between relatively moving parts and in which a coating consisting of adhesive and fine rayon, nylon or other flock is applied only to such parts that there will be no rubbing contact between two coated surfaces; and to provide an improved method of making a blower having surface portions thereof consisting of adhesive and flock particles of rayon or the like on only stationary surfaces or surfaces having relatively low velocities. Other objects and advantages of the invention will become more apparent as the description proceeds.

In accordance with the invention the clearance space

between cooperating parts of the blower is maintained at a desired minimum by adhesively bonding to cooperating parts of the blower, a multiplicity of fine, relatively short length fibers or flock of rayon, nylon, cotton, etc., in such manner that a substantial proportion of the fibers project outwardly from the surface of the part to give somewhat the appearance of a short pile velvet or velour.

The flock may be adhesively bonded to the parts by means of any desired adhesive. Known synthetic adhesive materials related to lacquers have been found highly satisfactory. The adhesive materials may be clear, pigmented, or colored and may be air drying or baking grade. Synthetic rubber adhesives or high temperature adhesives are examples of other suitable types. The adhesives employed preferably should offer high resistance to solvent or softening effect to oils encountered in service. The adhesive may be applied by spraying, brushing, etc. The following are representative examples of air drying adhesives that have been employed:

#35 Black	Behr Manning Co.
#35 Brown	Behr Manning Co.
156 C 4	Berry Brothers.
Zapon	Zapon Div. Atlas Powder Co.
35050	Minnesota Mining Co.

The flock may be sprayed onto the surface coated with the adhesive by a flock gun until no more fibers will be accepted by the adhesive. In practice, flock consisting of rayon fibers or particles about 1/32" long and about .0002" in diameter have proven highly satisfactory. Under the microscope these particles appear as short, hair-like particles and are of much smaller diameter than that of ordinary human hair which has a diameter on the order of .001" to .003". While rayon flock particles having the dimensions described above have proven especially advantageous in practice, it is contemplated that shorter and longer fibers also may be used and that the diameter of the fibers may be of greater or lesser dimensions. In some cases it is contemplated that mixtures of flock particles of different diameters and/or lengths may be used. It is also contemplated that flock particles of nylon, cotton, wool, etc., may be employed in place of rayon. Mixtures of different materials may be employed The following are the names and sources of rayon flock particles that have proven highly satisfactory:

Berlon	Behr Manning Company.
Raycote	Rayon Processing Company.
Flock	Oldremont Waste Company.

Presently preferred procedure in treating the metal parts and applying the coating is to thoroughly clean the metal parts such as aluminum as by a degreasing operation or the equivalent. Masks are applied as required. Tape or metal masks may be used. The adhesive is sprayed on the metal to give a wet coating of adhesive on the parts to be flocked. The flock is applied by blowing the flock onto the adhesively coated areas until the same are filled and will accept no more fibers. When applied by a flock gun the fibers stand pretty much on end, giving the surface a finish like a short pile velvet. The time interval between application of the adhesive and the flock must be no greater than the "open" time of the adhesive. After the flock is applied the masks are removed if masks have been used. The flocked parts then may be heated for a short time on the order of ½ hour in an oven at 275° F.

Reference is herewith made to the accompanying drawing showing a Root's type blower having two lobed rotors and constructed in accordance with a preferred embodiment of the invention.

In the drawing:

Figure 1 is an elevational view of the blower with parts cut away and in section.

Figure 2 is a sectional view substantially on line 2—2 of Figure 1.

Figure 3 is a fragmentary and somewhat diagrammatic, sectional view on an enlarged scale showing an adhesively bonded flock coating on a metal surface of a blower part.

In Figures 1 and 2 of the drawing, **10** represents one rotor having two lobes **12** and **14**, while **16** represents a cooperating rotor having two lobes **18** and **20**. Rotor **10** is fixed to a shaft **22** by means of pins **24** so as to be rotated with the shaft, while rotor **16** is similarly fixed to a shaft **26** by pins **28**. The shafts are supported in suitable bearings formed in end plates **30** and **32** of a rotor housing indicated in its entirety by **34**. The rotors are driven in proper registry with one another by gearing (not shown), so that the rotor lobes are relieved of any driving duty. The rotor housing has a portion **36** encircling 180° of rotor **10** and a portion **38** encircling 180° of rotor **16**. The rotor housing also has an inlet port **40** and an outlet port **42**. Aluminum is especially advantageous as the metal from which the rotors and other parts of the blower are made.

As indicated in Figures 1 and 2 of the drawing, the "valleys" between the arcuate tips of the rotor lobes each has an adhesively bonded flock coating thereon. This is shown at **44** and **46** on rotor **10** and at **48** and **50** on rotor **16**. The end plates **30** and **32** have adhesively bonded flock coatings **52** and **54**, respectively, while the portions **36** and **38** of the rotor housing have adhesively bonded flock coatings **56** and **58**, respectively. The adhesively bonded flock coatings are represented in Figures 1 and 2 of the drawing as of a greater thickness relative to the metal parts than is actually the case in order to illustrate the construction more clearly. As shown in the drawing the rotors and end plates are undercut a small amount at those portions which receive the adhesively bonded flock coatings. In the form illustrated the peripheral length of each uncoated arcuate lobe of each rotor is the same as the peripheral length of the cooperating "valley" which has the adhesively bonded flock coating thereon. During rotation of the rotors, therefore, there is at all times a condition in which one of the mating surfaces is of metal and the other is an adhesively bonded flock coating. The arcuate uncoated tips of the rotor lobes are the only portions thereof that move over the adhesively bonded flock coatings **56** and **58** on the rotor housing so that there is never a metal-to-metal, or flock-to-flock contact between relatively moving parts. The end surfaces of the rotors are uncoated and these portions move over or past the flock surfaces on the end plates **30** and **32**. In the form of the invention illustrated it will be seen that the flock coating is applied only to stationary surfaces or, where applied to the rotors, to the "valley" portions thereof which have relatively lower speeds than do the tips of the lobes. Thus there is little or no tendency for the adhesively bonded flock coating to be thrown off from the several parts.

Figure 3 illustrates somewhat diagrammatically the adhesively bonded flock coating on the metal surfaces of the blower parts. In this figure, **60** represents the metal surface having thereon an adhesive **62** and a multiplicity of fine flock particles **64** projecting outwardly from the metal surface and adhesive to give the coated surface the general appearance of a short pile velvet or velour. In Figure 3 the several parts are shown greatly enlarged to illustrate the construction more clearly.

A blower in accordance with the invention has numerous advantages over conventional designs. It is more efficient due to minimum air leakage, it is less expensive to build because larger tolerances are permissible in machining and assembly, and damage due to accidental rubs which wreck blowers of conventional design is eliminated.

Various changes and modifications of the embodiments of my invention described herein may be made without departing from the principles and spirit of the invention.

I claim:

1. A method of making a rotary blower which comprises forming a plurality of lobed rotors having valleys between the lobes, applying a liquid adhesive to said valleys, blowing a multiplicity of fine, short, hair-like flexible fibers onto the adhesive until the adhesive will take no more fibers, a substantial proportion of the said flexible fibers projecting outwardly from the coated valleys so that they present somewhat the appearance of a short pile velvet, thereafter drying the adhesive to fix the flexible fibers in place, assembling said rotors with a lobe of one rotor within the valley in another rotor, forming a rotor housing having arcuate surfaces, applying a liquid adhesive to said arcuate surfaces, blowing a multiplicity of fine, short, hair-like flexible fibers onto the adhesive on the arcuate surfaces until the adhesive on said arcuate surfaces will take no more fibers, a substantial proportion of said flexible fibers projecting outwardly from the surfaces so that the said arcuate surfaces have somewhat the appearance of a short pile velvet, thereafter drying said adhesive to fix the flexible fibers in place, and assembling said rotors in the housing so that the lobes will be in rotary engagement with the coated surfaces on said rotor housing.

2. A method of making a rotary blower as in claim 1 in which the flexible fibers are rayon having a length on the order of one thirty-second of an inch and a diameter on the order of .0002 inch.

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