Aug. 22, 1950 R. FLANAGAN 2,519,557

MEANS FOR PREVENTING SEIZURE OF MOVING PARTS

Filed Aug. 11, 1943

Fig. 1.

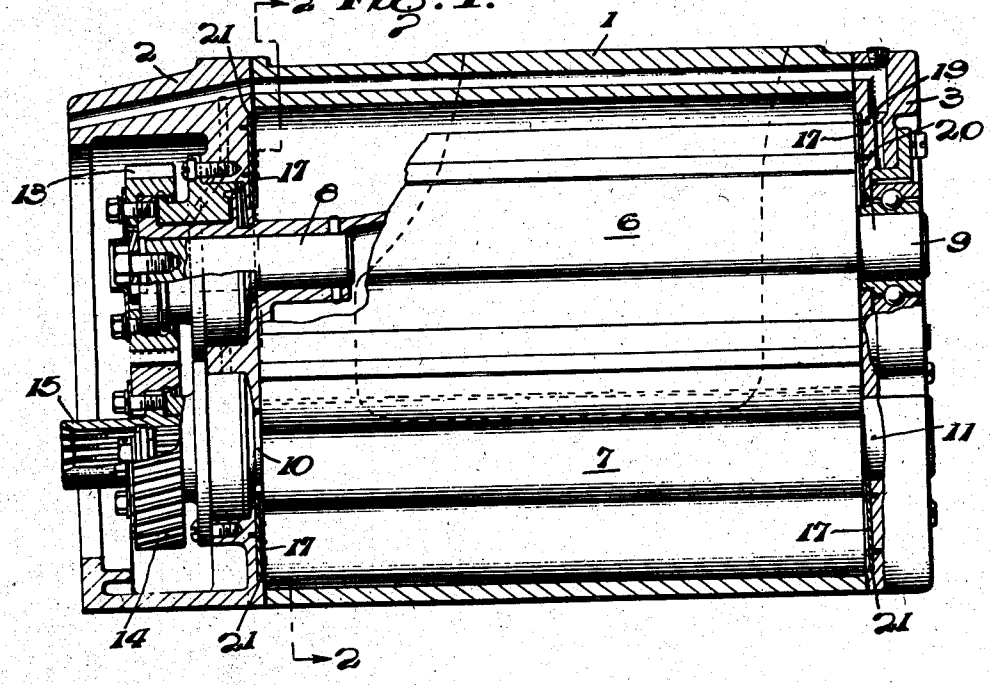


Fig. 2.

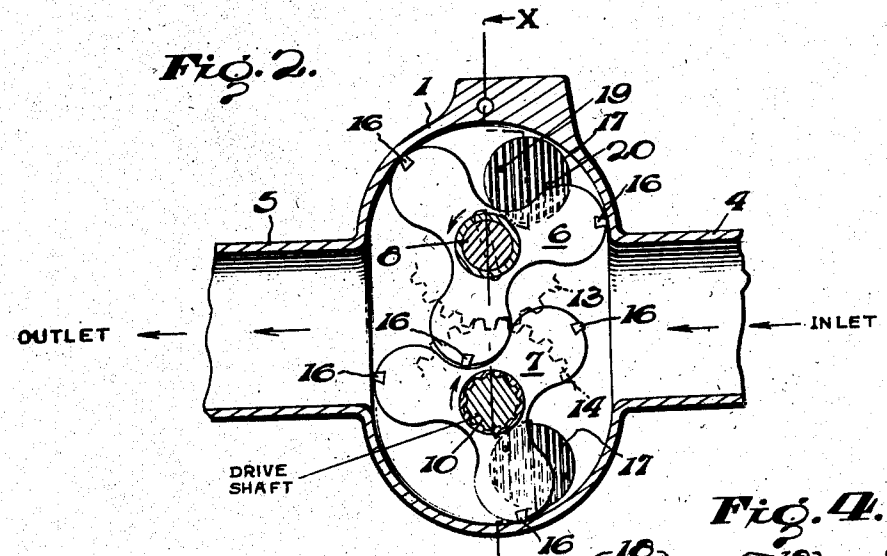


Fig. 4.

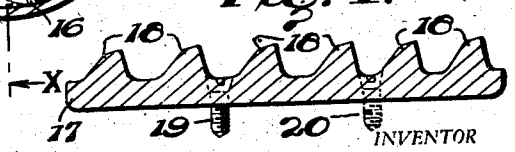
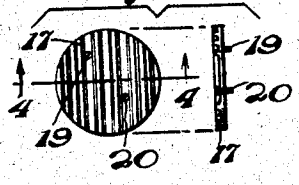


Fig. 3.



INVENTOR

BY Robert Flanagan.

Herbert L. Davis, Jr. ATTORNEY

Patented Aug. 22, 1950 2,519,557

UNITED STATES PATENT OFFICE

2,519,557

MEANS FOR PREVENTING SEIZURE OF MOVING PARTS

Robert Flanagan, Glen Rock, N. J., assignor to Bendix Aviation Corporation, Teterboro, N. J., a corporation of Delaware

Application August 11, 1943, Serial No. 498,243

7 Claims. (Cl. 230—141)

1

My present invention relates to novel means for reducing the hazard of seizure of moving parts due to a rise in temperature, and more particularly to a novel device for mounting in a rotary blower or pump for shaving, or scraping the side surfaces of a rotary member therein.

In the past, considerable difficulty has been experienced in the use of rotary air compressors or blowers of the Root's type, due to the fact that the operation thereof often causes extreme rises in temperature tending to cause the rotor to expand resulting in seizure between the rotor side surfaces and the housing.

It has therefore been an object of my invention to provide novel means for cutting, shaving, or scraping the side surfaces of the rotor as the same expands in response to a rise in temperature, so as to thereby lessen the hazards of seizure.

Another object of my invention is to provide a novel cutter means and arrangement for lessening the hazards of seizure in rotary blowers of the Root's type.

Another object of my invention is to provide a novel cutter device readily adapted for mounting in a conventional Root's blower for preventing seizure at the sides of the rotor.

Another object of my invention is to provide a novel cutter formed of tooled steel, which has been heat-treated in a manner well known in the art so as to adapt the same for scraping and cutting suitable plastics, mild steels, aluminum and other soft metals which may be utilized to form the rotor of an air compressor.

Another object of my invention is to provide a novel plate having mounted thereon a plurality of cutter blades, and the plate arranged for mounting on the inner surface of the end walls of a blower casing so that the cutter blades may shave the side end surfaces of the rotor blades of a conventional Root's type blower upon the expansion thereof.

Another object of my invention is to provide a novel system and method for preventing seizure between the housing and rotor of a Root's type blower.

Another object of my invention is to provide a novel compact cutter plate of the type described of great efficiency in comparison to its size and of such simplicity in construction as to adapt it for manufacture and installation at low cost.

Other objects and advantages of this invention are set forth in the following description, taken with the accompanying drawings; and the novel features thereof are pointed out in the appended claims. The disclosure, however, is illustrative

2

only and I may make changes in detail, especially in matters of shape, size and arrangement of parts within the principle of the invention to the full extent indicated by the broad and general meanings of the terms in which the appended claims are expressed.

In the accompanying drawings like characters of reference indicate like parts in the several views wherein:

Figure 1 is a part cut away, part sectional elevation of a blower showing my novel cutter plates in position within the housing of the blower.

Figure 2 is a sectional view of Figure 1 taken along the lines 2—2 and looking in the direction of the arrows.

Figure 3 is a plan view of my novel cutter plate, together with an end view thereof.

Figure 4 is an enlarged sectional view of the plan view of Figure 3 taken along the line 4—4 and looking in the direction of the arrows.

Referring more particularly to the drawings, it will be seen that in Figures 1 and 2 there is shown a conventional blower of the Root's type having a housing indicated generally by the numeral 1. End members 2 and 3 are affixed to the housing 1 in any convenient manner.

The housing 1 has provided inlet and outlet conduits 4 and 5. Rotatably mounted within the housing 1 are impeller rotors 6 and 7. The rotor 6 has affixed at opposite sides thereof shafts 8 and 9 which are journalled in suitable bearings provided in the end members 2 and 3, respectively. Similarly, the rotor 7 has affixed at opposite sides of the same shafts 10 and 11, which are likewise journalled in suitable bearings provided in the end members 2 and 3, respectively. The shafts 8 and 10 have fixed thereon piloting gears 13 and 14 which in turn are operatively connected with a driving shaft 15.

The impeller rotors 6 and 7 have been shown of conventional type, each having three impeller teeth or lobes which intermesh in sealing relation in a manner well known in the art.

In order to further effectively seal the engagement of the impeller gear teeth with the housing and with each other, each tooth is provided at the end thereof with a suitable plastic or rubber seal indicated by the numeral 16. The seal 16 projects slightly beyond the outside circumference of the gear tooth so as to engage in sealing relation the inner surface of the housing. After the contact face of the seal 16 has worn away the same can be readily removed and a new seal inserted in its place.

In operation of a pump of the type described

the fluid medium, such as air, enters the pump housing 1 through the inlet 4 as indicated at Figure 2. As the rotors rotate in the direction of the arrows, the intake fluid is entrapped between the housing 1 and each two successive rotor teeth and carried around by the rotating intermeshing impeller rotors 6 and 7, and the fluid medium ejected from the outlet conduit 5 as indicated by the arrows.

During such operation the rapid rotation of the impeller rotors 6 and 7 causes a rise in temperature due to increased pressure of the fluid medium. Such rise in temperature in the conventional type of rotary pump often causes the rotors to expand at the sides resulting in the subsequent welding or seizure of the rotors at the inner surfaces of the housing side members and failure in operation of the pump.

In order to avoid such seizure, I have provided the novel cutter devices shown in detail in Figures 3 and 4 and including a circular plate-like member 17. Projecting from the plate 17 are a plurality of knife-like blades 18 extending parallel and in spaced relation one to the other.

The blades 18 are preferably formed of a tooled steel which has been heat-treated in a manner well known in the art so as to adapt the same for cutting or shaving the surface of an adjacent rotary member formed of a softer material such as suitable plastics, mild steels, aluminum and other soft metals.

For convenience in mounting, the plate 17 has provided the attachment screws 19 and 20, whereby the plate 17 may be fastened at the inner surface of the opposite end members 2 and 3 as shown in Figures 1 and 2.

Suitable recesses 21, as indicated in Figure 1, are provided in the inner surface of the end members 2 and 3 for receiving the cutter plates 17. The cutter plates 17 are mounted within the housing 1 as best shown in Figure 2, at a point on the end member to that side of an imaginary line X—X drawn through the centers of rotation of the impeller rotors 6 and 7 nearest the inlet 4. Each of the cutter plates 17 have the knife-like blades 18 carried thereby projecting above the inner surface of the end member and extending parallel to said imaginary line so as to shave as the rotor revolves the opposite side surface of the impeller rotor upon the expansion thereof. Thus by shaving the side surface of the impeller rotor, seizure between such side of the rotor and the inner surface of the end member may be readily avoided. Moreover, it will be seen that the knife-like blades 18 are so positioned with respect to the rotors that the side of the rotor teeth in passing the knife-like blades 18 first strikes the blades at the ends thereof and move longitudinally and laterally in respect thereto, so that the expanded portions of the rotor teeth are shaved therefrom with a combined cutting and scraping effect for the more efficient removal of such expanded portions of the rotor.

Thus it will be seen that I have provided simple and efficient means for avoiding seizure in a rotary type blower due to extreme temperature increases during the operation thereof.

Although only one embodiment of the invention has been illustrated and described, various changes in the form and relative arrangement of the parts, which will now appear to those skilled in the art, may be made without departing from the scope of the invention. Reference is, therefore, to be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. A Root's type blower having a housing, mutually interengaging impeller rotors mounted within said housing, cutter affixed at the inner side surfaces of said housing and projecting inwardly into said housing for shaving adjacent side surfaces of said rotors upon expansion of the latter in such manner as to prevent seizure of said rotors between the inner side surfaces of said housing upon an increase in temperature.

2. A Root's type blower having a housing, said housing having an inlet and an outlet opening for a fluid medium, a pair of mutually interengaging impeller rotors, rotary shafts for rotatably mounting said impeller rotors within said housing, knife-like blade members positioned at opposite sides of each of said impeller rotors and projecting inwardly of the housing for engagement with the ends of the rotors, said knife-like blades extending substantially parallel to a plane extending through the centers of rotation of said shafts and positioned at that side of said plane nearest the inlet opening in said housing, whereby upon expansion of said rotors in response to a rise in temperature said impeller rotors on rotating will engage said blades at the longitudinal ends thereof and then move longitudinally and laterally in relation thereto so as to cause the removal of said expanded portion of said impeller rotors.

3. A device for reducing the hazard of seizure of moving parts, comprising, in combination, a plurality of moving parts, a housing for said moving parts, a circular plate mounted in the inner side surfaces of said housing, knife-like blades which, in one position of the device, extend vertically and project horizontally outwardly from said circular plates into the interior of said housing and positioned adjacent side surfaces of said moving parts, and said knife-like blades so arranged in relation to said moving parts that upon the expansion of said parts the side surfaces of said moving parts will engage said blades at the longitudinal ends thereof, and then move longitudinally and laterally in relation to said blades for removing expanded structurally integral portions of said moving parts.

4. In a rotary blower of the type including a housing having an end wall, and a rotor journaled in said housing and having an end surface adjacent a surface of said end wall, one of said adjacent surfaces having a hardness less than the hardness of the other of said adjacent surfaces, the other of said adjacent surfaces being provided with substantially sharp blade means affixed thereto and capable of rapidly abrading said one surface upon rotating contact relative thereto due to longitudinal thermal expansion of the rotor relative to the housing, whereby an optimum working clearance is maintained between said end wall of the housing and said adjacent end surface of the rotor.

5. The combination defined by claim 4 wherein the means for abrading the surface comprises a plurality of spaced apart knife-like blades for shaving the adjacent surface of said one end wall upon expansion of said rotor due to an increase in temperature.

6. In a rotary blower of the type including a housing having an end wall, and a rotor journaled in said housing and having an end surface adjacent a surface of said end wall, one of said adjacent surfaces being of a relatively soft material and arranged to present an abradable surface to said other adjacent surface, said other adjacent surface being provided with substantially

sharp cutter members capable of rapidly shaving said adjacent one surface upon rotating contact relative thereto, whereby an optimum working clearance is maintained between said end wall surface and said adjacent end surface of the rotor.

7. A rotary blower including a housing having an end wall, a rotor journaled in said housing and having an end surface adjacent a surface of said end wall, means to prevent seizure of said rotor by said end wall upon thermal expansion of the rotor, said means comprising one of said surfaces including cutter means affixed thereto and the other of said surfaces formed of a relatively readily abradable material such that, upon rotating contact of the cutter means of said one surface with said other surface, the other surface is rapidly worn away by engagement with said cutter means to provide working clearance.

ROBERT FLANAGAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
247,691	Roots	Sept. 27, 1881
799,642	Frasch	Sept. 19, 1905
800,127	Frasch	Sept. 19, 1905
1,030,083	Green	June 18, 1912
1,785,386	McIntyre	Dec. 16, 1930
2,087,527	Norton	July 20, 1937

FOREIGN PATENTS

Number	Country	Date
464,475	Great Britain	Apr. 16, 1937

Certificate of Correction

Patent No. 2,519,557 August 22, 1950

ROBERT FLANAGAN

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 4, line 4, after the word "cutter" insert *means*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of October, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.