Feb. 16, 1937. J. HAYDOCK, JR., ET AL 2,071,258

ROTARY BLOWER AND THE LIKE

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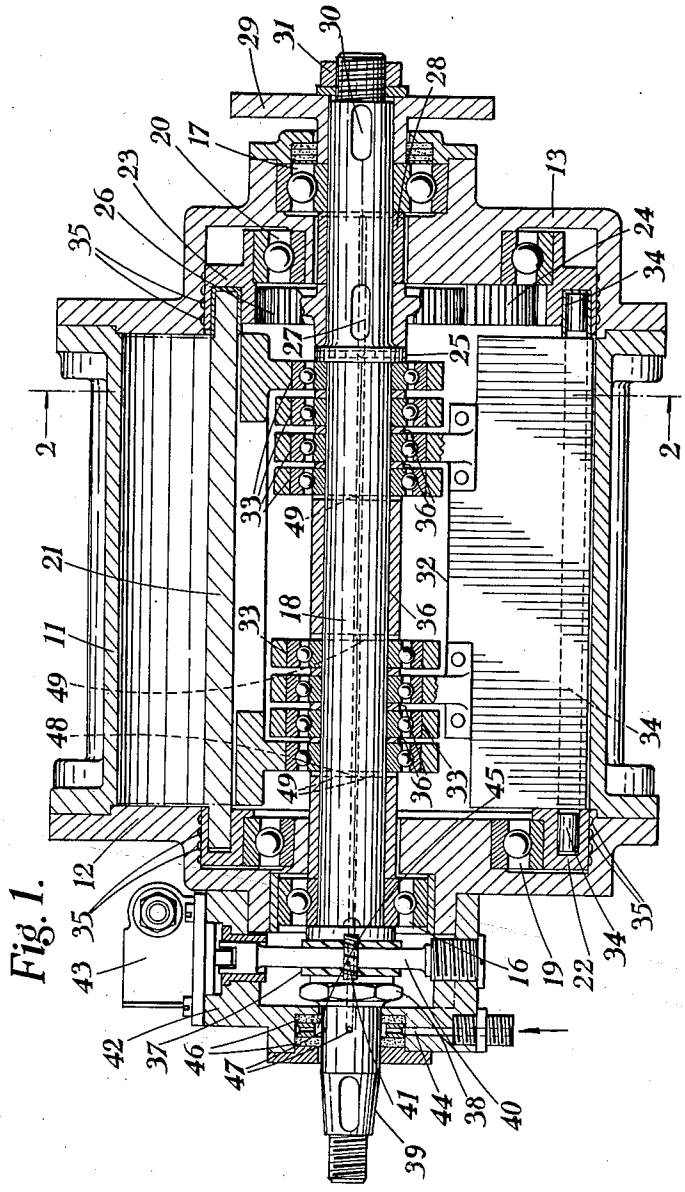


Fig. 1.

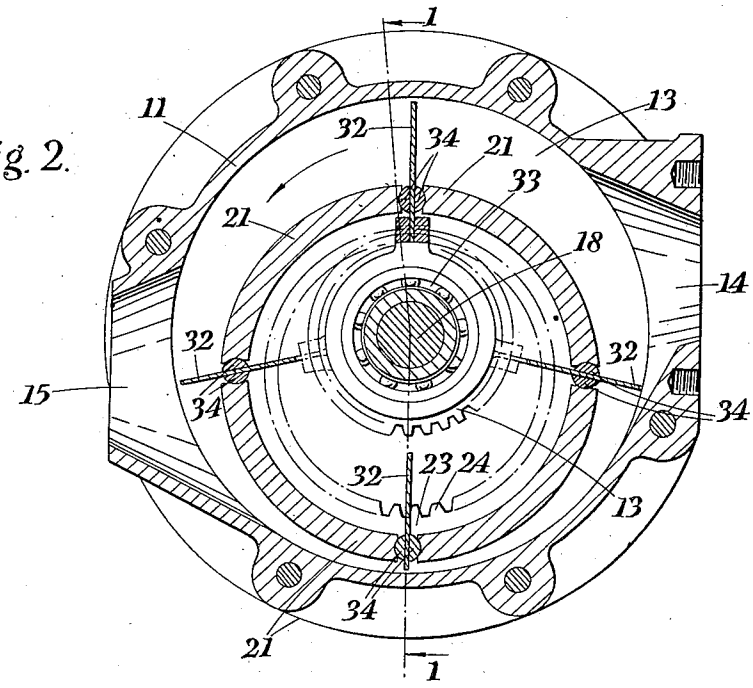
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Fig. 2.



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ROTARY BLOWER AND THE LIKE

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1 Claim. (Cl. 230—157)

This invention relates to rotary blowers, compressors, or vacuum pumps, and in particular to those of the kind in which a hollow rotor is rotatable within a substantially cylindrical casing to drive a plurality of blades rotatable upon a stub shaft extending concentrically of the casing within the rotor, said blades projecting through a corresponding number of slots, respectively, formed longitudinally of the curved wall of the rotor, and there being a small clearance between the outer edges of the blades and the inner surface of the casing.

The invention has for an object to provide an improved device of the kind referred to which inter alia shall have the advantage that a drive may be transmitted through the blower, e. g., to another auxiliary unit such as a magneto or from a starting handle to the crank shaft of an internal combustion engine with which the blower is associated as a "supercharger."

According to the invention an internally cylindrical casing has a longitudinally slotted rotor journalled eccentrically, and a drive shaft journalled concentrically, there at both ends thereof, a plurality of blades which project through the longitudinal slots of the rotor being rotatable upon said shaft, and at least one driving wheel fast on said shaft cooperating with the inner periphery of a corresponding annulus concentric with and carried by the rotor to impart rotation to the latter and thus to the blades.

Preferably, in order that the rotor may be driven positively, both such driving wheel and rotor annulus are formed with spur teeth.

Preferably also, a rotor annulus is formed integrally with one of two annular members which receive, in annular groves formed concentrically therein, opposite ends of a number of members of arcuate cross-section constituting the curved wall of the rotor, said annular members, and therefore the rotor, being supported by bearings mounted at the ends of the casing eccentrically of the latter, the blades on the drive shaft being equal in number to the arcuate rotor members and extending radially of the casing between adjacent arcuate members, respectively.

In the accompanying drawings a blower according to a preferred form of the invention is illustrated by Figure 1 in cross-sectional side elevation on the line 1—1 of Figure 2 and by Figure 2 in cross-sectional end elevation on the line 2—2 of Figure 1.

As shown, an internally cylindrical casing 11, 12, 13 is built up from a tubular member 11 having the usual diametrically opposite intake and exhaust ports 14 and 15 and two end caps 12 and 13. The end caps 12 and 13 are bored concentrically and carry bearings 16 and 17 in which is journalled a drive shaft 18 and also have mounted eccentrically thereon bearings 19 and 20 for a built up rotor 21, 22, 23 comprising four members 21 of arcuate cross-section and two annular end members 22 and 23 which are grooved concentrically to receive the ends of the arcuate members 21 and are supported by the bearings 19 and 20, respectively; the annular end members 23 being formed just inside the bearing 20 with a series of inwardly directed spur teeth 24 to constitute an annulus wheel. If desired, in a modification, the four arcuate members 21 may be formed integrally with the annular end member 22.

The drive shaft 18 is formed with a shoulder 25 and has passed over the adjacent end thereof a pinion 26 secured fast on the shaft by a key 27, then a distance piece 28, then the bearing 17, and finally a flanged member 29 secured fast by a key 30; these several parts 26, 28, 29 being positioned longitudinally of the shaft by a nut 31 between which and the shoulder 25 they are firmly clamped.

Each blade, of which there are four, is formed as an assembly, comprising the blade proper indicated at 32 and two co-axial spaced bearings 33, and, if desired, two counter-balance weights (not shown) carried by the bearings, respectively, at points diametrically opposite to the blade proper 32.

Adjacent edge surfaces of arcuate members 21 constituting the grooved wall of the rotor are concave and receive between them bearing members 34 of a light material (such as one of the non-metallic materials from which some toothed gear wheels are made) which offers a minimum of friction to sliding motion over the blade surfaces; each blade 32, as will be understood, extending radially of the casing 11, 12, 13 through a corresponding "slot" between two adjacent arcuate members 21. In the case in question, the bearing members of each of said slots are comprised by a cylindrical rod of such material, the ends of which extend as shown in Figure 1 into the concentric grooves of the annular end members 22, 23 of the rotor, 21, 22, 23, such rod being formed between said circular members 22, 23 with a diametral slot through which the corresponding blade 32 extends. Also in the case in question the annular end members 22, 23 are received within complementary recesses in the end caps 12 and 13 of the casing 11, 12,

13, the peripheral surfaces of the annular members 22 and 23 and the corresponding surfaces of the recesses fitting closely and either or both of these surfaces at each end of the device being formed as indicated at 35 with a series of grooves or ribs for retaining oil and thus providing good seals between the rotor ends and the casing.

In addition to the blade bearings 33, the shaft 18 has passed thereover a number of distance pieces 36, the bearing 16, and next a "skew" gear wheel 37; these parts 33, 36, 16 and 37 being clamped longitudinally in position on the shaft 18 by means of a nut 38 at the outer side of which the shaft 18 is of reduced diameter and tapered as at 39 for the reception of a driving member (not shown) such as a gear wheel or sprocket.

A driving spindle 40 for an oil pump extends across the shaft 18 and has fast thereon a skew gear wheel 41 complementary with the wheel 37 on the shaft 18, the corresponding end cap 12 of the casing carrying a housing 42 for this pump drive and the pump itself being mounted as shown at 43 externally of this housing 42 so as to be accessible, e. g., for adjustment.

The outlet from the pump 43 is connected via a pipe (not shown) to a bore 44 in the wall of the housing 42 which communicates in turn with a space 45 between two felt washers 46, 46 or equivalent which constitute an oil seal at the corresponding end of the shaft 18, which latter is bored transversely as indicated at 47 to give passage to oil from the pump 43 between said washers 46 through said transverse bores 47 into a longitudinal bore indicated at 48 by broken lines within the shaft 18, which longitudinal bore 48 communicates with further radial bores indicated at 49 for supplying lubricant to the interior of the device. To reduce weight, each blade at that part thereof which is always within the rotor may be cut away as shown or formed with one or more apertures.

It will be observed that in a rotary blower or the like according to the present invention the shaft (18) upon which the blades (32) are rotatable is supported at both ends, whether or not it is desired that the device shall be capable of having a drive transmitted therethrough, thus blades (32) of much greater axial length can be employed as compared with the longest blades which can be used in a device to which the blade carrying shaft (18) is supported at one end only. Moreover in view of the gearing (24, 25) or equivalent through which the rotor (21, 22, 23) is driven the latter rotates at a slower speed than does the drive shaft (18), which feature in turn leads to the effect that the rotary speed of the blades (32) in relation to the shaft (18) about which they rotate is much reduced; the shaft (18) actually rotating at a speed which is slightly greater than that at which the rotor (21, 22, 23) rotates in relation to the casing (11, 12, 13). A blower according to the invention may be readily driven directly from the crank shaft of, for example, a motor car engine without interfering with the convenient use of a starting handle, whilst provision for providing a separate oil pump for lubricating the blower may easily be made.

What we claim to be new is:—

A device of the class described including a casing having end caps, a shaft extending longitudinally and concentrically of the casing and having a shoulder, bearings carried by the end caps at opposite ends of the casing and journaling the shaft, annular end members carried by the casing within the end caps, one of said members having an annulus provided with spur teeth and said end members having concentric grooves, a rotor within the casing and comprising arcuate members constituting the wall thereof, said arcuate members having their opposite corresponding ends in the grooves of the annular end members, said rotor having slots defined between the adjacent edges of the arcuate members, blades carried on the shaft and extending through the slots of the rotor, a pinion carried by the shaft and engageable with said spur teeth, said shoulder on said shaft being between the pinion and one of said blades within the casing, said shaft being adapted to impart rotation to the annulus through said pinion whereby the rotor will be rotated, said pinion being fixed to the shaft and limited against endwise movement by said shoulder and blade.

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