

Sept. 19, 1933.

H. C. EDWARDS

1,927,563

SUPERCHARGER

Filed Nov. 2, 1927

2 Sheets-Sheet 1

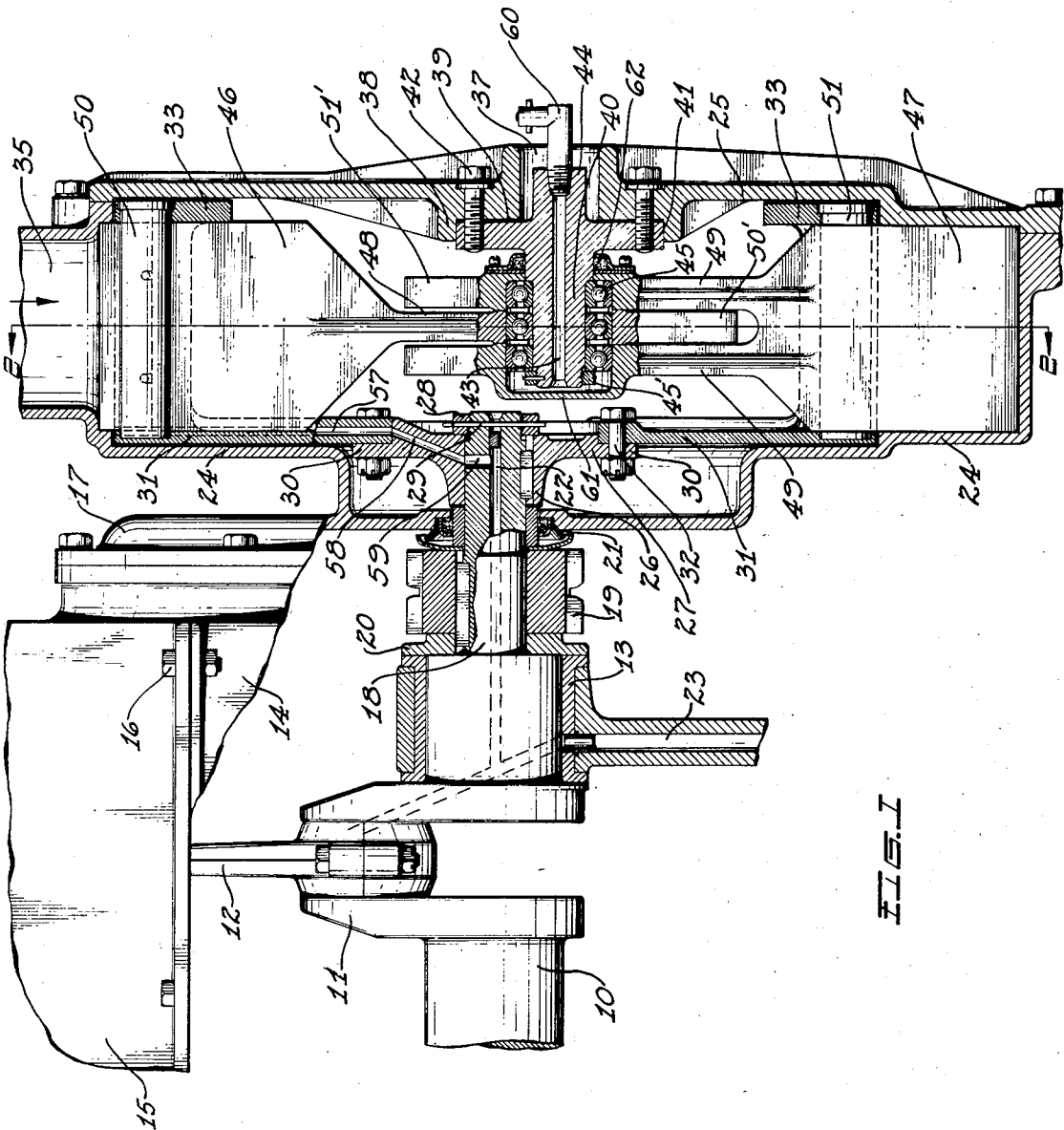


FIG. 1

Inventor

HERBERT C. EDWARDS.

By *William L. Edwards*

Attorney

Sept. 19, 1933.

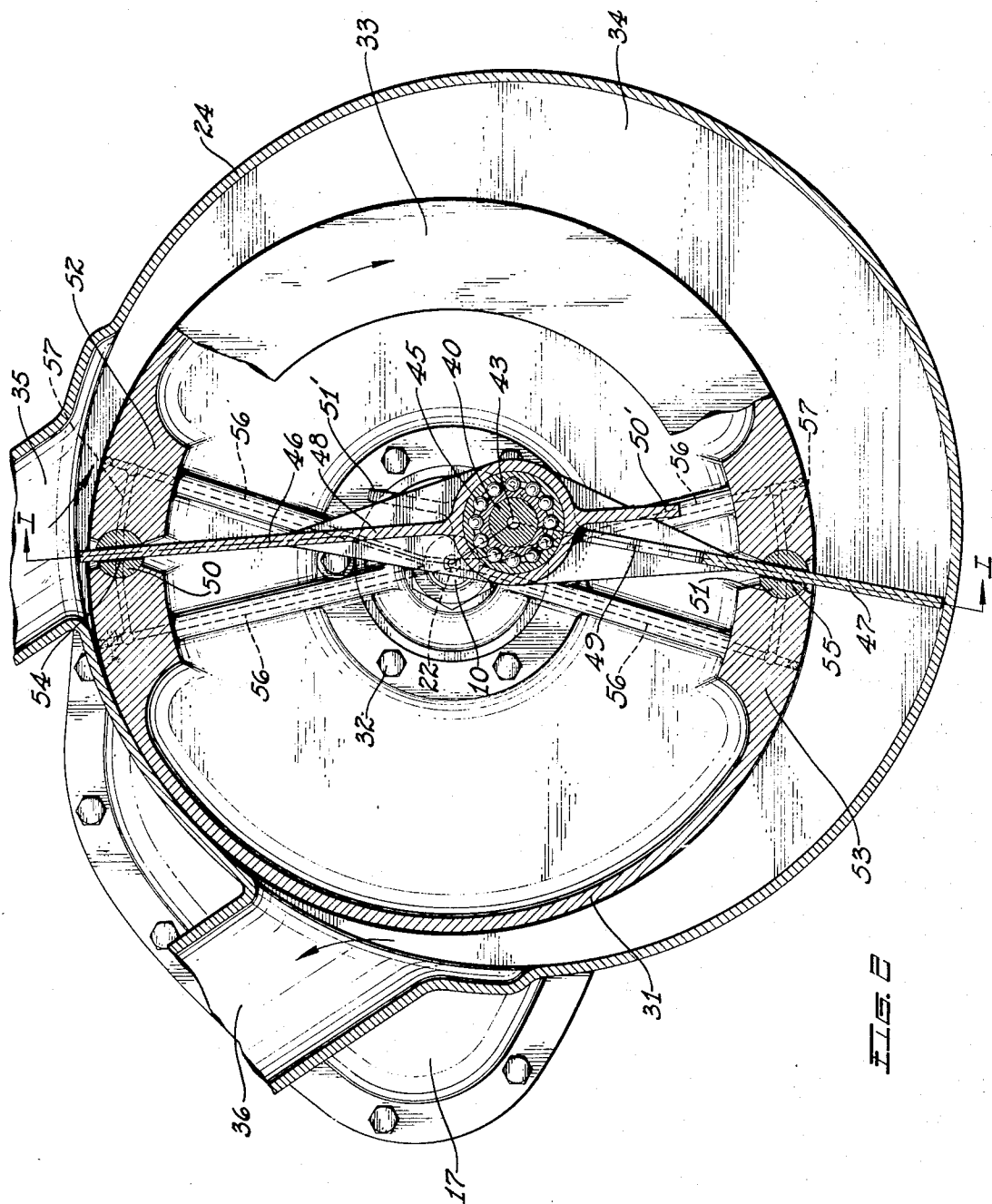
H. C. EDWARDS

1,927,563

SUPERCHARGER

Filed Nov. 2, 1927

2 Sheets-Sheet 2



Inventor

HERBERT C. EDWARDS.

By *William S. Little*

Attorney

## UNITED STATES PATENT OFFICE

1,927,563

## SUPERCHARGER

Herbert C. Edwards, Detroit, Mich., assignor to  
Packard Motor Car Company, Detroit, Mich.,  
a corporation of Michigan

Application November 2, 1927. Serial No. 230,412

2 Claims. (Cl. 230—157)

This invention relates to internal combustion engines and more particularly to air pumps or compressors adapted to supply air under pressure to the engine carburetor.

Usually in the operation of internal combustion engines, the air entering the engine carburetor is at atmospheric pressure. It has been determined, however, that if air is supplied to the carburetor under pressure, that is to say, at a pressure greater than atmospheric, other things being equal, the power characteristics of the engine will be improved, higher engine speed will be obtainable and the general efficiency of the engine will be increased. This results primarily from the greater volumetric efficiency made possible by the increased air pressure and also by the higher compressive pressure within the engine cylinder. Having in mind these improvements in the power characteristics, speed and general efficiency of internal combustion engines resulting from the supplying of air to the engine carburetor under pressure, the air pump or compressor of the present invention has been devised.

It is an object of this invention to improve the general efficiency, power characteristics and speed of internal combustion engines.

Another object is to provide a simple and effective means for supplying air under pressure to the carburetor of an internal combustion engine.

A further object is to provide a simple, durable, compact and efficient pump or compressor for supplying air under pressure to the carburetor of an internal combustion engine.

Other objects of this invention will appear from the following description taken in connection with the drawings forming a part of this application, and in which:

Fig. 1 is a sectional view on line 1—1 of Fig. 2, showing the pump or compressor of this invention and its mode of attachment to the engine crankshaft, and

Fig. 2 is a sectional view of the pump or compressor on line 2—2 of Fig. 1.

Referring to the drawings, 10 represents the crankshaft of an internal combustion engine having a crank arm 11 to which the lower end of a connecting rod 12 is secured. The crankshaft is supported in suitable bearings, one of which is shown at 13, in the upper portion of the crankcase 14. The engine cylinder block 15 is seated on and bolted to crankcase 14 by suitable bolts 16, and a cover 17 closes the forward open end of the crankcase. Forwardly of bearing 13,

crankshaft 10 is provided with an extension 18 of reduced diameter, and to this extension is keyed a timing gear 19 and a spacer 20. Interposed between timing gear 19 and crankcase cover 17 is a suitable stuffing box 21 adapted to prevent the leakage of lubricant from the crankcase around the crankshaft end. The crankshaft 10 and the crankshaft bearing supports are drilled as at 22 and 23 to provide conduits for supplying lubricant to the engine bearings.

Associated with crankcase cover 17 and preferably formed integrally therewith is a cylindrical casing 24 having one end open which is adapted to be closed by a cover 25. As may be seen in Fig. 1 of the drawings, the reduced end 18 of crankshaft 10 projects through crankcase cover 17 into the casing 24. A hub 26, having an integral annular flange 27, is keyed to the reduced end 18 of the crankshaft and is secured thereon against unintentional removal by means of a nut 28 screwed on the threaded end of the shaft 10 and pinned thereto in any suitable manner as by pin 29. Hub flange 27 is provided with shouldered periphery 30 to which is secured in any suitable manner, as by bolts 32, one side of a cylindrical casing 31. Casing 31 is smaller than and is arranged within casing 24 and is adapted to rotate with crankshaft 10. Casing 31 is open on the side opposite to the side attached to hub 26 except for a radial annular flange 33 integral with the circumferential portion of the casing.

Cylindrical casings 24 and 31 are eccentrically arranged and have a point of tangency, as may be seen from Fig. 2 or, otherwise stated, the axis of cylindrical casing 24, does not coincide with the center-line of crankshaft 10 which is the axis of cylindrical casing 31 and the degree of eccentricity is such that the exterior circumferential surface of casing 31 touches or substantially touches the interior circumferential surface of casing 24. The space between the circumferential surfaces of casings 24 and 31 provides a working chamber 34, having an inlet and an outlet provided by circular ducts 35 and 36, preferably formed integrally with the casing 24 on its circumferential surface. Inlet 35 is preferably screened to prevent the passage of dirt or dust into the pump, and outlet 36 is connected to the air inlet of the carburetor.

Cover 25 of casing 24 is provided with a central aperture 37 and on the inner side of the cover concentric with the aperture 37, is an annular shoulder 38 defining in the cover 25 a circular depression 39. A pivot member 40 having a radial

annular flange 41 adapted to fit in the depression 39 is secured to cover 25 in any suitable manner as by bolts 42 passing through the cover and engaging flange 41. Thus mounted, pivot member 40 is eccentrically arranged with respect to the axis of crankshaft 10, that is to say, the axis of pivot member 40 does not coincide with the axis of the crankshaft but lies to one side thereof. Pivot member 40 is axially bored at 43 and has an extension 44 projecting into the aperture 37 for lubricating purposes as will presently appear. Rotatably mounted on pivot member 40 upon suitable bearings 45 retained against axial displacement by any suitable means as nut 45' are vanes 46 and 47, one of the vanes 46 having a single arm 48 engaging pivot member 40, and the other of the vanes 47 having two spaced parallel arms 49 engaging pivot member 40. Each of the arms 48 and 49 is suitably strengthened by reinforcing webs and is provided with suitable weighted extensions 50' and 51' to balance the weight of the vanes 46 and 47. When mounted in position on pivot member 40, arm 48 is interposed between the arms 49, as clearly shown in Fig. 1.

Vanes 46 and 47 are adapted to be rotated by casing 31 about pivot member 40 within casing 24 and for this purpose casing 31 has mounted therein preferably at diametrically opposed points adjacent its periphery, pins 50 and 51. The circumferential portion of casing 31 is suitably thickened adjacent the pins 50 and 51, as at 52 and 53 to provide ample strength. Pins 50 and 51 are each provided with diametral slots shown at 54 and 55 through which vanes 46 and 47 are adapted to slide upon rotation of casing 31 within casing 24, the sliding of the vanes in the slots of the pins being due to the relative eccentricity of the mountings of the vanes and casing 31. Pins 50 and 51 require no positive means for retaining them in position in casing 31 other than the grip of the casing on the pins, this being due to the snugness with which casing 31 fits within casing 24, thus effectually preventing any substantial axial movement of the pins.

In the operation of the device, the engine will be running and the rotation of the crank shaft will rotate cylindrical casing 31 and the vanes 46 and 47. As one of the vanes 46, for example, sweeps past working chamber inlet 35, a partial vacuum or area of low pressure is produced and air will rush in to the working chamber 34 on the receding side of vane 46. Air will continue to enter the working chamber until, by virtue of the rotation of the vanes, vane 47 passes inlet 35. Air drawn into the working chamber on the receding side of vane 46 will then be moved around working chamber 34 until vane 46 reaches working chamber outlet 36, when the air will be forced out of the outlet by vane 47 upon further rotation of the vanes. This cycle is repeated upon each revolution of the vanes in the working chamber 34. Air enters the pump at atmospheric pressure and is delivered to the engine carburetor under pressure, the pressure and volume of de-

livered air depending, of course, on the speed of the engine. If desired the rotatable casing 31 may be geared to the crankshaft to obtain a speed therefor greater or less than the crankshaft speed, since it is evident that casing 31 need not necessarily be mounted directly on the crankshaft.

Lubrication of pins 50 and 51 and the surfaces of the vanes sliding therethrough is provided for by oil ducts 56 and 57 in the side wall and cylindrical portion respectively of casing 31, these ducts being connected through ducts 58 in hub 26, aperture 59 and bore 22 in the crankshaft 10 with the oil pressure system of the engine.

A lubricating connection 60 attached to pivot extension 44 connects with bore 43, through which lubricant is forced to vanes bearing 45. Arm 49 of vane 47 is provided with an enlargement 61 which completely encloses the end of the pivot member 40 to prevent the leakage or escape of lubricant from bearings 45. A stuffing box 62 attached to arm 49 of vane 47 and surrounding pivot member 40 is adapted to prevent leakage of lubricant in this direction from bearing 45.

The simplicity and compactness of the air pump or compressor will be evident. The pump has but relatively few moving parts, all of which are adequately lubricated, and compared with the volume of air delivered to the engine carburetor and the pressure at which it is delivered, the pump occupies but relatively small space. The integral construction of crankcase cover 17 and fixed casing 24 adds materially to the compactness and simplicity of the pump. The pump is durable and efficient and adequately performs its function of delivering air under pressure to the engine carburetor in an effective manner.

The embodiment of this invention described and illustrated is to be considered merely as a preferred one, and it will be understood that the invention is to be limited only by the scope of the appended claims.

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

1. In an air pump, a casing, a working chamber in the casing, a pivot member mounted on said casing, a lubricating conduit extending through said pivot member, vanes mounted on said pivot member and movable in said working chamber, one of said vanes having a portion thereof adapted to enclose an end of said pivot member to prevent the escape of lubricant from the pivot member into the working chamber.

2. In a pump structure, a casing, a pivot member mounted at one end on said casing and free at the other end, bearings surrounding said pivot member, means including a passage-way through the free end of said pivot member for lubricating said bearings, and vanes rotatable in said casing on said bearings, said vanes including means to lead the lubricant from the free end of the shaft to the bearings and for sealing said lubricant in said bearings.

HERBERT C. EDWARDS.