Feb. 7, 1933. A. M. NIVEN 1,896,095

INTERNAL COMBUSTION ENGINE

Filed May 30, 1930 2 Sheets-Sheet 1

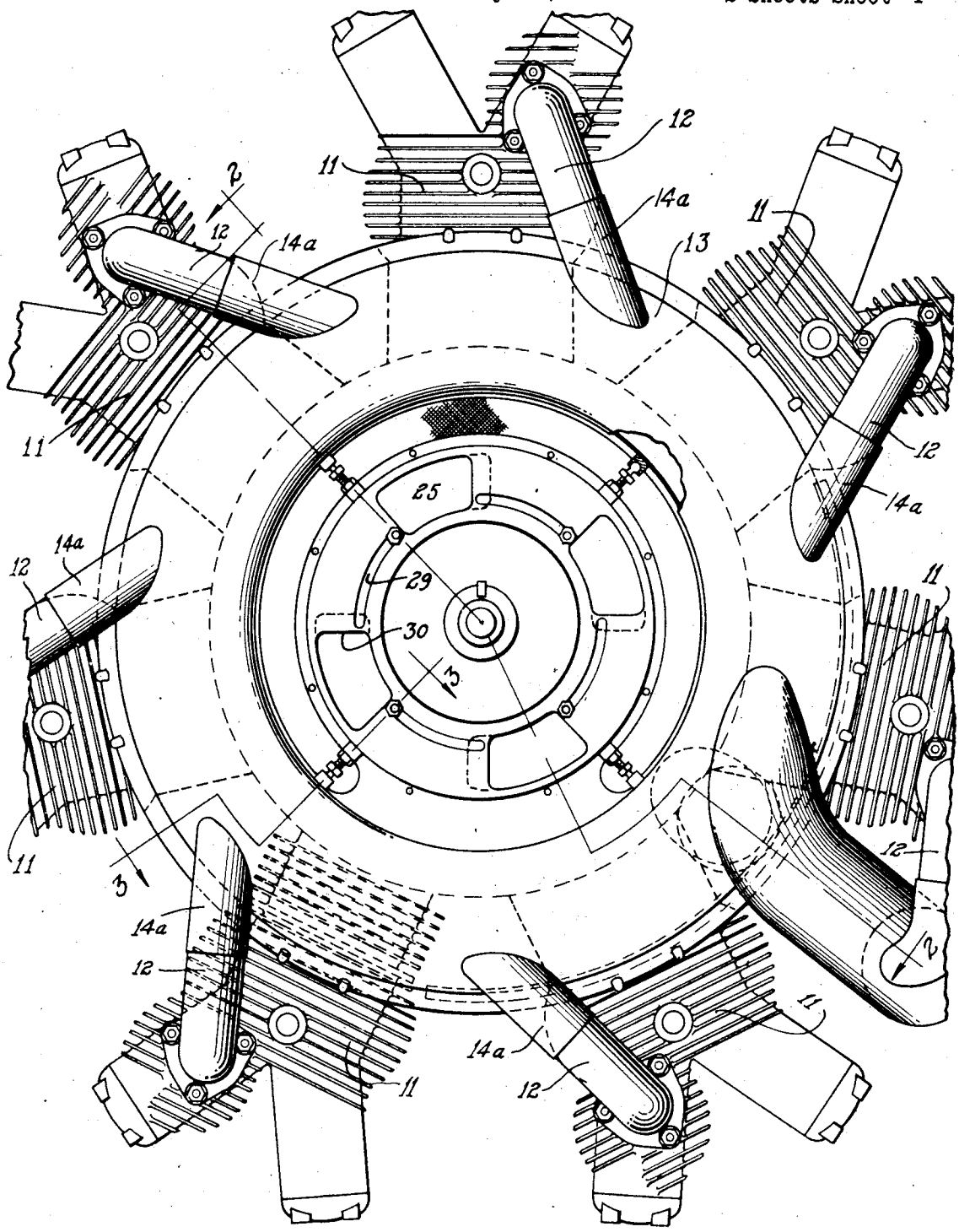


Fig. 1.

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Fig. 2.

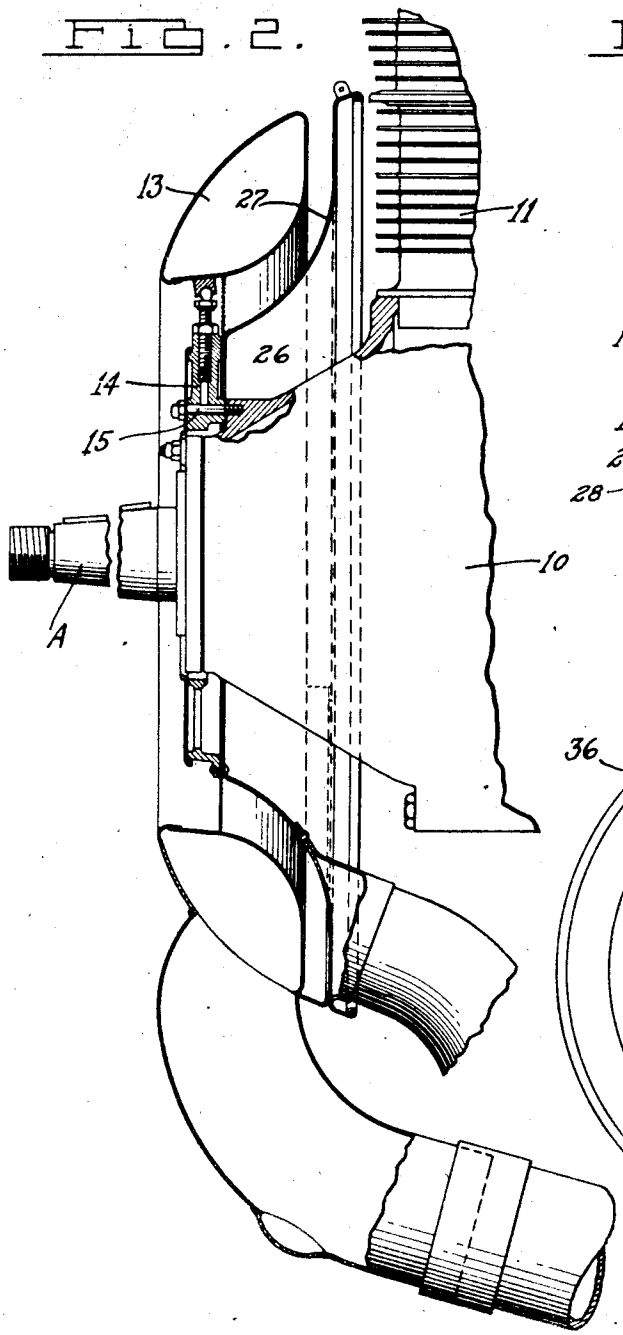
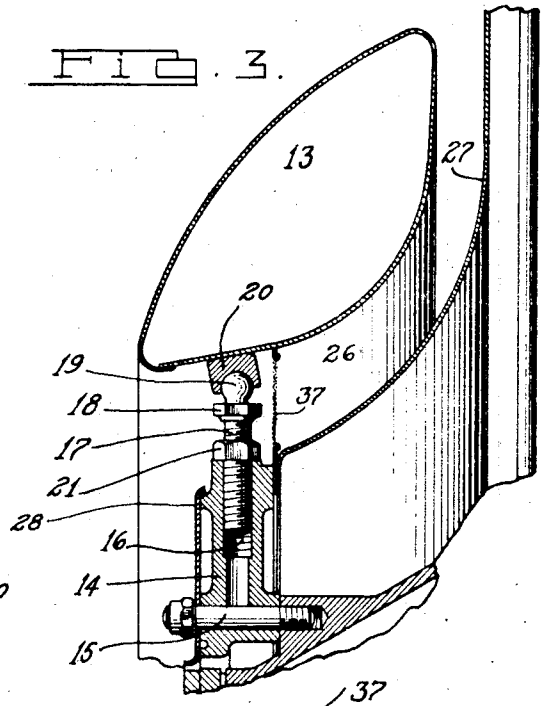


Fig. 3.



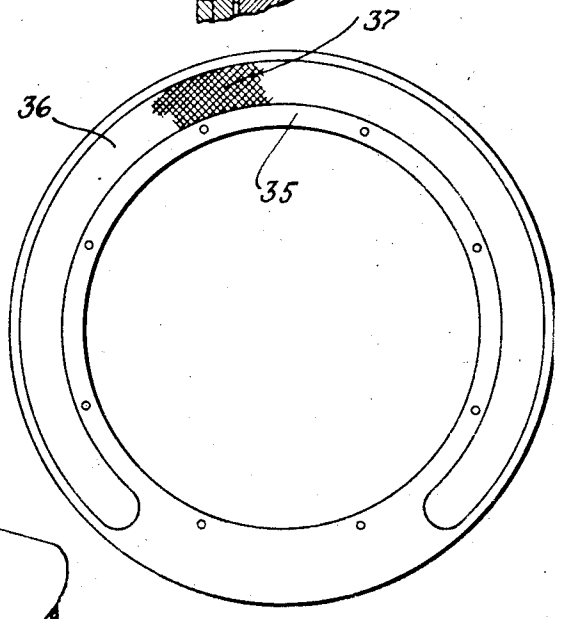


Fig. 4.

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UNITED STATES PATENT OFFICE

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INTERNAL COMBUSTION ENGINE

Application filed May 30, 1930. Serial No. 457,628.

My invention relates to internal combustion engines and is related more particularly to the exhaust gas collecting ring and the supporting means therefor.

It has been customary to rigidly secure the exhaust gas collecting ring to the crankcase structure of an internal combustion engine of the radial type by means of bolts or other suitable fastening devices which bolt the inwardly extending flanges or ears, usually carried by the exhaust ring, to the crankcase. Difficulty has been experienced however, in maintaining these ears or flanges in the proper location or position so that the holes therein through which the boltes are passed will register with the tapped holes in the crankcase in which the bolts are secured. It is found that these ears or flanges become distorted while being welded to the exhaust gas collecting ring, and quite often the holes in the ears do not register with the holes in the crankcase, and for this reason it is found to be somewhat difficult at times to readily assemble the exhaust gas collecting ring to the engine crankcase.

It is the object of my invention to facilitate the manufacture of an internal combustion engine of the radial type having an exhaust gas collecting ring, by providing an improved supporting means for securing the collecting ring to the crankcase structure.

Another object of my invention is to facilitate the assembly of an exhaust gas collecting ring with the crankcase structure of an internal combustion engine of the radial type by providing supporting means for the collecting ring which supports said ring from the crankcase in floating relation therewith, and which eliminates the necessity of providing recesses or holes that must accurately register to permit bolts or other fastening devices to pass therethrough.

A further object of my invention is to increase the efficiency of an internal combustion engine of a radial type by providing means for controlling the flow of air utilized for cooling purposes past the engine structure, thereby more efficiently and positively concentrating the cooling medium at points where it is most needed.

Further objects and features of my invention relate to various structural details and mechanism that will be described in more detail hereinafter, and a more detailed understanding of my invention may be had by reference to the accompanying drawings which illustrate one form which my invention may assume, and in which:

Fig. 1 is an elevational view of the front of an air cooled internal combustion engine of the radial type showing the exhaust gas collecting ring assembled therewith,

Fig. 2 is a sectional view thereof taken substantially on the line 2—2 of Fig. 1,

Fig. 3 is an enlarged detailed sectional view through the supporting means which support the exhaust gas collecting ring, and taken on the line 3—3 of Fig. 1, and

Fig. 4 is a detailed elevational view of the screen element secured to the crankcase structure to the rear of the collecting ring supporting means.

The internal combustion engine illustrated in the accompanying drawings comprises the usual crankcase structure 10 to which a plurality of cylinders 11 are secured and disposed radially about the crankcase, each cylinder provided with an exhaust manifold 12 of substantially standard construction. An exhaust gas collecting ring is assembled with engines of this character, this ring being usually located to the front of the engine and supported by suitable means from the engine crankcase. I have provided an exhaust gas collecting ring 13 to which I secure a plurality of elbows 14ª arranged to be suitably connected with the manifold sections 12 secured to the various cylinders. This collecting ring is arranged to be supported from the crankcase but in full floating relation therewith. A supporting ring 14 is secured to the front end of the engine crankcase by means of bolts or other suitable fastening devices 15. A plurality of internally threaded recesses 16 are provided about the perimeter of the supporting ring and extended radially inwardly of the supporting ring. I preferably have provided at least 4 of such recesses, these recesses being arranged to adjustably receive a collecting

ring supporting or clamping means. The collecting ring supporting or clamping means comprises a bolt 17 having the usual hexagonal head 18 and a ball portion 19 at one end which is swiveled within a clamping pad 20 (see Fig. 3). The shank of the bolt 17 is provided with external threads and is arranged to be adjustably threaded into the internally threaded recess 16, any suitable form of locking nut 21 being employed to lock the bolt with respect to the supporting ring 14. To assemble the exhaust gas collecting ring with the engine, the same is assembled over the front end of the crankcase and to the elbows 14ª secured to said manifold sections 12 carried by the cylinder. When the exhaust ring has been thus located the bolts 17 may be adjusted with respect to the supporting ring by relatively turning the threaded bolt in the internally threaded recess until the swivelly supported pad 20 engages the inner annular surface of the collecting ring. All of the supporting means which are disposed in spaced relation about the supporting ring are adjusted so that the swivelly supported pads carried thereby are all clamped tightly against the inner face of the collecting ring. The lock nut 21 is then screwed down and the adjusting screw is thus fixed in position and the connecting ring is rigidly supported from the crankcase structure, but in full floating relation therewith. Preferably, the collecting ring 13 is positioned substantially concentric with respect to the axis of the crankshaft A of the engine. However, where the propeller shaft is driven from the crankshaft through a suitable gear reduction means, the collecting ring is preferably arranged concentrically about said propeller shaft.

The supporting ring 14 is constructed with a larger diameter than the crankcase front end and is provided with a plurality of openings 25 disposed in spaced relation around the supporting ring to permit air to flow through the supporting ring into a passage 26 formed by the flared cowling 27 which is arranged to be rigidly secured to the crankcase, this cowling being provided with suitable openings that register with the openings 25 in the supporting ring. A shutter structure 28 is adjustably supported by the supporting ring by means of the bolts 15 which secure said supporting rings to the crankcase structure. These bolts preferably are extended through the annular slots 29 carried by the shutter 28 and thus it is possible to adjustably position the shutter with respect to the supporting ring, this shutter provided with openings 25 to allow a full flow of air therethrough, or they may be rotated as to close the openings 25 and to prevent the flow of air through the openings and into the passage 26 to the rear of the supporting ring and adjacent to the crankcase structure.

A ring 35 is preferably secured to the rear of the supporting ring, the same being clamped between the supporting ring and the flared cowling 27 in a manner as shown in Fig. 3. This ring 35 is provided with an annular horseshoe slot or opening 36 that extends almost around the ring, and which is covered by a screen 37 which is preferably of a fine mesh and so arranged as to remove heavy particles from the air screen which are thrown against the engine.

Although I have illustrated but one form of my invention and have described in detail but a single application thereof, it will be apparent to those skilled in the art to which my invention pertains, that various modifications and changes may be made therein without departing from the spirit of my invention or from the scope of the appended claims.

What I claim as my invention is:

1. In an internal combustion engine of the radial type having a crankcase structure and a propeller shaft projecting beyond the crankcase front end, an exhaust ring, and a plurality of means adjustably carried by the crankcase structure and provided with a swivelly supported pad, said means adapted for adjustment radially outwardly to clamp the swivelly supported pad against the inner surface portion of said exhaust ring to support the same in suspended relation with said crankcase structure.

2. In an internal combustion engine of the radial type having a crankcase and a propeller shaft projecting beyond the crankcase front end, a supporting ring fixed to the crankcase, an exhaust ring concentrically positioned about the supporting ring and secured thereto, an air duct open adjacent the crankcase front end and extending to the rear of said supporting ring for confining the air flowing therethrough to a predetermined path, said air duct open at the front, and adjustable means for regulating the size of the front open end of the air duct.

3. In an internal combustion engine of the radial type having a crankcase and a propeller shaft projecting beyond the crankcase front end, a supporting ring fixed to the crankcase and provided with one or more annular openings, an exhaust ring secured to said supporting ring, an air duct in communication with said opening or openings in said supporting ring and extending to the rear of said supporting ring, and adjustable valve means for said opening or openings.

4. In an internal combustion engine of the radial type having a crankcase and a propeller shaft projecting beyond the crankcase front end, a supporting ring fixed to the crankcase and provided with one or more annular openings, an exhaust ring secured to said supporting ring, said crankcase having a member cooperating therewith to provide an air duct surrounding the crankcase and

communicating with said opening or openings in said supporting ring, said air duct extending to the rear of said supporting ring, and an adjustable shutter responsive to manual operation for the opening or openings in said supporting ring.

5. In an internal combustion engine of the radial type having a crankcase and a propeller shaft projecting beyond the crankcase front end, a supporting ring fixed to the crankcase, an exhaust ring secured to said supporting ring and radially spaced therefrom, and a screen member secured intermediate said supporting ring and exhaust ring.

6. In an internal combustion engine of the radial type having a crankcase and a propeller shaft projecting beyond the crankcase front end, a supporting ring fixed to the crankcase and provided with one or more annular openings, an exhaust ring secured to said supporting ring, said crankcase having a member cooperating therewith to provide an air duct surrounding the crankcase and communicating with said opening or openings in said supporting ring, said air duct extending to the rear of said supporting ring, means for supporting said exhaust ring in substantially concentric floating relation with respect to said crankcase structure, said exhaust ring radially spaced from the supporting ring, and an annular screen element secured to said crankcase structure and located intermediate the exhaust ring and supporting ring.

7. In an internal combustion engine of the radial cylinder type having a crankcase and a propeller shaft projecting beyond the crankcase front end, an exhaust ring located substantially concentric with the propeller shaft and constructed to encircle the crankcase in spaced relation therewith to provide an air duct extending to the rear of said exhaust ring and lying intermediate said ring and crankcase, and means regulating the flow of air through said air duct.

8. In an internal combustion engine of the radial cylinder type having a crankcase and a propeller shaft projecting beyond the crankcase front end, an exhaust ring located substantially concentric with the propeller shaft and constructed to encircle the crankcase in spaced relation therewith to provide an air duct extending to the rear of said exhaust ring and lying intermediate said ring and crankcase, means associated with said air duct for dividing same into a pair of ducts constructed to deliver air to various parts of the cylinders, and means regulating the flow of air through one of said air ducts.

9. In an internal combustion engine of the radial cylinder type having a crankcase and a propeller shaft projecting beyond the crankcase front end, an exhaust ring located substantially concentric with the propeller shaft and constructed to encircle the crankcase in spaced relation therewith to provide an air duct extending to the rear of said exhaust ring and lying intermediate said ring and crankcase, means associated with said air duct for dividing same into a pair of ducts, one of said ducts arranged to deliver air adjacent the outer extremity of the cylinder and the other arranged to deliver air adjacent the base of the cylinder, and means regulating the flow of air through said last mentioned air duct.

In testimony whereof I affix my signature.

ARCHIE M. NIVEN.