

May 29, 1928.

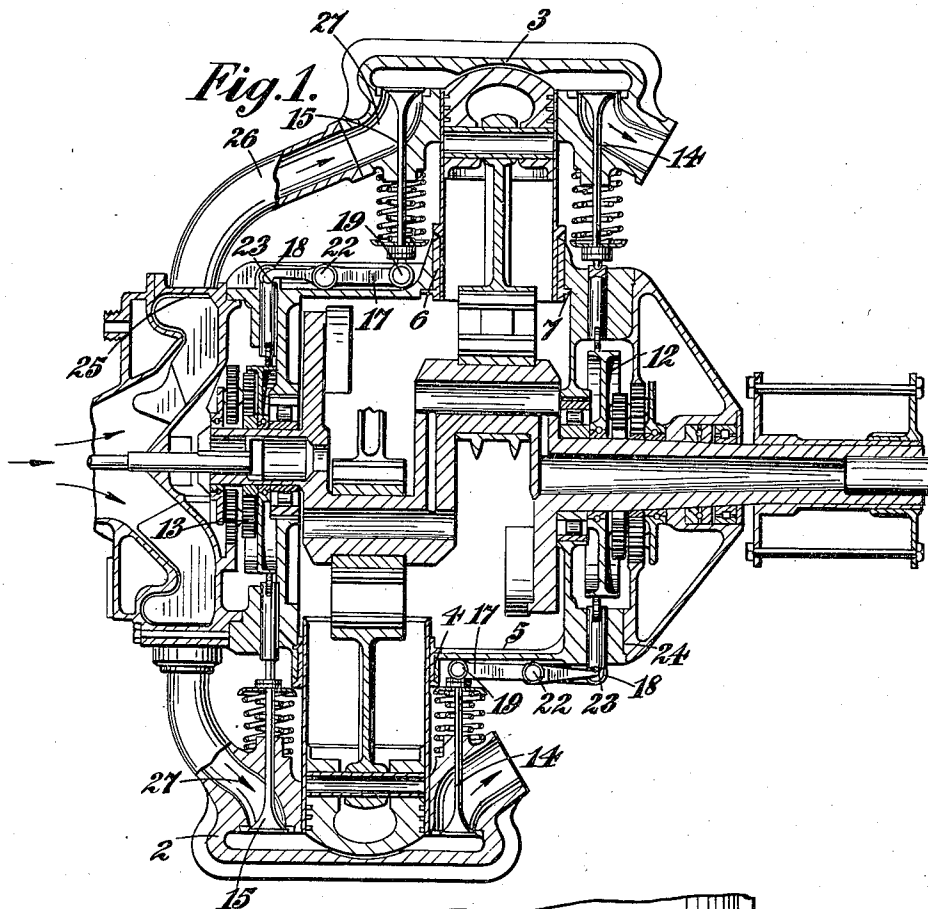
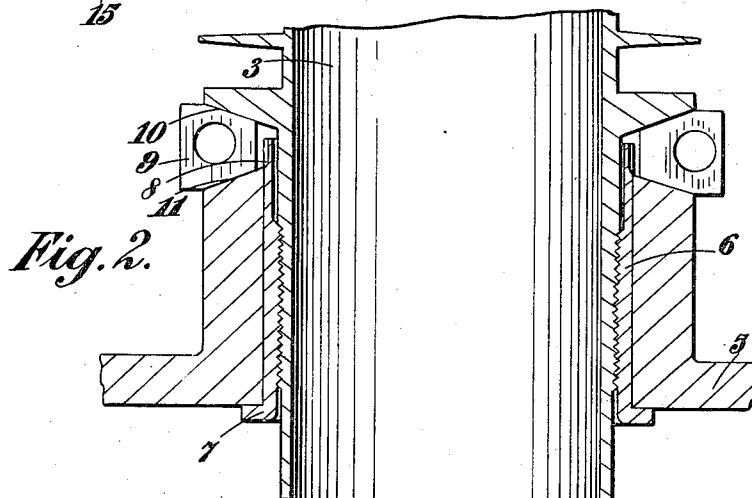
1,671,400

J. C. BRIGGS

INTERNAL COMBUSTION ENGINE

Filed Aug. 24, 1927

2 Sheets-Sheet 1



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May 29, 1928.

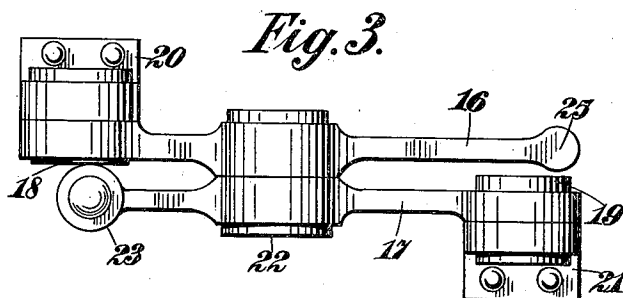
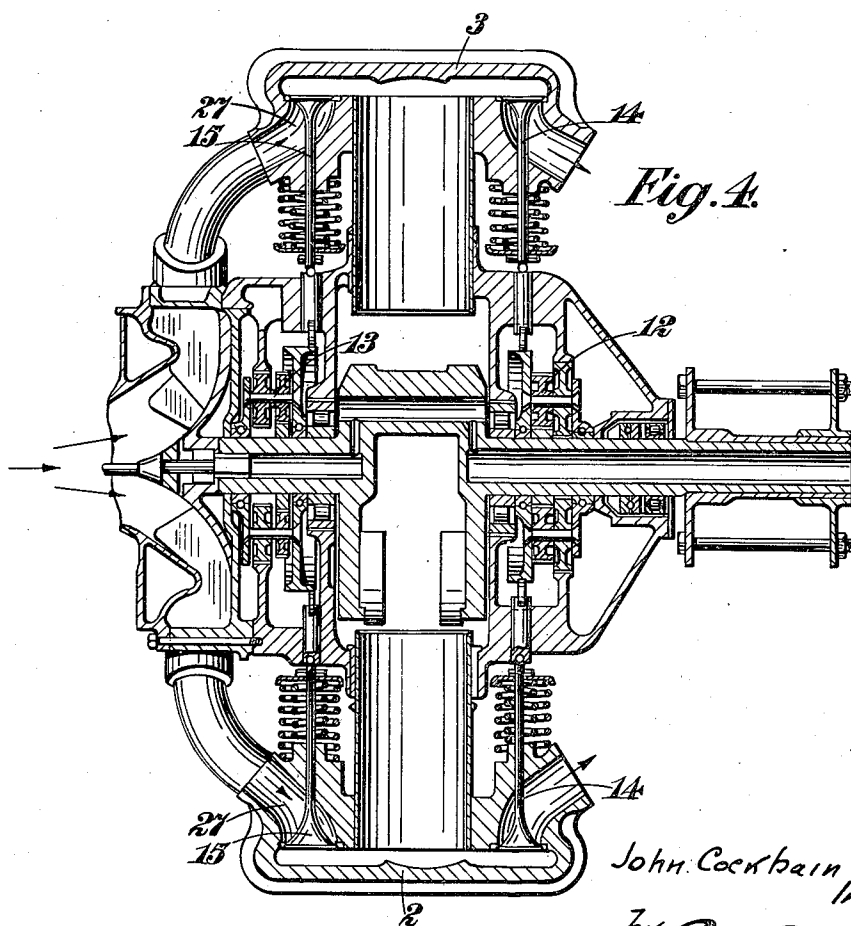
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J. C. BRIGGS

INTERNAL COMBUSTION ENGINE

Filed Aug. 24, 1927

2 Sheets-Sheet 2



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Patented May 29, 1928.

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UNITED STATES PATENT OFFICE.

JOHN COCKBAIN BRIGGS, OF COVENTRY, ENGLAND.

INTERNAL-COMBUSTION ENGINE.

Application filed August 24, 1927, Serial No. 215,075, and in Great Britain July 23, 1926.

This invention relates to internal combustion engines, of the kind having radially arranged cylinders, such as are frequently employed on air craft, and its principal object is to provide an engine of this kind of small diametral size with ample space for efficient piping, and, if necessary, a blower.

In the accompanying drawings,

Figure 1 is an axial section showing the application of the invention to an engine having two rows of cylinders,

Figure 2 is a fragmentary axial section to a larger scale, showing the attachment means for the cylinders,

Figure 3 shows a part of the valve actuating means, and

Figure 4 is an axial section showing the application of the invention to an engine having a single row of cylinders.

In the method of carrying out the invention illustrated by Figures 1-3, two rows of T-headed cylinders are spaced longitudinally of the engine, the cylinders 2 of one row being in staggered relationship to those of the other row shown at 3.

The cylinders may be connected to the crankcase 5 by employing a sleeve 6 screw-threaded on the cylinder and having a shouldered engagement 7 with the inside of the crankcase or the like and a part 8 adapted to be engaged by a spanner projecting outside the crankcase sufficiently to be engaged for screwing up, the final fixing of the cylinders being effected by an external diametrically split collar 9 or the like wedging between a shoulder 10 on the cylinder and an outer face 11 on the crankcase, with means for drawing together the two parts of the collar. This arrangement avoids the waste of space lengthwise of the engine which would arise through necessary rotational clearance for the T-heads if the cylinders were screwed directly into the crankcase, and also the sleeve is readily accessible for adjustment on the cylinder.

At each end of the engine, valve operating gearing 12 and 13 is provided, of which that at 12 is adapted to operate the exhaust valves 14 of both rows of cylinders, whilst the other 13 is adapted to operate the inlet valves 15 thereof. This is effected by providing that the front gearing 12 directly acts upon the row of valves on the front side of the front row of cylinders 2 and indirectly (for example by means of bellcrank levers and horizontal push rods) the similar valves at

the front of the rear row of cylinders 3. In the construction shown, the indirect connection comprises two levers 16 and 17 (Figure 3) arranged side by side, both levers being pivoted respectively at 18 and 19 to brackets 20 and 21 fixed to the crankcase. The pivotal attachment of each lever is adjacent the free end of the other lever, and the two levers are connected to one another by an intermediate pin 22 which may be fast in one lever and have the necessary freedom in the other to provide for the oppositely curved paths followed by the connected parts.

The free end 23 of the lever 17 is in engagement with a cam tappet 24, whilst the free end 25 of the lever 16 is in engagement with the stem of the valve 14, and thus the tappet and the valve move together in the same direction.

A corresponding arrangement is adopted with the valve operating gear 13 at the rear end of the engine. This directly operates the rear valves 15 of the rear row of cylinders 2, and indirectly, and preferably as just described, the rear valves 15 on the front row of cylinders 3.

The valves 15 at the rear of each row of cylinders are preferably those for inlet of the charge, and the fan induction chamber 25 is at the rear of the rear valve-operating gear 13. Relatively short and symmetrically arranged branch pipes 26, therefore, connect the fan chamber to the ports 27 of the inlet valves. The fan chamber can be replaced by a centrally arranged mixture passage from which the branches extend as directly as possible to the cylinders. In each case the branches for a particular row of cylinders are substantially of like dimensions so that carburation troubles such as arise from unequal lengths of branches are avoided.

Where the invention is intended to be applied to an engine having only a single row of cylinders as shown in Figure 4, the two valve-operating mechanisms 12 and 13 are arranged as in Figure 1 at the respective ends of the engine, but in this case they are respectively adapted to operate directly on the inlet and exhaust valves without the necessity for the indirect connections previously described. It will be seen, however, that all the advantages obtained in the double row construction due to the use of the T-headed cylinders, the valve mechanism at each end of the cylinder and the arrange-

ment of the mixture supply system are present in the single row construction also.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. In an internal combustion engine, the combination of a rotating crankshaft a crank pin thereon, radially arranged stationary cylinders spaced around said crankshaft, T-heads on said cylinders, valve pockets in each cylinder on opposite sides thereof, inlet valves and inlet ports for each cylinder located in said pockets at one end of said engine, exhaust valves located in pockets at the other end of said engine, two sets of valve-operating mechanism arranged one at each end of said engine, one set operating the exhaust valves and the other set operating the inlet valves, a casing enclosing each set of valve actuating mechanisms, a removable cover over one casing having formed in it a centrally arranged mixture supply passage, and tangential branches communicating therewith attached to said casing cover arranged symmetrically to connect with the inlet port of each of said cylinder head, substantially as set forth.

2. In an internal combustion engine, the

combination of a rotating crankshaft, two rows of radially arranged stationary cylinders spaced around said crankshaft, T-heads on said cylinders, valve pockets in each cylinder on opposite sides thereof, inlet valves for each cylinder located in the pockets towards one end of said engine, exhaust valves located in the pockets toward the other end of said engine, two sets of valve operating mechanism arranged one at each end of said engine, one set operating directly the inlet valves of one row of cylinders, and indirectly those of the other row, and the other set operating by similar direct and indirect means the exhaust valves of both rows of cylinders, substantially as set forth.

3. An internal combustion engine as claimed in claim 2, in which the indirect operation of the valves is effected by interconnected levers arranged side by side and each pivoted at one end to the crankcase at points remote from one another and adapted at their free ends to engage respectively the tappet and the valve, substantially as set forth.

In testimony whereof I have signed my name to this specification.

JOHN COCKBAIN BRIGGS.