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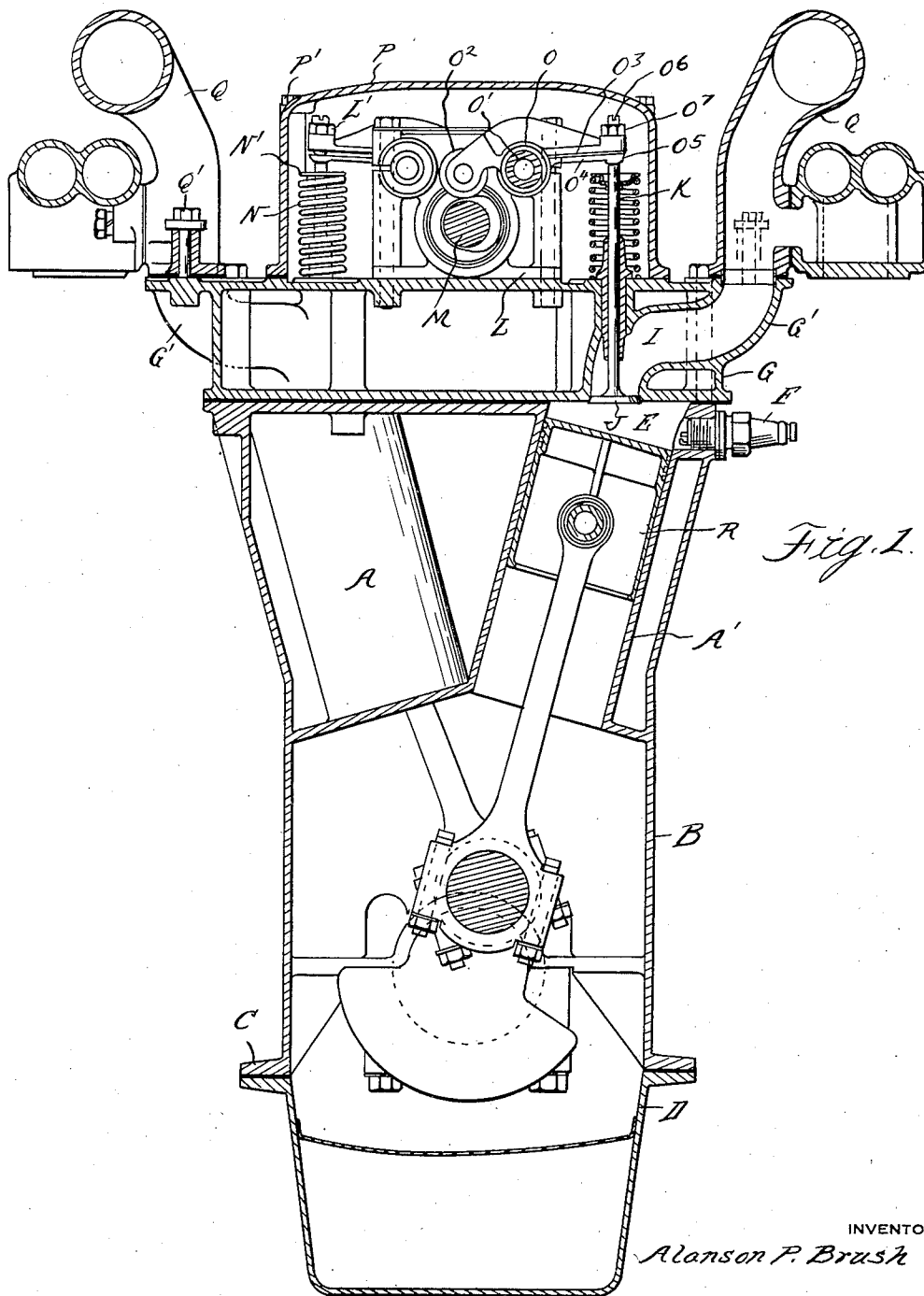
A. P. BRUSH

2,014,036

INTERNAL COMBUSTION ENGINE

Filed Sept. 9, 1929

3 Sheets-Sheet 1



BY

INVENTOR

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Sept. 10, 1935.

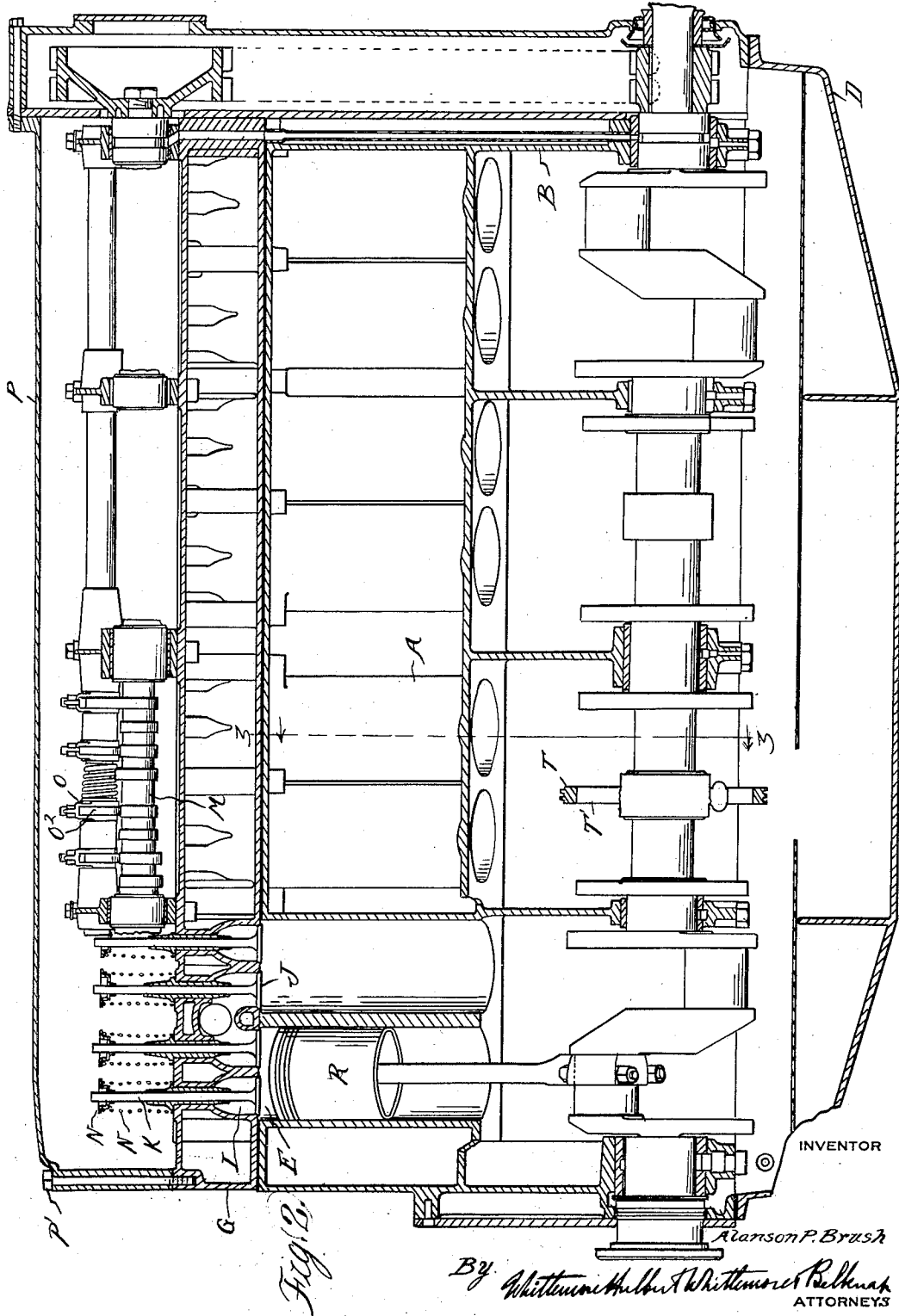
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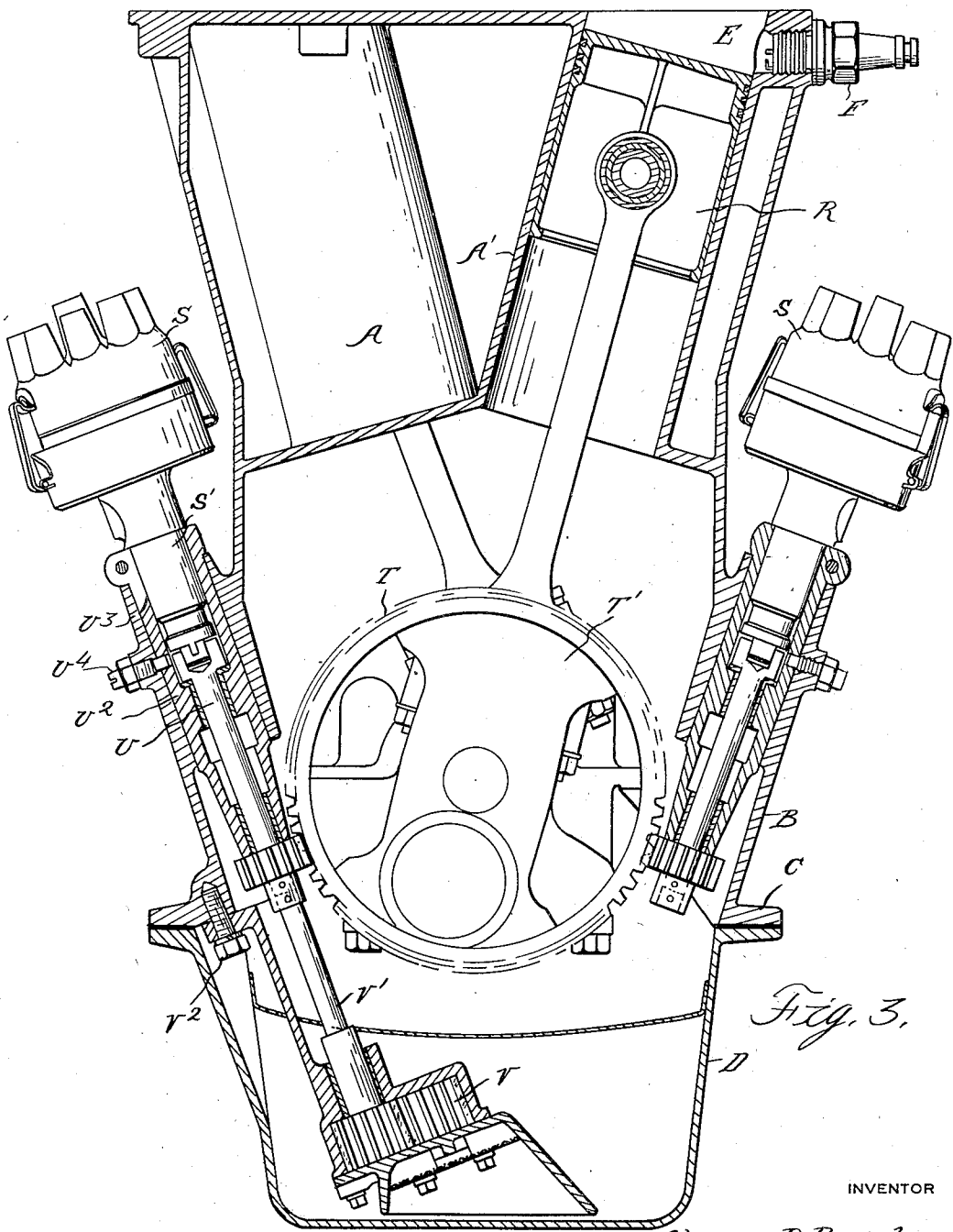
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INTERNAL COMBUSTION ENGINE

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2,014,036

INTERNAL COMBUSTION ENGINE

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3 Claims. (Cl. 123—90)

The invention relates to multi-cylinder internal combustion engines of the V type, and it is the object of the invention to simplify the construction and to obtain various features of advantage as hereinafter set forth.

In the drawings:

Figure 1 is a vertical cross section;

Figure 2 is a longitudinal section broken away to show parts in different planes;

Figure 3 is a cross section of Figure 2 illustrating the pump and distributor mechanism and manner of driving the same;

In the present state of the art in the construction of internal combustion engines it has been found impracticable to arrange more than eight cylinders in alignment or in a single plane. Where a larger number of cylinders is desired the double bank or V type construction may be used, but this increases complication and cost of manufacturing. With my improvement I combine certain advantages in the aligned type of engine with those secured by the V type, particularly with respect to simplicity in construction, reduction in the number of parts and in compactness of arrangement.

My improvements are applicable to engines with any number of cylinders but are particularly advantageous in engines having more than eight cylinders, as for instance twelve or sixteen, the construction being as follows:

A and A' are two banks of aligned cylinders in an integral block and having their axes arranged at a limited angle to each other, preferably thirty degrees. The integral block also includes a crank case B which is of the width of the two banks of cylinders at their lower ends and extends downward below the plane of the crank shaft, being provided with flanges C for the attachment of the oil pan D. The top and bottom faces of the block are parallel and in horizontal planes which makes the upper face intersect the cylinders at an oblique angle resulting in wedge shaped clearance spaces E above the pistons, the large ends of the wedges being on the outer side. This gives room for the insertion of the spark plugs F which are thus directly attached to the block independent of its removable head.

For closing both banks of cylinders I employ a single head G having a horizontal lower face abutting against the upper face of the block and secured thereto by suitable bolts H. The head G has formed therein the inlet and exhaust valve ports I which are arranged in alignment longitudinally of the block and substantially cen-

trally with respect to the axes of the cylinders. J are the valves for controlling these ports which are substantially flush with the lower face of the head G and have the axes of their stems K arranged perpendicular to this face. The upper face of the head G is parallel to the lower face and has centrally mounted thereon at spaced points bearings L having cam shafts M, these bearings being secured to the head by bolts L'. The valve stems K project upward beyond the upper face of the head G being provided with valve springs N and collars N' of any suitable construction. Intermediate the cam shaft M and the respective valve stems are rockers O which are centrally fulcrumed at O', their inner ends being provided with rollers O² for engagement with a cam and their outer ends bearing on the upper ends of the stems K to provide for adjustment and seating of the valves. The rockers O are longitudinally slotted at O³ to leave a comparatively thin and flexible section O⁴ which carries the bearing O⁵ engaging the valve stem. Above the slot O³ is a rigid portion in which is arranged an adjustment screw O⁶ bearing against the portion O⁵ and held in its position of adjustment by a lock nut O⁷. This simple arrangement permits of direct engagement of the rocker with the cam and the valve stem while providing for setting and adjustment of the valves.

The valve mechanism just described is enclosed in a housing or cover P resting upon the upper face of the head G and secured thereto by bolts P'. On opposite sides of this housing P are the inlet and exhaust manifolds Q which preferably engage the upper faces of lateral extensions G' of the head, being coupled thereto by the bolts Q'. The specific construction of these manifolds is not essential to the present invention and therefore will not be described in detail.

The pistons R are connected to the crank shaft by rods R' so constructed as to permit of insertion and removal through the upper ends of the cylinders, and the rods for the adjacent cylinders of the opposite banks engage the same crank case. Separate distributors S are used for each bank of cylinders and these are arranged at an oblique angle on opposite sides of the block. For driving the distributors and also for driving the oil pump I arrange a single ring gear T which is mounted on one of the throws T' of the crank shaft. The distributor shafts U are located in the same transverse plane as this ring gear and are so arranged that the gears U' thereon will intermesh with said ring gear. The shafts U are journaled in bearings U² which together with

the gears U' may be inserted longitudinally through quills U³ formed integral with the block. The bearings U² also form sockets for receiving the shank S' of the distributor casing and all parts are held in position by the lock screws U⁴ inserted laterally through the quill.

The oil pump V has its drive shaft V' arranged in axial alignment with the shaft Q and suitably coupled thereto. The pump casing is bolted at V² to a suitable bearing on the block and extends downward into the oil pan where it is arranged substantially centrally thereof. Thus the single ring gear T serves as a driving means for both distributors and both oil pumps.

What I claim as my invention is:

1. A valve mechanism for multi-cylinder internal combustion engines having a plurality of cylinder banks and attachable and detachable therefrom as a unit, said mechanism comprising a cam shaft, a pair of fulcrum shafts on opposite sides thereof extending the full length of the multi-cylinder engine, rocker arms mounted on said fulcrum shafts with their inner ends engaging said cam shafts and their outer ends engaging valve stems, the arms for the valves of each bank being engaged with the fulcrum shaft on the same side of the cam shaft, a plurality of spaced block bearings each having bearings for engaging all of said shafts and holding the axes thereof in fixed relation to each other, and means for attaching said block bearings to said engine.

2. A valve assembly for multi-cylinder internal combustion engines having a plurality of banks of cylinders and a common head therefor, said mechanism comprising a cam shaft, parallel fulcrum shafts on opposite sides thereof extending the full length of said common head, rocker arms pivoted on said fulcrum shafts with

their inner ends in engagement with said cam shaft and their outer ends in engagement with the stems of the valves, each of said rocker arms having a flexible portion for engaging the stem of the valve, a rigid portion parallel thereto and a screw threaded in said rigid portion and abutting against said flexible portion to form a normally rigid spacer therebetween, adjustable for taking up clearance between the rocker arm and the valve stem, a plurality of spaced block bearings each having bearings for engaging all of said shafts and means for attaching said block bearings to the engine whereby said valve mechanism may be attached to or detached from said engine as a unit.

3. A valve unit assembly for multi-cylinder internal combustion engines having a plurality of cylinder banks, said assembly comprising a cam shaft, a pair of fulcrum shafts on opposite sides and above the same extending the full length of said banks and between the same, rocker arms pivoted on said fulcrum shafts with their inner ends engaging said cam shaft and their outer ends engaging the stems of the valves, each of said rocker arms being provided with a flexible portion having a segmental bearing at its outer end for engaging the upper end of the stem and being also provided with a rigid portion, a screw having a threaded engagement with said rigid portion and bearing against said flexible portion to form a normally rigid spacer therebetween, adjustable to take up clearance between said segment and the valve stem, a plurality of spaced block bearings each having bearings for holding all of said shafts with their axes in fixed relation to each other and means for attaching said block bearings to the engine permitting the mounting and demounting of the same as a unit.

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