March 1, 1932. J. F. HERMANN 1,847,560

INTERNAL COMBUSTION ENGINE

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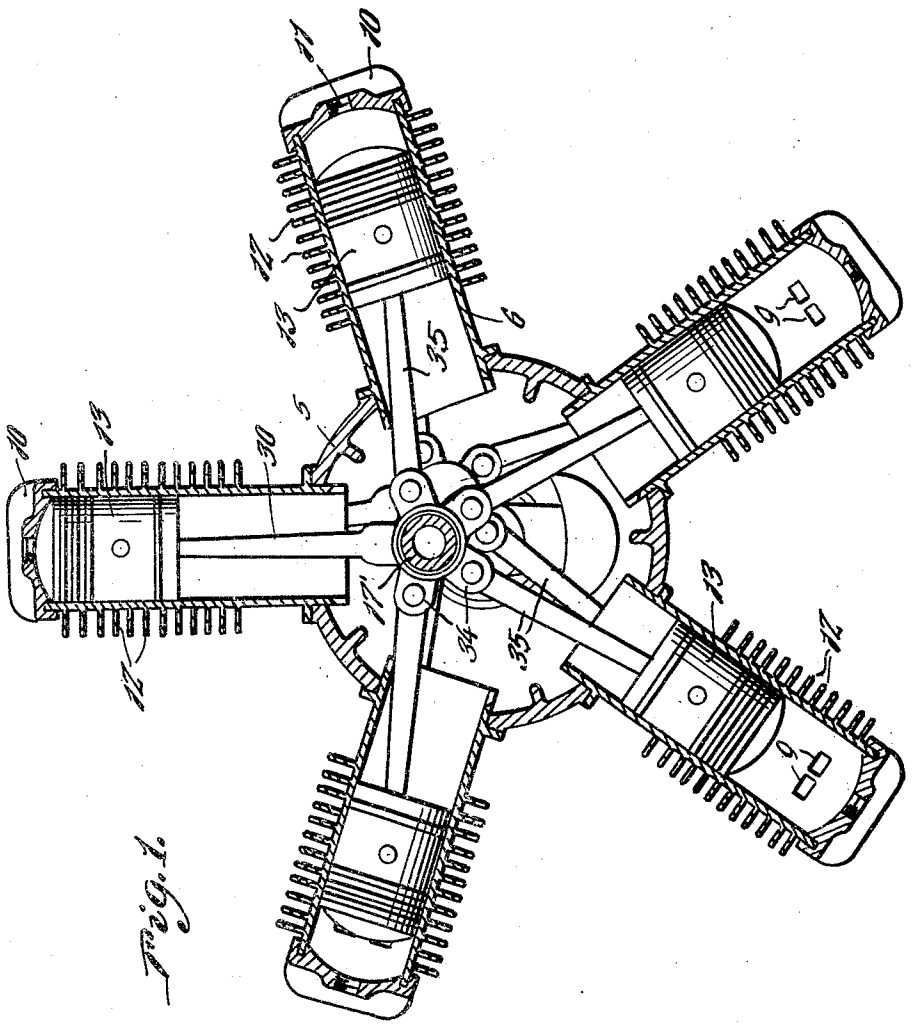


Fig. 1.

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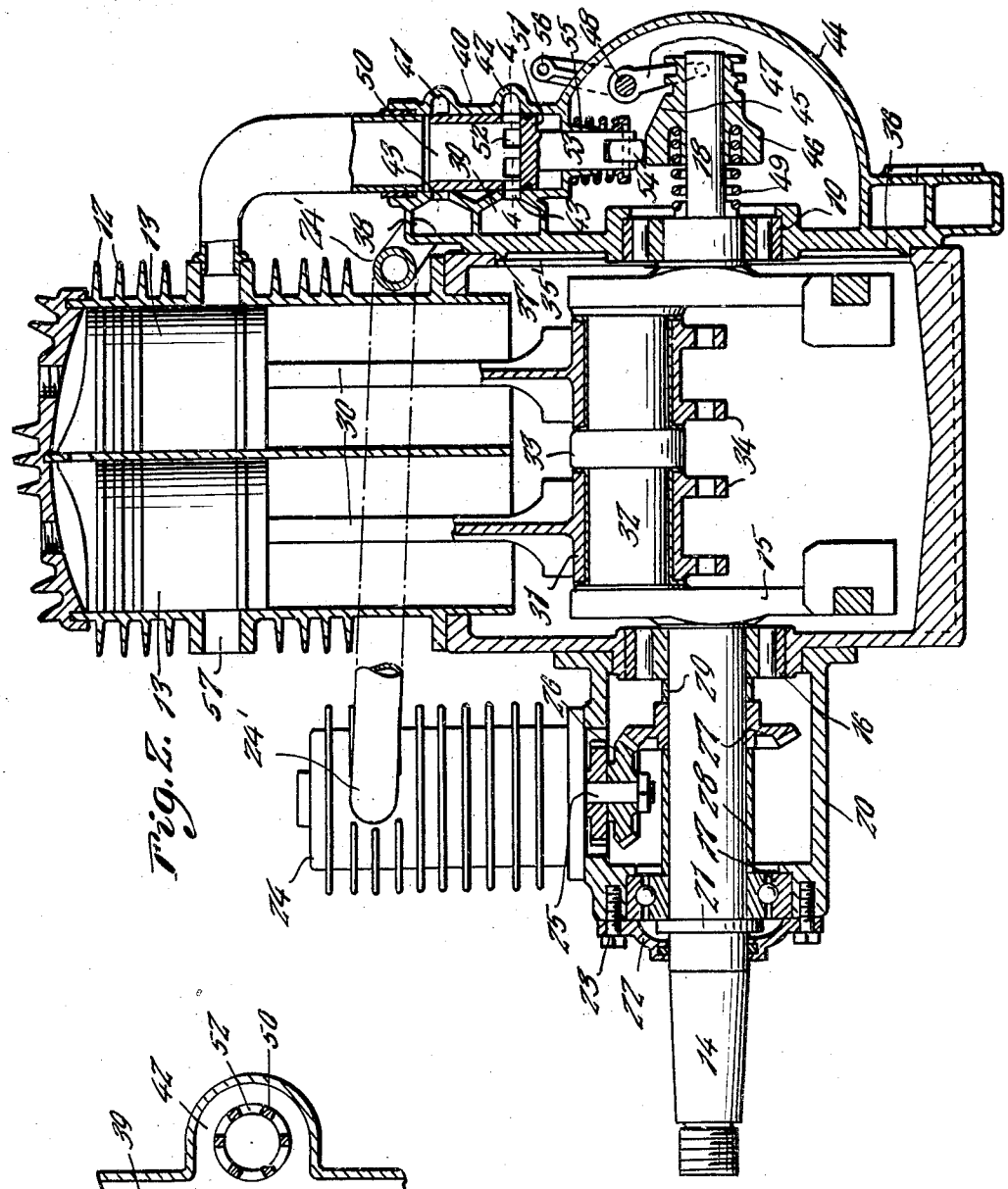


Fig. 3.

Fig. 4.

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INTERNAL COMBUSTION ENGINE

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Fig. 4.

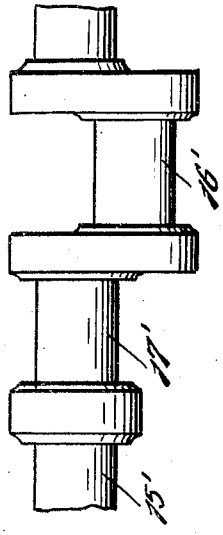


Fig. 8.

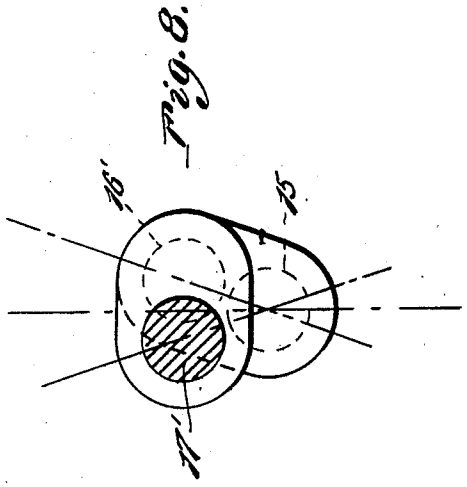


Fig. 5.

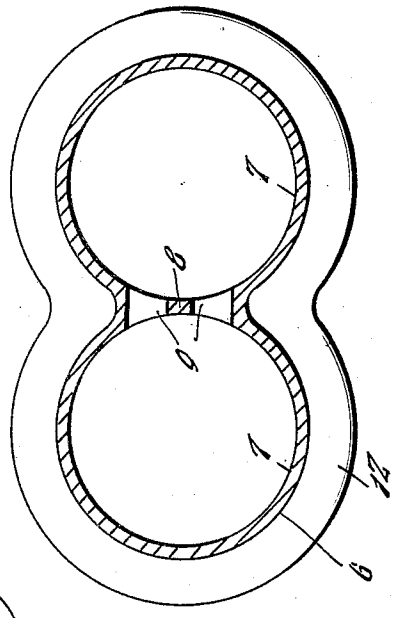
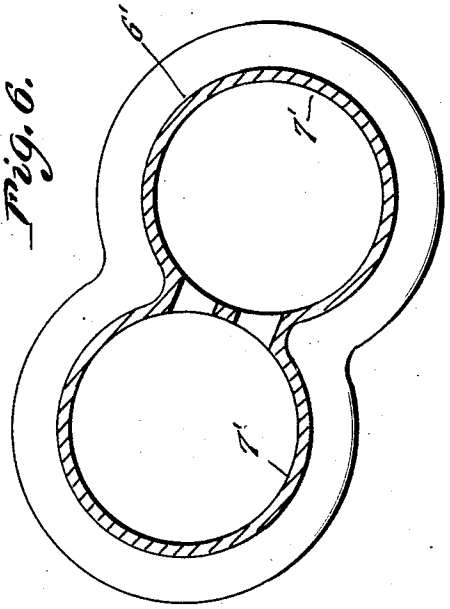


Fig. 6.



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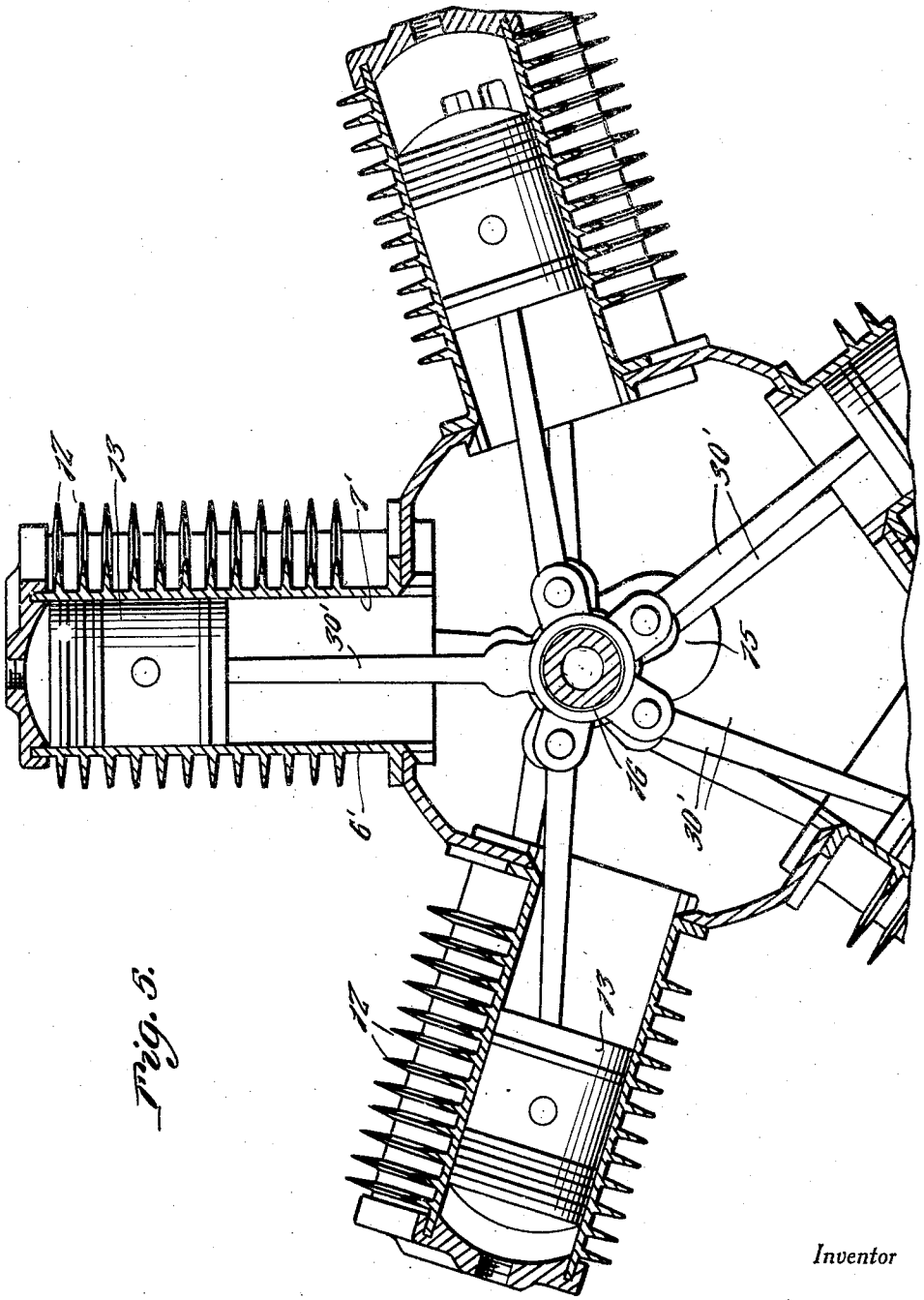


Fig. 5.

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UNITED STATES PATENT OFFICE

JOHN F. HERMANN, OF HAVANA, ILLINOIS

INTERNAL COMBUSTION ENGINE

Application filed December 4, 1929. Serial No. 411,567.

This invention relates to new and useful improvements in the art known as internal combustion engines and more particularly to a novel engine of the radial cylinder type. The principal object of this invention is to provide an engine of such construction as to eliminate the use of fuel intake and exhaust ports for each cylinder.

Another important object of the invention is to provide a novel control for regulating the mixture of air and gas.

After referring to the following specification and claims, other important objects and advantages of the invention will readily become apparent.

In the drawings:

Figure 1 represents a vertical sectional view through the improved engine.

Figure 2 represents a vertical sectional view taken longitudinally through the engine and showing the controlling details thereof.

Figure 3 represents a cross sectional view, through a pair of the parallel cylinders.

Figure 4 represents a horizontal sectional view taken substantially on the line 4—4 of Figure 2.

Figure 5 represents a fragmentary vertical sectional view, through a modified form of the invention.

Figure 6 represents a cross sectional view of a pair of parallel cylinders of the modified engine construction.

Figure 7 represents a fragmentary side elevation of the crank shaft for the preferred form of the invention.

Figure 8 is a cross sectional view through the crank shaft.

Referring to the drawings wherein like numerals designate like parts, it will be seen that the improved engine includes a housing 5, from which radiates the dual cylinder construction 6. As is clearly shown in Figure 3, each dual cylinder construction consists of a block bored for two cylinders 7—7. Between the cylinder bores is a partition 8 and at the upper portion of the partition wall is a pair of ports 9—9. Each cylinder is provided with a head having a threaded opening 11 therein for receiving the spark plug, while circumferentially disposed around the cylinder construction are the cooling fins 12. A piston 13 is operable within each cylinder bore.

In Figure 2, the drive shaft is denoted by the numeral 14 and extends from one side of the crank 15 through the bearings 16 and 17. The opposite end of the crank has the pintle 18 projecting therefrom and through a bearing construction 19.

The bearings 16 and 19 are in the side walls of the housing 5, while the bearing 17 is located at the outer end of the housing 20, which projects laterally from the housing 5 and co-axially with respect thereto. As is shown in Figure 2, the drive shaft 14 has a collar 21 thereon and this is for interposition between the bearing construction 17 and the packing plate 22 which is secured to the outer end of the housing 20 by screws 23.

Mounted upon the housing 20 is a supercharger 24, the shaft of which extends downwardly toward the drive shaft 14 and is denoted by the numeral 25. The shaft 25 is operatively connected to the drive shaft 14 by the bevelled gears 26 and 27. The sleeves 28 and 29 on the drive shaft space the gear 27 from the bearing construction 17 and 16 and so that the same will be maintained in the proper meshed engagement with the gear 26. A conduit 24′ extends from the supercharger 24, to communicate with the channel 38, while fuel travels through the channel 39.

As is clearly shown in Figure 2, the sectional view is taken through the master rods 30 which are pivotally connected to the pistons 13 at their outer end and rigidly to the annular members 31 on the crank pin 32. The circumferential shoulder 33 at the intermediacy of the crank pin spaces the annular members 31 apart. The annular member 31 is provided at circumferentially spaced intervals with pairs of apertured ears 34—34, for receiving the inner ends of the connecting rods 35 of the remaining pistons.

Again referring to Figure 2, it will be seen that the sides of the housing 15 opposite from the supercharger 24 is provided with an enlarged opening 35′, which is to be closed by the circular plate 36. An annular rib 37 is provided on the inner side of the plate for

engagement within the opening 35, to prevent vertical displacement of the plate, while additional means may be provided for securing the plates against outward movement. A pair of annular passageways 38 and 39 are provided on the outer side of the plate 36. A vertically disposed tubular construction 40 is provided with an upper and a lower internal groove way 41 and 42, respectively. The tubular construction 40 at each grooveway has a port 43 communicating with the corresponding annular passageways 38 or 39. A casing 44 of hemi-spherical shape protrudes outwardly from the plate 36 and has a shaft 48 journaled horizontally therethrough.

Slidably mounted on the pin 18 is a cam 46, and connecting the cam with the shaft 48 is a yoke 47. The inclined surface 46 of the cam is disposed upwardly and the cam is maintained in the position shown in Figure 2, by the tension of the coiled spring 49.

Vertically slidable within the tubular construction 40 is a valve unit 50 which includes a tubular body open at its upper end and closed at its lower end 51. The closed bottom portion 51 is provided with a suitable packing, while the tubular portion of the valve unit 50 is provided with openings 52, registerable with the lower port of irrigating opening 43. A leg 53 depends from the closed lower end of the unit 50 and is bifurcated at its lower end to receive the roller 54. A spring 55 serves to draw the valve unit 50 downwardly upon the release of the cam 46, and as noted in Figure 2, the lever 56 is employed for actuating the aforementioned shaft 48. Thus it will be seen that when starting the engine, with the cam 46 in the position shown in Fig. 2, the valve 50 will be fully connecting the intake pipe with the gas passageway 39. The burnt gases of the cylinders are received through the exhaust port 57. The lever 56 may be actuated to actuate the valve 50 to permit air to enter from the passageway 38, to mix with the intake gas. Obviously, by shifting the lever 47, the position of the cam can be adjusted to vary its effect on the valve.

In Figure 5 of the drawings, the modified form of the engine is shown wherein the cylinders 7′—7′, (see Figure 6) of each cylinder block 6′ are raised in offset relation with respect to the drive shaft.

Thus the width of the engine may be minimized to reduce the space necessary in which to mount the same. In this form of the invention, the master connecting rod is denoted by numeral 30′ and connects with the crank shaft 15′ in the manner shown. As is shown in Figure 8, in order to compensate for the alined relation of the pistons of the form shown in Fig. 1, the crank shaft 15′ is provided with one crank 16′, through which the pistons of one radial group are connected, while the crank pin 17′ is offset on the crank shaft in proportion to the offset relation of the cylinders and to this end are connected the pistons in the cylinders of the other radial group of cylinders. The angular degree of offset between the pins 16′ and 17′ is governed by the offset disposition of the cylinders 7′—7′. Otherwise the construction of the engine, in Figure 5, is the same as the preferred form of the invention, the sole factor in the modification being the compactness of construction and the novel features of the engine construction necessary to accomplish this factor.

While the foregoing specification has been in detail, setting forth each specific part, it is to be understood that in the manufacture of this novel engine construction, various changes in the shape, size and materials may be resorted to, without departing from the spirit and scope of the invention as claimed hereinafter.

What is claimed as new is:

1. An internal combustion engine comprising a plurality of radial cylinders, pistons operable in the cylinders, a crank shaft through which the pistons are connected, a drive shaft, a supercharger driven by the drive shaft, an air conduit in communication with the supercharger, a fuel conduit, a mixing chamber in communication with the said conduit, a valve operable in the mixing chamber for regulating the mixture of air and gas, and a pipe line communicating the mixing chamber with the said cylinders, said valve being provided with a depending member, a cam for engagement with the depending member, and manual means for actuating the cam for shifting the valve to regulate the said mixture.

2. An internal combustion engine comprising a plurality of radial cylinders, pistons operable in the cylinders, a crank shaft through which the pistons are connected, a drive shaft, a supercharger driven by the drive shaft, an air conduit in communication with the supercharger, a fuel conduit, a mixing chamber in communication with the said conduit, a valve operable in the mixing chamber for regulating the mixture of air and gas, and a pipe line communicating the mixing chamber with the said cylinders, said valve being provided with a depending member, a cam for engagement with the depending member, and manual means for actuating the cam for shifting the valve to regulate the said mixture, and spring means for normally maintaining the cam in full communication with the gas conduit.

In testimony whereof I affix my signature.

JOHN F. HERMANN.