Nov. 6, 1928. 1,690,321

R. S. BAKER

GAS ENGINE

Filed June 27, 1925 3 Sheets-Sheet 1

Fig. 1.

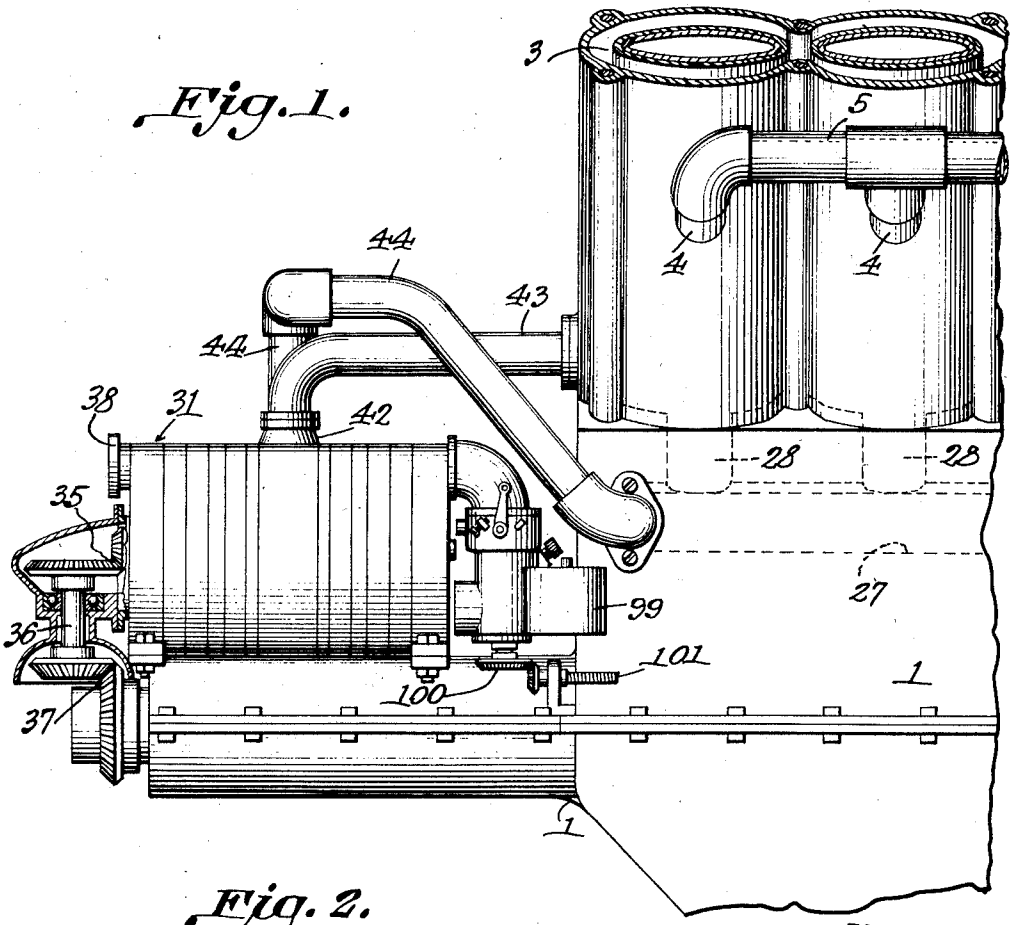
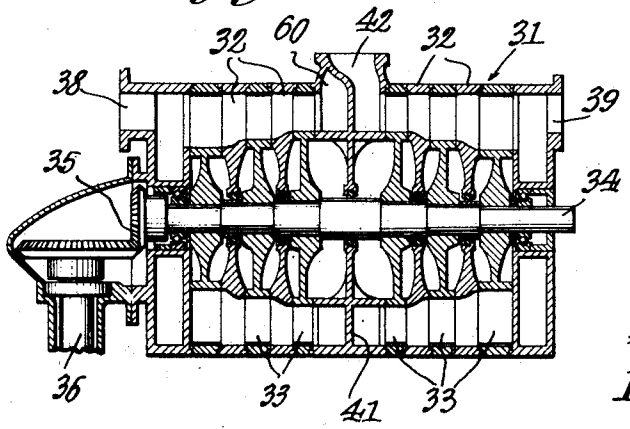


Fig. 2.



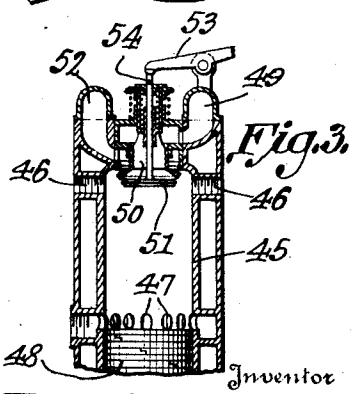


Fig. 3.

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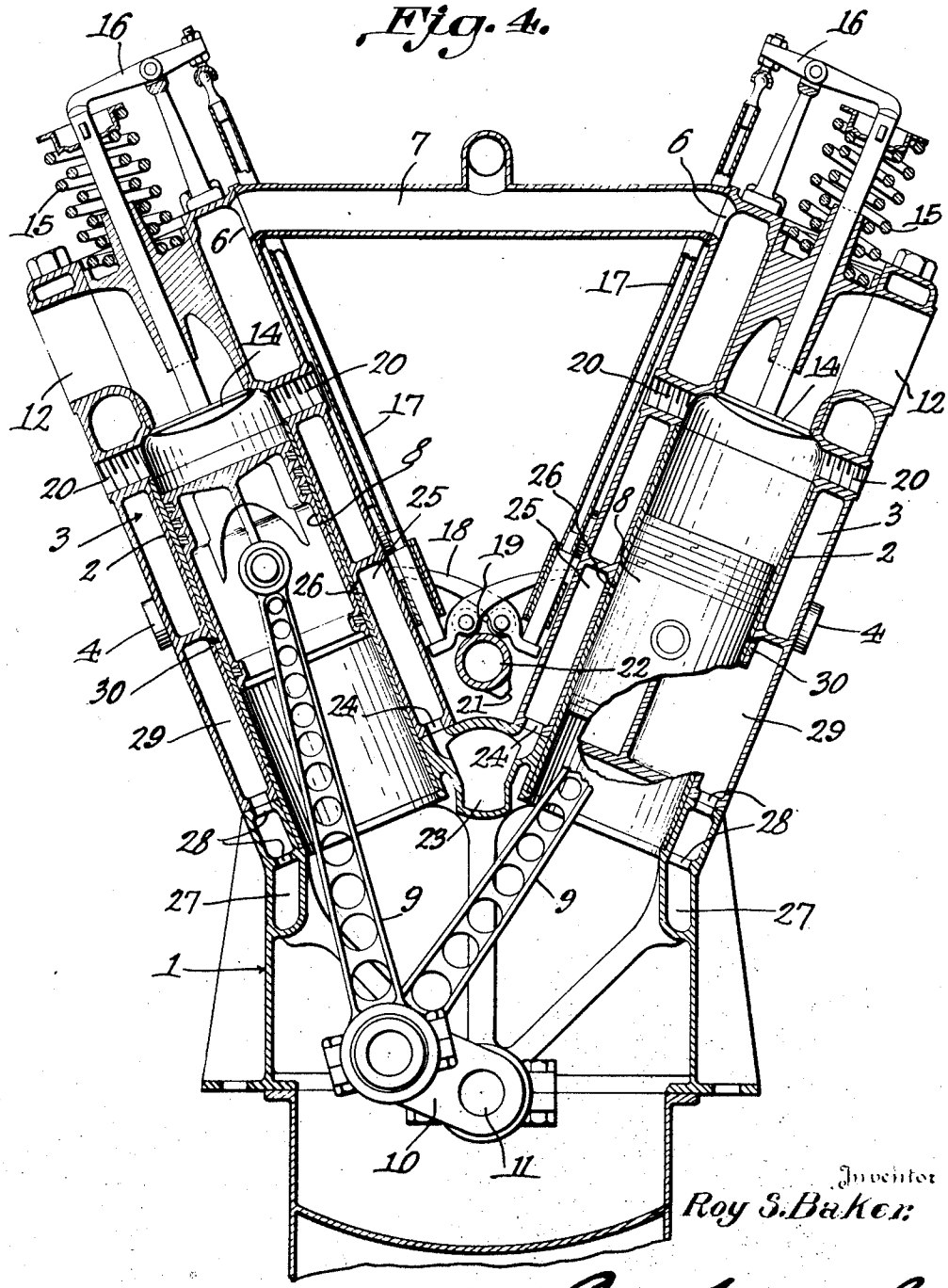
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Fig. 4.



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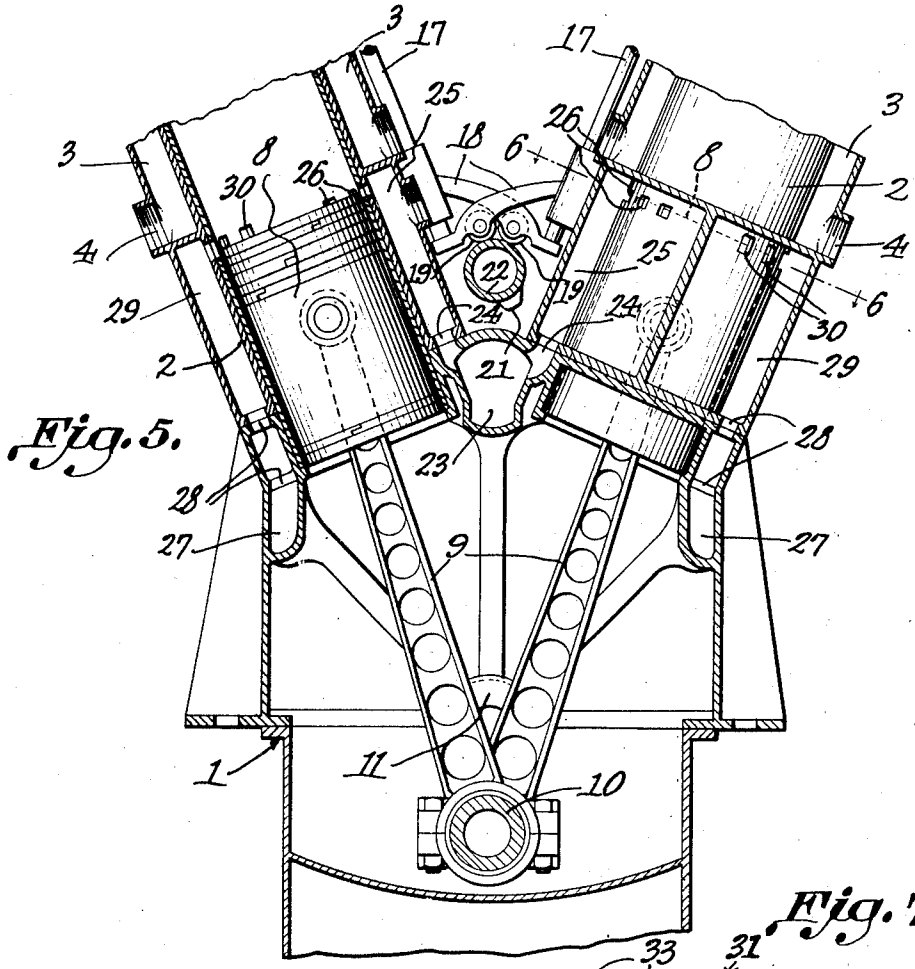


Fig. 5.

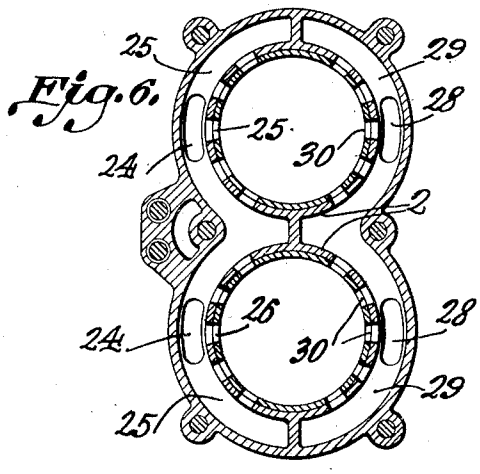


Fig. 6.

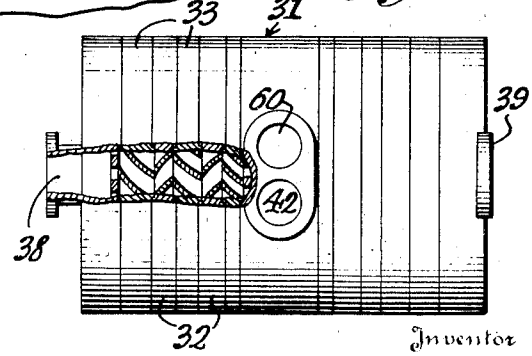


Fig. 7.

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Patented Nov. 6, 1928. 1,690,321

UNITED STATES PATENT OFFICE.

ROY STURM BAKER, OF POMONA, CALIFORNIA.

GAS ENGINE.

Application filed June 27, 1925. Serial No. 40,019.

This invention aims to provide a novel means for scavenging the cylinder of an internal combustion engine by means of a stream of air and a stream of gas, the air and the gas being compressed, externally of the engine, and independent of the pressure produced by the pistons, the air stream being admitted a little before the stream of fuel, so as to provide a protective layer of air between the incoming fuel mixture and the exhaust gas which is being expelled.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the invention appertains.

With the above and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed without departing from the spirit of the invention.

In the accompanying drawings:—

Figure 1 shows in side elevation, one of the many forms which the invention may take; Figure 2 is a sectional view of the compressor; Figure 3 is a longitudinal section disclosing a modification in the engine structure; Figure 4 is a transverse vertical section of one engine upon which the device may be used; Figure 5 is a vertical sectional view disclosing the parts as they will appear when one cylinder is taking in air and fuel; Figure 6 is a horizontal sectional view taken through the cylinders of the engine; Figure 7 is a plan of the compressor, parts being in section.

The device forming the subject matter of this invention may be incorporated in internal combustion engines of widely different sorts, but, since it is necessary to show one form of engine, and by way of illustration, there appears in the drawings, an engine including a frame 1 carrying cylinders 2 provided with spark plug mountings 20, the cylinders having water jackets 3, the inlets 4 of which communicate with a water supply pipe 5, the jackets having outlets 6 communicating with a water outlet pipe 7. The pistons appear at 8 and are connected by rods 9 with the cranks 10 of a shaft 11 supported for rotation on the engine frame.

The cylinders 2 have lateral exhaust ports 12 under the control of valves 14, which are seated by springs 15, the stems of the valves being operatively related to rock arms 16, fulcrumed intermediate their ends, and cooperating with push rods 17 slidable upon any part of the engine, the lower ends of the push rods coacting with levers 18, fulcrumed at their outer ends, and provided with rollers 19 adapted to cooperate with cams 21 on a shaft 22 supported for rotation on the engine frame and connected in any suitable way (not shown) with the shaft 11 to work in properly timed relation with respect thereto.

The numeral 23 marks a longitudinal fuel manifold, communicating, by way of ports 24 in the engine structure, with chambers 25 which extend part way around each cylinder, transversely. Each cylinder has ports 26 communicating with the chamber 25 and communicating with the interior of the cylinder. Air manifolds 27 are mounted on the engine frame and communicate, by means of ports 28 with chambers 29 extended part way around each cylinder, the chambers 29 communicating, by way of ports 30, with the interior of each cylinder 2. Referring to Figure 5, it will be seen that the air ports 30 are set a little in advance of the fuel ports 26, longitudinally of the cylinder 2, so that, as the piston 8 approaches the end of its stroke, the air ports 30 will open a trifle in advance of the ports 26 which admit the fuel.

From the foregoing, it will be appreciated readily that if some suitable compression means, external to the engine, is provided, a stream of air will shoot through the ports 30, and, shortly thereafter, a stream of fuel will shoot through the ports 26, the exploded gas beng ejected by the streams of air and fuel under pressure, the layer of clean air being interposed between the exploded gas and the incoming charge of fuel. In order to permit the exhaust to pass out, the valve

14 opens responsive to the action of the parts 16, 17, 18, 19, 21 and 22, the exhaust proceeding through the ports 12.

Any suitable means may be supplied for compressing the air and the gaseous fuel, and the compressor may be located as desired with respect to the engine. By way of illustration, the drawings show a compressor 31 mounted on the engine frame and including a plurality of stators 32, and a plurality of rotors 33 alternating with the stators, the rotors being mounted on a shaft 34 which is driven by bevelled gears 35, a supplemental shaft 36 journaled on the engine frame, and beveled gears 37, with the crank shaft 11. At one end, the compressor 31 has an air inlet 38, and at its other end, it is supplied with a fuel inlet 39. Any suitable means may be supplied for preparing the fuel mixture, that means, in the present embodiment of the invention, but not necessarily, being in the form of a carburetor 99 for communicating with the fuel inlet 39 of the compressor. The compressor 31 has an internal division plate 41, to the end that the air and fuel may not mix within the compressor, the compressor being supplied with a fuel outlet 42, connected by a pipe 43 with the fuel manifold 23. Pipes 44 connect the air outlet 60 of the compressor with the air manifolds 27 of the engine. The air compressor need not be described in greater detail, because I am aware of the fact that any specific sort of an air compressor cannot be protected in itself, along with an engine, and because any sort of a compressor may be employed, which will answer the purpose. The compressor mechanism operates, in a way which will be obvious from what has been stated hereinbefore, to supply the necessary streams of air and fuel under compression, the air entering the compressor at 38, and the fuel entering the compressor at 39.

If desired, the air and fuel may be admitted into the head of the engine cylinder, the exhaust taking place at a point intermediate the ends of the cylinder. One construction adapted to attain this result is delineated in Figure 3 of the drawings, wherein appears the cylinder 45 of an engine, the spark plug mountings being shown at 46, the exhaust ports 47 being located in the body of the engine cylinder and being under the control of the piston 48. The numeral 49 designates an air manifold on the head of the cylinder, the manifold 49 discharging through a slidable sleeve valve 50, which is spring seated, the flow of air through the valve 50 being controlled by a spring seated valve 51. The fuel manifold is shown at 52, and discharges into the cylinder 45 externally of the sleeve valve 50, and under the control of the sleeve valve. The rock arm 53 operates the stem of the valve 51, the stem of the valve 51 having a projection 54 adapted to engage the sleeve valve.

In practical operation, the valve 51 is first opened by the action of the rock arm 53, and, thereupon, air flows from the air manifold 49 through the sleeve valve 50, the sleeve valve being seated until the projection 54 slides the sleeve valve to an open position, whereupon a charge of fuel will proceed from the manifold 52 into the engine cylinder 45, the stream of compressed air preceding the stream of compressed gas, as and for the purpose hereinbefore specified.

The carburetor 99, or other suitable means for preparing the fuel mixture, may embody any desired operating mechanism 100, and means 101 for operating the same from a remote point, the construction being such that the necessary adjustments may be made from time to time by the operator, as dictated by altitude, if the engine is used on an airplane, or as dictated by other considerations, if the device is used nearer the surface of the earth.

Having thus described the invention, what is claimed is:—

1. An internal combustion engine comprising a frame, a cylinder on the frame, a crank shaft journaled in the frame, a piston operating in the cylinder and connected operatively to the crank shaft, a compressor mounted on the frame above the crank shaft and at one end of the engine, the compressor including a shaft disposed parallel to the crank shaft above the crank shaft, means for supplying fuel to the compressor, means for supplying air to the compressor, means for delivering fuel from the compressor to the cylinder, means for delivering air from the compressor to the cylinder in advance of the delivery of fuel to the cylinder, and mechanism for connecting the shafts at the outer ends thereof, said mechanism comprising a supplemental shaft disposed at right angles to the compressor shaft and the crank shaft and journaled on the engine frame, and intermeshing beveled pinions connecting the ends of the supplemental shaft with the ends of the crank shaft and the compressor shaft, respectively.

2. In an internal combustion engine, a cylinder having a head, the cylinder being provided intermediate its ends with an exhaust port, a piston slidable in the cylinder and controlling the exhaust port, an air inlet member on the head of the cylinder, a spring seated sleeve valve in the head and through which the air inlet member discharges, a spring seated second valve cooperating with the sleeve valve to control the flow of air through the sleeve valve, both of said valves being arranged concentrically with respect to each other in the head, a fuel inlet member on the head of the cylinder and discharging into the cylinder externally of the sleeve valve

and under the control of the sleeve valve, interengaging elements on the valves whereby motion may be transmitted from the second valve to the sleeve valve, to open the sleeve valve and admit fuel after the second valve has opened to admit air, said interengaging elements being external to the head and accessible, means for operating the second valve to open it, mechanism independent of piston compression in the cylinder for delivering air under pressure to the air inlet member on the cylinder head, and mechanism independent of piston compression in the cylinder for delivering fuel to the fuel inlet member on the head.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

ROY STURM BAKER.