Oct. 12, 1948. G. L. BALSTER 2,451,271

V-TYPE INTERNAL-COMBUSTION ENGINE

Filed Aug. 18, 1945 3 Sheets-Sheet 1

Fig. 1.

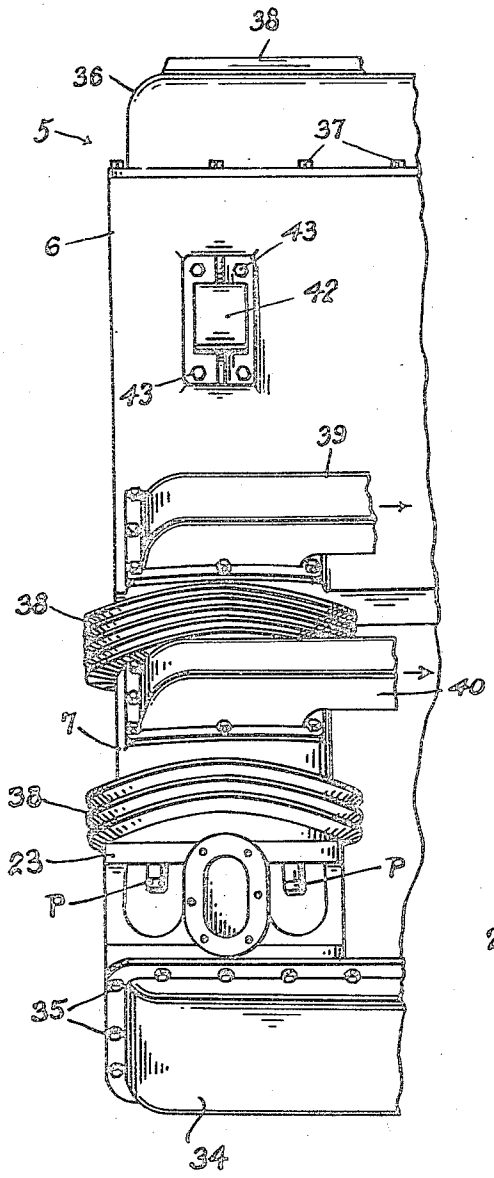


Fig. 5.

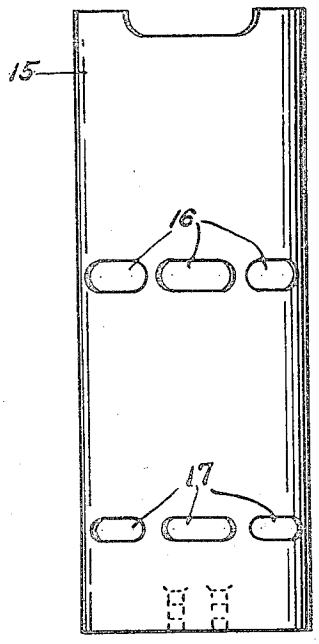
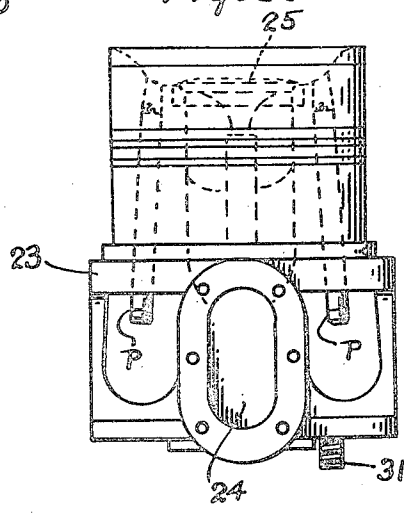


Fig. 6.



INVENTOR.

George L. Balster

BY L. B. James

ATTORNEY

Oct. 12, 1948. G. L. BALSTER 2,451,271

V-TYPE INTERNAL-COMBUSTION ENGINE

Filed Aug. 18, 1945 3 Sheets-Sheet 2

Fig. 2.

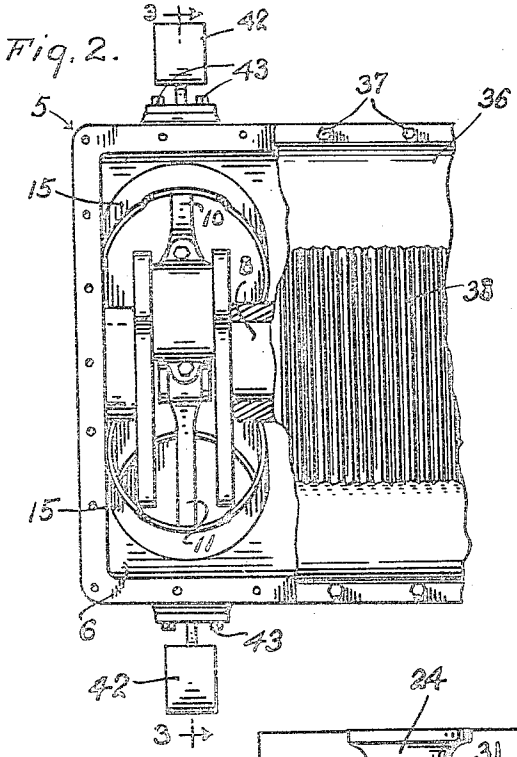


Fig. 7.

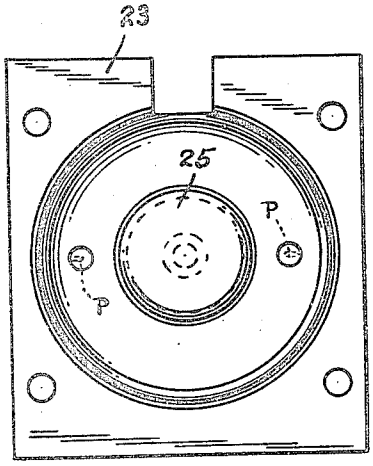
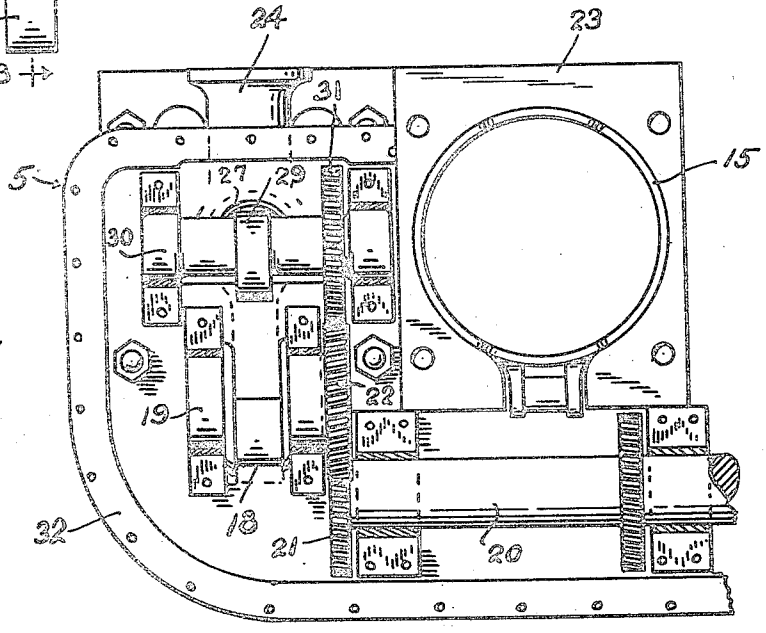


Fig. 4.



INVENTOR.

George L. Balster

BY L. B. James

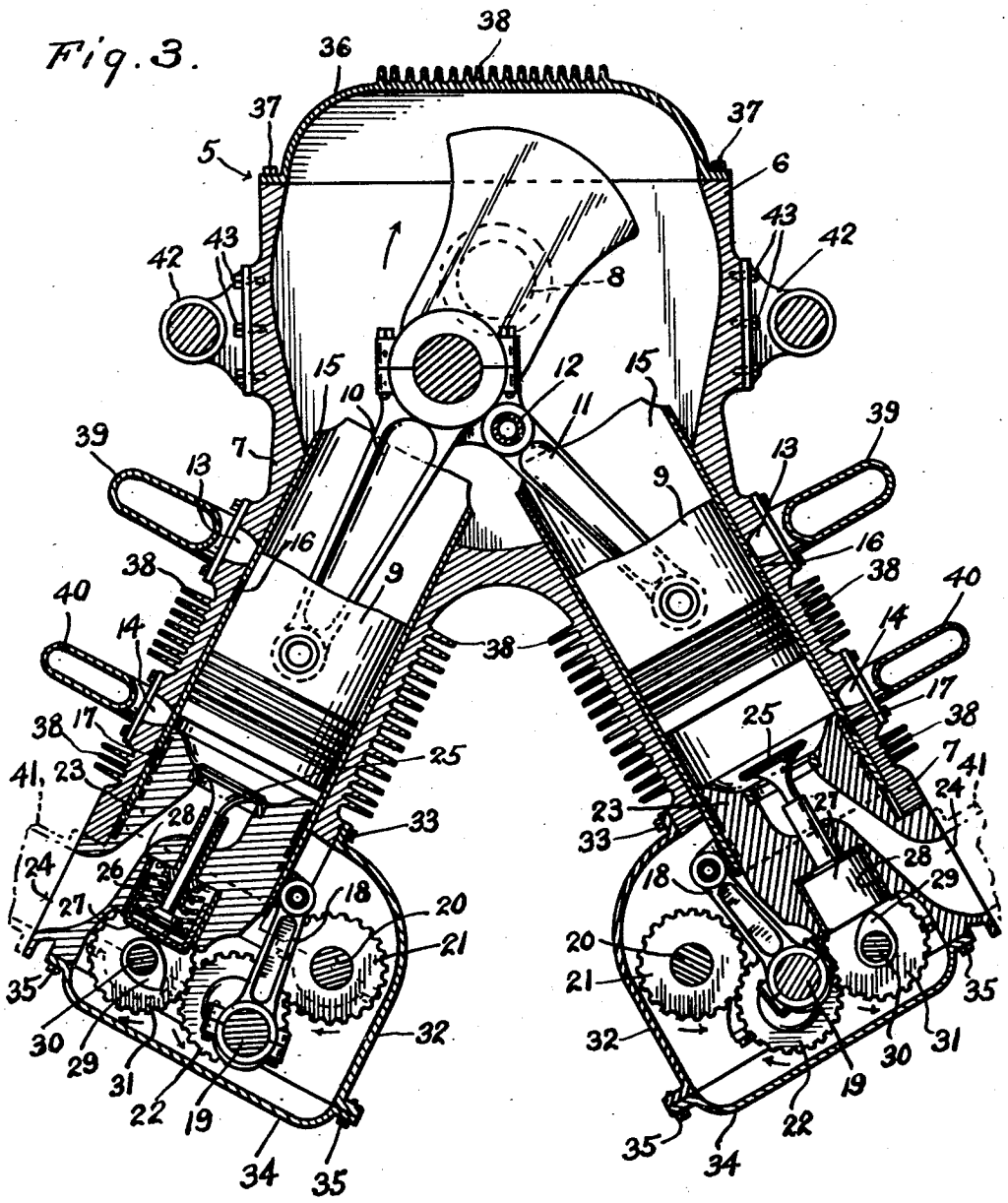
ATTORNEY

Oct. 12, 1948. G. L. BALSTER 2,451,271

V-TYPE INTERNAL-COMBUSTION ENGINE

Filed Aug. 18, 1945 3 Sheets-Sheet 3

Fig. 3.



INVENTOR.

George L. Balster

BY L. B. James

ATTORNEY

Patented Oct. 12, 1948

2,451,271

UNITED STATES PATENT OFFICE

2,451,271

V-TYPE INTERNAL-COMBUSTION ENGINE

George L. Balster, Seward, Nebr.

Application August 18, 1945, Serial No. 611,340

1 Claim. (Cl. 123—55)

1

This invention relates to internal combustion engines of four cycle type and more particularly inverted V-type engines.

The primary object of this invention resides in the provision of an internal combustion engine of considerable less weight than the conventional engines of said type, adapted to produce a high degree of efficiency in operation through elimination of an undue degree of heat therefrom.

Another object of this invention resides in the provision of an air cooled internal combustion engine of inverted V-type design used in airplanes adapted to expel an undue degree of heat therefrom and thereby permit smooth operation thereof with lubricant of considerable lower viscosity than demanded in conventional engines of similar types.

A further object of this invention resides in the provision of an air cooled internal combustion engine of inverted V-type design adapted to operate at a lower temperature so as to permit its cooperating elements to be close fitted for producing the maximum performance thereof, eliminating warm up period.

A still further object of this invention resides in the particular construction and operation of the pistons of the engine.

Aside from the foregoing objects, this invention resides in the particular construction and operation of the sleeve valve.

In addition to the aforesaid objects, this invention resides in the provision of an air cooled internal combustion engine, preferably of the inverted V-type design adapted to expel a high degree of heat created thereby seven times faster at the bottom of the strokes thereof than obtained with conventional engines of similar types and thereby leaving a lesser degree of heat to pass through the ports of the sleeve at the top thereof.

One of the salient features of this invention resides in so constructing the engine as to not only obtain the maximum strength, rigidity and permanent alignment of elements, but to provide good vision forward of the same when mounted on an airplane with a minimum frontal area resisting flight of the plane.

With these and other objects prevailing in the present engine, this invention resides in certain novel features of construction and arrangement of cooperating elements to be hereinafter more

2

particularly set forth in the specification, illustrated in the accompanying drawings and pointed out in the appended claim and, although this disclosure depicts my present conception of the invention, the right is reserved to resort to such changes in construction and arrangement of elements as come within the spirit of the invention.

In the accompanying drawings forming a part of this application;

Fig. 1 is a side view of a portion of two of the cylinders of the engine.

Fig. 2 is a plan view thereof with the cap removed.

Fig. 3 is a vertical sectional view of the engine taken approximately on line 3—3 of Fig. 2.

Fig. 4 is a bottom view with the cap removed.

Fig. 5 is a side view of one of the sleeve valves.

Fig. 6 is a side view of one of the cylinder plugs.

Fig. 7 is a bottom view of one of the cylinder heads.

In the present illustration of this invention the numeral 5 designates, in general, an internal combustion engine preferably but not necessarily of the inverted V-type design as it is apparent the salient features of the invention can be successfully practiced in other types of internal combustion engine whether they be air or water cooled, however, the paramount adaptation thereof is with an air cooled internal combustion engine of the present design.

The engine 5 herein disclosed consists of a crank case 6 having a plurality of cylinders 7 formed integral therewith and in radial alignment with a crank shaft 8 journalled therein connecting pistons 9 through the instrumentality of main and articulated connecting rods 10 and 11, the latter of which are pivotally connected to the bases of the former by wrist pins 12. Said cylinders are provided with main exhaust and scavenger ports 13 and 14, the former of which are disposed at the limits of the working strokes of the pistons while the latter of which are disposed at the limits of the exhaust strokes of the pistons.

Slidably disposed within the cylinders and accommodating the aforesaid pistons in compression tight working relation therewith are sleeve valves 15 provided with ports 16 and 17 for registration with the aforesaid ports 13 and 14 through the instrumentality of a link 18 con-

necting the sleeve valves with crank-shafts 19 which in turn are driven by meshing gears 21 and 22 keyed on counter-shafts 20.

Secured to the outer or lower ends of the cylinders with certain portions thereof extending into the outer ends of the sleeve-valves are cylinder-plugs 23 which are provided with fuel inlet ports 24 having poppet valves 25 normally held closed by expansible coil springs 26 which are covered by substantially cup-shaped hoods 27 operable with bores 28 in the outer surfaces of the plugs through the instrumentality of cams 29 on shafts 30. Said shafts 30 are driven by the aforesaid countershafts 20 through the instrumentality of gears 31 which mesh with gears 22 and, in order to synchronize operation of the pistons, sleeve-valves and poppet-valves in performing their assigned functions, the counter-shafts 20 are connected to the crank-shaft 8 by well known means (not shown). Removably disposed in the plugs, preferably on opposite sides of the poppet-valves, are spark plugs P of the usual or any approved type.

The plug assemblies above set forth are disposed or concealed within casings 32 secured to the cylinders by cap-screws 33 and are provided with caps 34 removably secured thereto by cap-screws 35, while the crank-case is provided with a cap 36 secured thereto by cap-screws 37.

As usual in air cooled internal combustion engines, heat dissipating fins 38 are formed on the peripheries of the cylinders leaving areas thereof around the ports therein for detachably securing exhaust manifolds 39 and 40.

Secured to the plug in register with the inlet port therein is an inlet manifold 41 connected to a supercharge (not shown) or other conventional fuel mixer.

To facilitate mounting the engine on a plane, blocks 42 or the like are removably secured to the sides of the crank-case by cap-screws 43, however, it is to be understood that any type of mounting means for the engine may be used without affecting operation of the same at its high degree of efficiency.

Due to the particular construction and assemblage of the cylinder plugs, sleeve valves, pistons and connecting rods, they are disposed in operative positions on the cylinders and removed therefrom as a unit, thus ensuring of proper alignment and adjustment of the aforesaid elements prior to assembling the same for connection and operation by the crank-shaft.

Although but two cylinders of the engine are herewith disclosed, it primarily consists of sixteen cylinders constructed and assembled as herein illustrated with the remaining or omitted similar elements synchronized to function in practicing the invention, the same being of the 4-cycle type developing 2500 horsepower at 4200 R. P. M., said high speed being permitted by rapid and complete elimination of excessive heat which maintains the lubricant or oil and working elements in cool condition, thus eliminating detonation and permitting higher supercharging and compression ratio.

In that an engine constructed in accordance with this invention necessarily demands use of certain high grade materials in constructing the various parts thereof so as to withstand the high speed heretofore mentioned, it being deemed unnecessary to limit use of the same by recitation as it is within the purview of the invention to utilize any material in constructing the engine and parts thereof found appropriate.

With an internal combustion engine of the present type mounted for operation, fuel is injected or drawn through the inlet ports into the sleeve-valves and compressed on the compression strokes of the pistons during their predetermined cycles and with the ports of the sleeve-valves in unregistered disposition with the exhaust ports of the cylinders and, as the fuel in each sleeve-valve is ignited in order, the pistons reach the limits of their working strokes at which time the ports in the sleeve-valve register with the ports in the cylinders through the instrumentality of the aforesaid operating crank-shafts and links thereof and thereby permits discharge of a large volume of the burnt fuel at bottom of stroke with the greater portion of the remaining volume being expelled when the pistons reach the limits of their scavenger strokes. The aforesaid rapid discharge of the burnt fuel reduces the period of the same from heating the working elements and also permits fresh fuel to enter the combustion chamber in a cool condition without being reduced in viscosity by otherwise confined burnt fuel.

Through the provision of an internal combustion engine of the type herein set forth, it is manifest that means are recited whereby operation and performance of the same materially supersedes conventional engines of similar types and, through the particular assemblage of elements employed, manufacture of the same require no wide departures from recognized operations in the art.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

An internal combustion engine of inverted V-type design comprising a crankcase open at its top, a cover removably secured to the crankcase over the opening therein, a crank-shaft journalled in the crankcase, radially and downwardly disposed cylinders on the crankcase and having longitudinally spaced ports of different areas therein, the larger ones being disposed at points above the heads of pistons in the cylinders when at the limit of their working strokes and the smaller ones being at points above the piston heads when at the limit of their scavenger strokes, sleeve-valves slidably disposed in the cylinders and having main and scavenger exhaust ports aligned with the ports in the cylinders, plugs having their inner portions disposed in the lower ends of the cylinders in spaced relation to the walls thereof and surrounded by outer portions of the sleeve-valves, said plugs having fuel inlet ports therein leading from their outer sides to the center of their inner ends, piston rings surrounding the inner ends of the plugs and bearing against the inner walls of the sleeve-valves, poppet-valves including stems disposed over the inner ends of the inlet ports with their stems slidably extending into enlarged recesses in the outer surfaces of the plugs, cushioning means disposed in the recesses of the plugs and bearing against the outer ends of the valve-stem, connecting rods securing the pistons to the crank-shaft, counter-shafts journalled on one side of the plugs, cam-shafts journalled on the plugs over the cushioning means of the poppet-valves, cams on the counter-shafts and bearing on said cushioning means, crank-shafts mounted on the plugs between the cam-shafts and counter-shafts, links connecting said last mentioned crank-shafts to the outer ends of the sleeve valve, casings enclosing the aforesaid elements on the outer ends of the cylinders, and

caps removably secured over openings in said casings.

GEORGE L. BALSTER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
923,496	Cutler	June 1, 1909
977,334	Sears	Nov. 29, 1910
1,081,051	Lamplough	Dec. 9, 1913
1,312,585	Shepard	Aug. 12, 1919
1,329,811	Smith	Feb. 3, 1920
1,404,015	Edwards	Jan. 17, 1922
1,862,222	Kasten	June 7, 1932
2,091,370	Lichte	Aug. 31, 1937
2,254,439	McCarthy	Sept. 2, 1941
2,349,157	Ford et al.	May 16, 1944

FOREIGN PATENTS

Number	Country	Date
5,358	England	Apr. 9, 1915
305,903	Germany	June 1, 1918
128,299	England	June 26, 1919