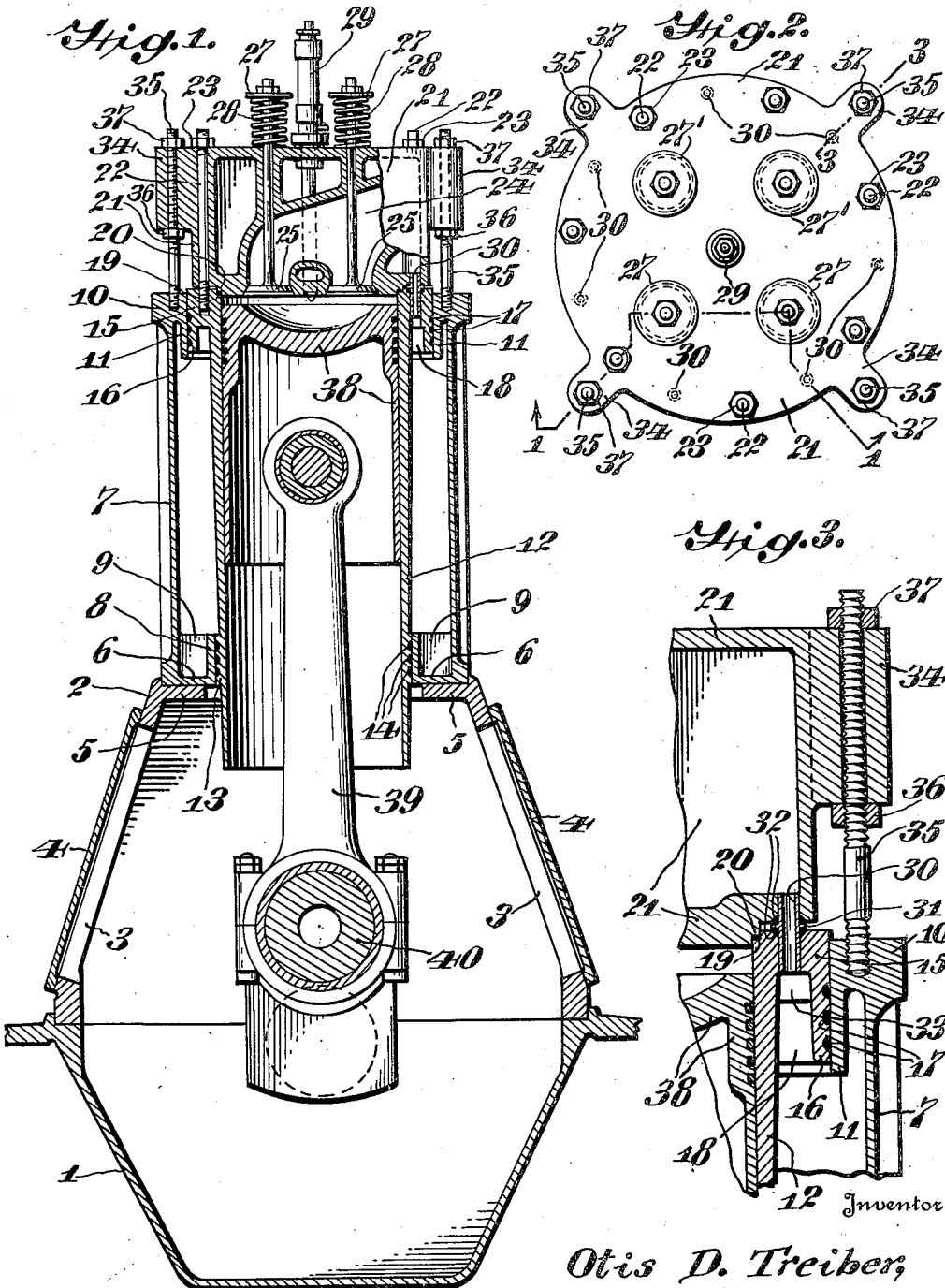


Feb. 10, 1931.

O. D. TREIBER
INTERNAL COMBUSTION ENGINE

1,792,201

Filed Aug. 24, 1928



UNITED STATES PATENT OFFICE

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INTERNAL-COMBUSTION ENGINE

Application filed August 24, 1928. Serial No. 301,801.

My invention relates to internal combustion engines and has particular reference to internal combustion engines provided with means for adjusting the combustion or compression spaces of the said engines.

The general object of my invention is to provide a novel engine construction wherein the cylinder walls and the heads secured thereto are adapted to be adjusted inwardly and outwardly of the said engine for varying the combustion or compression spaces thereof.

Another object of my invention is to provide a novel construction of means of the character indicated wherein the combustion cylinders and the heads secured thereto are adapted to be adjusted inwardly and outwardly with respect to the cylinder jacket or jackets in which they are slidably positioned and with respect to the pistons which reciprocate therein, portions of the cylinders having fluid-tight engagement with the said jackets which surround the said cylinders and which form cooling chambers therewith.

It also is an object of the present invention to provide a novel engine construction wherein means is provided for adjusting the combustion spaces of the engine, the combustion cylinders being slidably and adjustably mounted in an external jacket or jackets and supported by heads secured detachably to the said cylinders, which heads are adjustably supported on the top of the said jacket or jackets.

Other objects and advantages of my invention will be pointed out in the following description or will be apparent from such description.

In order that the invention may be more fully comprehended, reference may be had to the accompanying drawing in which I have illustrated one embodiment thereof, but it is to be understood that the invention is susceptible of being embodied in other constructions than that which is shown herein and that various changes may be made in the details of construction without departing from the scope of the appended claims.

In the said drawing:

Fig. 1 is a view in longitudinal section taken on the line 1—1 of Fig. 2 through one

of the cylinders of an internal combustion engine embodying my invention;

Fig. 2 is a top plan view of the cylinder head shown in Fig. 1; and

Fig. 3 is an enlarged view in longitudinal section showing a fragmentary portion of the structure and taken on the line 3—3 of Fig. 2.

For the sake of clarity and convenience I have undertaken to illustrate my invention only as applied to one of the cylinders of an internal combustion engine embodying the said invention, but it will be understood that the said engine may comprise any number of cylinders, as is usual in practice, each of which may embody the said invention.

Referring to the drawing, the numeral 1 designates the bottom crank case of the engine of my invention upon which is supported the upper crank case 2 provided with man-hole openings 3 which are covered by the removable plates 4 for permitting access to the interior of the engine in known manner. The upper or top portion of the said crank case is directed inwardly to form a horizontal flange 5 upon which is seated the opposed flange 6 formed on the bottom end of the jacket 7. The inner edge of the flange 6 is projected inwardly and upwardly to form a cylindrical wall or skirt 8 which is disposed in spaced relation to the wall of the jacket and connected thereto by means of webs or partitions 9 for strengthening and reinforcing the said wall. The upper end of the jacket is enlarged to form a flange 10 the inner end of which is projected inwardly of the said jacket and downwardly therein to form a cylindrical wall or skirt 11, as shown.

A combustion cylinder or sleeve 12 is positioned within the said jacket and is provided with a flange or projection 13 near the inner depending end thereof, which flange is provided with a number of annular grooves in which packing rings 14 are embedded, the said flange and packing rings engaging the inner surface of the cylindrical wall 8 in fluid-tight but slidable relation therewith. The outer end of the combustion cylinder 12 is thickened and enlarged to form a laterally extending flange portion 15 the outer edge of

which also is extended or projected inwardly with respect to the outer end of the said cylinder to form a depending skirt 16 having a number of annular packing rings 17 embedded in grooves which are cut in the outer surface thereof, the said packing rings and the surface of the depending skirt being in slidable fluid-tight engagement with the cylindrical inner surface of the skirt 11 and flange 10 of the said jacket. The depending skirt 16 is disposed in spaced relation to the outer surface of the cylinder to form an annular channel at 18. It will be observed that the flanges which are formed on the jacket and the cylinder cause a space to be formed between the wall of the said cylinder and the wall of the jacket, which space serves the purpose of a cooling chamber surrounding the said cylinder. It also will be observed that the cylinder is slidably positioned in the jacket and is accurately guided thereby.

The outer end of the cylinder is provided with a shoulder formed by the notch 19 on the inner edge thereof in which notch a complementary shoulder 20 formed on the cylinder head 21 is adapted to seat. The said cylinder head is secured to the outer end of the cylinder by means of bolts or studs 22 which are screw-threaded into the outer end of the cylinder and extend through elongated openings formed in the said head and which are provided with nuts 23 for clamping the cylinder head to the cylinder.

The cylinder head comprises a casing of usual construction, having inlet and outlet passageways for admitting air into the cylinder of the engine and for conveying the gases of combustion from the cylinder. The passageway 24, which is shown, may be regarded as the inlet passageway for admitting air into the cylinder of the engine. The outlet passageway is not shown. Admission of air through the passageway into the cylinder of the engine is controlled by the valves 25, the stems of which project upwardly through openings provided in the top portion of the cylinder head. The ends of the stems which project outwardly from the top of the cylinder head are provided with disks 27 which are engaged on their under sides by springs 28 interposed between the said disks and the cylinder head. These springs operate normally to retain the valves in closed positions, as will be understood. The top ends of the stems of the valves for controlling the admission of the gases of combustion into the exhaust passageway (referred to but not shown), the disks corresponding to the disks 27 and the springs corresponding to the springs 28, are indicated at 27¹ in Fig. 2. The cylinder head also is provided with a fuel inlet valve or nozzle 29, of known construction, the discharge end of which projects into the combustion chamber of the engine cylinder. I have not undertaken to il-

lustrate the valve actuating mechanism because any suitable means of known construction may be employed for that purpose. The wall of the passageway 24 and the webs which extend through the interior of the said head form or cause to be formed channels or passageways in the interior of the said cylinder head through which a cooling medium may be conducted. The interior of the said head, or rather the channels formed therein, are placed in communication with the cooling chamber formed between the combustion cylinder and the jacket by means of tubular members 30 which are positioned in oppositely disposed openings in the adjacent or oppositely facing surfaces of the top and bottom ends of the cylinder and of the cylinder head. These tubular members are provided with collars 31 intermediate the ends thereof which collars retain packing members 32 within annular countersunk grooves which are formed in the openings of the cylinder head and cylinder through which the ends of the sleeve member extends, thereby forming fluid-tight connections therewith. The inner end of the sleeve members which extend inwardly through the outer end of the cylinder communicate with the annular groove or channel 18 through passageways 33, as is clearly shown in Fig. 3.

As a result of the construction which has just been described it will be obvious that the circulation of a cooling medium through the chamber surrounding the combustion cylinder and into and through the cylinder head may be effected. The said cooling medium is introduced into the cooling chamber surrounding the cylinder and discharged from the interior of the cylinder head by conduits of known construction (not shown). It will be understood that in a multiple cylinder engine the cooling water will be distributed to each of the cooling chambers and discharged from the cylinder heads through suitable manifolds, as is usual in internal combustion engines.

The cylinder head is provided with outwardly extending projections or lugs 34 through which extend screws or studs 35 mounted on the top or outer end of the jacket. The said lugs or projections rest upon nuts 36 which are threaded upon the said screws or studs intermediate the ends thereof and nuts 37 are provided on the outer free ends of the said screws for securing the said projections in contact with the nuts 36. By loosening the nuts 37 and adjusting the nuts 36 the cylinder head and the cylinder which is secured thereto and supported thereby may be adjusted vertically with respect to the jacket and to the engine. It follows that corresponding adjustments and variations will result in the size of the combustion chamber which is formed between the cylinder head, the cylinder, and the piston 38, the

latter being adapted to reciprocate within the combustion cylinder in known manner. The said piston actuates the connecting rod 39 connected to the crank shaft 40, the latter
 5 being mounted in suitable bearings provided in the crank case, as will be understood.

It now will be apparent that I have provided a novel construction of means wherein the combustion cylinder of the engine may
 10 be adjusted inwardly and outwardly with respect to the engine and to the piston which reciprocates within the said cylinder. By providing a removable cylinder head I am able to disassemble the engine quickly and
 15 conveniently for repairing and cleaning the parts thereof. It also will be seen that I have provided a novel construction wherein a fluid-tight cooling chamber is provided between the adjustable combustion cylinder and the
 20 cylinder jacket with which the interior of the detachable cylinder head is in communication through fluid-tight passageways located wholly within the engine structure. As a result the cooling medium may be circulated
 25 through the said engine without danger of leakage and loss of the same, thereby increasing the efficiency of the said engine and reducing the cost of repairs.

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

1. An internal combustion engine comprising a crank shaft, an external jacket supported in fixed position with respect to said crank
 35 shaft, a combustion cylinder mounted in said jacket in spaced relation thereto, a piston adapted to reciprocate therein, means for connecting said piston to said crank shaft, a cylinder head detachably secured to the outer end of said cylinder, the said cylinder being
 40 supported by the said cylinder head, and means for adjustably supporting the said cylinder head whereby the said head and the cylinder may be adjusted inwardly and outwardly with respect to said piston.

2. An internal combustion engine comprising an external stationary jacket having guides formed on the inner side thereof, a combustion cylinder slidably mounted
 50 therein in engagement with said guides, said guides holding said cylinder in spaced relation to said jacket to form a chamber between said jacket and cylinder, a piston adapted to reciprocate in said cylinder, a head detachably secured to said cylinder, the latter being
 55 supported by said head, said jacket being provided with means for adjustably supporting said cylinder head whereby the said head and the cylinder may be adjusted inwardly and outwardly with respect to said piston.

3. An internal combustion engine comprising a crank case, a crank shaft, a jacket mounted on said crank case in fixed position with respect to said crank shaft the interior of which jacket is provided with spaced cy-

lindrical guides on the interior thereof, a combustion cylinder slidably mounted in said jacket in slidable engagement with the said guides, a piston adapted to reciprocate in
 70 said cylinder, means for connecting said piston to said crank shaft, a head detachably secured to said cylinder, the said head being adapted to support the cylinder and having a plurality of valves therein, and means for adjustably supporting said cylinder head
 75 whereby the said head and the cylinder may be adjusted inwardly and outwardly with respect to the said piston.

4. An internal combustion engine comprising, a crank shaft, a crank case and a jacket
 80 supported thereby, said jacket being supported in fixed position with respect to said crank shaft, a combustion cylinder slidably mounted in said jacket, a piston adapted to reciprocate in said cylinder the wall of said
 85 cylinder being spaced from the wall of said jacket to form a cooling chamber, a head detachably secured to the outer end of said cylinder having a plurality of valves mounted therein, the said head being hollow whereby
 90 a cooling medium may be conducted therethrough, means for permitting communication between the said cooling chamber and the interior of said cylinder head, the latter being adapted to support the said cylinder, and
 95 means mounted on said jacket for adjustably supporting said cylinder head whereby the said head and the cylinder may be adjusted inwardly and outwardly with respect to the said piston.

5. An internal combustion engine comprising, a crank shaft, a crank case having a jacket mounted thereon, said jacket being supported in fixed position with respect to
 100 said crank shaft, a combustion cylinder slidably supported in said jacket, the latter having guides formed on the interior thereof adapted to receive and guide the said cylinder in the said jacket, a cooling chamber being formed between said jacket and cylinder, a
 110 head detachably secured to the outer end of said cylinder having a plurality of valves mounted therein, the said head being hollow whereby a cooling medium may be conducted therethrough, means permitting communication between the said cooling chamber and the interior of said cylinder head, a piston adapted to reciprocate in said cylinder, and means on the outer end of said jacket for adjustably supporting said cylinder head whereby
 115 the said head and the cylinder may be adjusted inwardly and outwardly with respect to the said piston.

6. An internal combustion engine comprising, a crank shaft, a crank case and a
 120 jacket adapted to be supported thereby, said jacket being supported in fixed position with respect to said crank shaft, guides formed on the interior of said jacket, one of said guides being located near the outer end
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of the said jacket and comprising an inwardly projecting cylindrical wall, a combustion cylinder mounted in said jacket and forming therewith a cooling chamber, the outer end of said cylinder having a flange formed thereon, an inwardly projecting skirt being provided on the outer edge of said flange, the said skirt forming an inwardly facing annular channel with the opposite surface of the combustion cylinder, the outer surface of said skirt having sliding engagement with the inner surface of said cylindrical wall, a head for such cylinder having valves positioned therein, the interior of said head being hollow whereby a cooling medium may be conducted therethrough, and a passageway interposed between the interior of said head and the said cooling chamber whereby a cooling medium may be circulated around the said cylinder and through the cylinder head.

7. An internal combustion engine comprising, a crank shaft, a crank case and a jacket adapted to be supported thereby, said jacket being supported in fixed position with respect to said crank shaft, the interior of said jacket being provided with spaced cylindrical guides near the opposite ends thereof, a combustion cylinder slidably supported in said jacket, the outer end of said cylinder being enlarged and having an inwardly projecting skirt formed thereon the outer surface of which is adapted to slidably engage one of the guides formed in the said jacket, a portion of the outer surface of the inner end of said cylinder being in engagement with the other of said guides, the said cylinder being disposed in spaced relation to the said jacket to form a cooling chamber for the said cylinder, means for rendering fluid-tight the engagement of the outer and inner end portions of the cylinder with the said guides, and means for adjustably supporting the said cylinder within the said jacket.

8. An internal combustion engine comprising, a crank shaft, a crank case and a jacket adapted to be supported thereby, said jacket being supported in fixed position with respect to said crank shaft, the interior of said jacket being provided with spaced cylindrical guides near the opposite ends thereof, a combustion cylinder slidably supported in said jacket, the outer end of said cylinder being enlarged and having an inwardly projecting skirt formed thereon the outer surface of which is adapted to slidably engage one of the guides formed in said jacket, a portion of the outer surface of the inner end of said cylinder being in engagement with the other of said guides, the said cylinder being disposed in spaced relation to the said jacket to form a cooling chamber for the said cylinder, a head for said cylinder having channels formed therein whereby a cooling medium may be circulated therethrough, means for permitting communication between the said channels and the

said cooling chamber, said head being detachably mounted on the outer end of said cylinder, a piston adapted to reciprocate in said cylinder, the said cylinder being supported by the said head, and means for adjustably supporting the said head whereby the said head and the cylinder may be adjusted inwardly and outwardly with respect to the said piston to vary the combustion space between the piston and cylinder head, and the cylinder.

9. An internal combustion engine comprising, a crank shaft, a crank case and a jacket adapted to be supported thereby, said jacket being supported in fixed position with respect to said crank shaft, the interior of said jacket being provided with inwardly projecting cylindrical walls near the opposite ends thereof, a combustion cylinder slidably positioned in said jacket, the outer end of which is enlarged and provided with an inwardly projecting skirt the outer surface of which is adapted to engage one of said guides, the outer surface of the inner end portion of said cylinder being adapted to engage the other of said guides, a head secured to the outer end of said cylinder having channels formed therein, oppositely disposed openings formed in the contiguous ends of said cylinder and said head, a tubular member disposed in said openings and having fluid-tight engagement therewith for permitting communication between the interior of said head and the said cooling chamber, and means for adjustably supporting the said head whereby inward and outward adjustments of said head and the cylinder may be effected.

10. An internal combustion engine comprising, a crank shaft, an external jacket having spaced cylindrical guides formed on the interior thereof, said jacket being supported in fixed position with respect to said crank shaft, a combustion cylinder slidably positioned in said jacket, the outer end of said cylinder being enlarged and having an inwardly projecting skirt formed therein the outer surface of which is adapted to slidably engage one of said guides, the outer surface of the inner end portion of said cylinder being in engagement with the other of said guides, and means for adjusting said cylinder inwardly and outwardly with respect to the said jacket.

11. An internal combustion engine comprising, a crank shaft, an external jacket, the interior of which is provided with spaced guides near the opposite ends thereof, said jacket being supported in fixed position with respect to said crank shaft, a combustion cylinder positioned in said jacket the outer end of which is adapted to engage one of said guides, the outer surface of the inner end portion of said cylinder being in engagement with the other of said guides, a head detachably secured to the outer end of said cylinder,

and means for adjustably supporting said head whereby inward and outward adjustments of the said head and the cylinder may be effected.

5 In testimony that I claim the foregoing as my invention I have hereunto signed my name this 22nd day of August, A. D. 1928.

OTIS D. TREIBER.

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