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A. A. BULL

INTERNAL COMBUSTION ENGINE

Filed Oct. 30, 1922

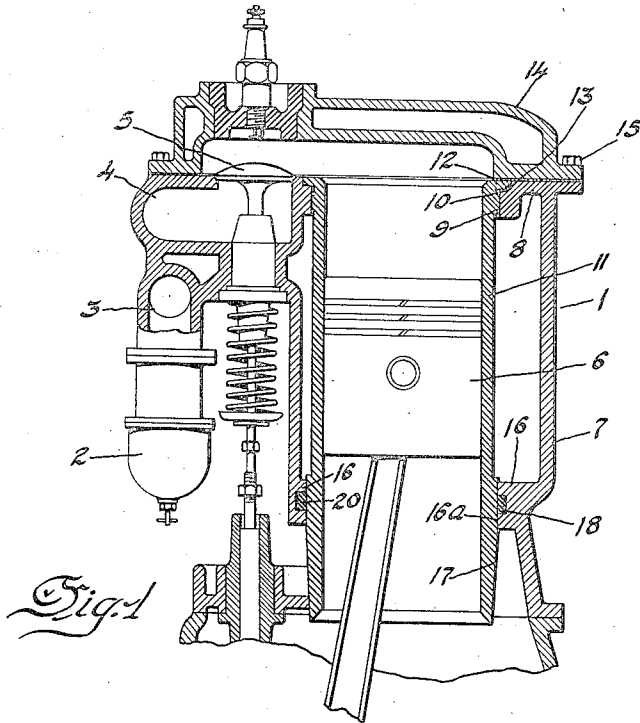


Fig. 1

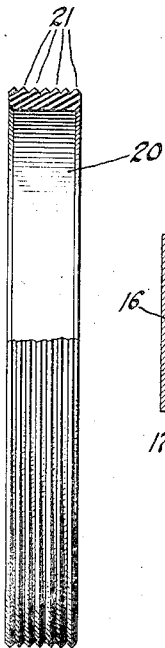


Fig. 4

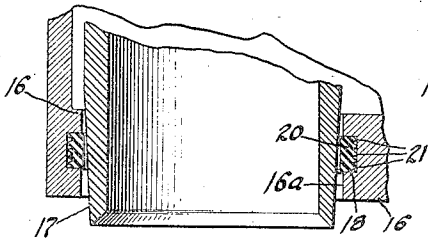


Fig. 2

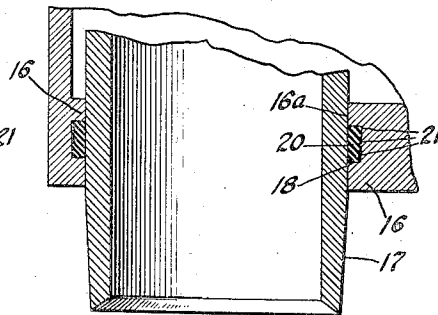


Fig. 3

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INTERNAL-COMBUSTION ENGINE.

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This invention relates to internal combustion engines, and more particularly to that type of engine in which the cylinder is detachably mounted in the casing thereof.

One of the objects of the invention is to provide new and improved means for sealing the space between the cylinder and the casing with a construction that will permit the expansion of the cylinder without distorting the same, and at the same time will prevent the leakage of the cooling fluid.

Another object of the invention is the provision of sealing means that is simple in construction, efficient in operation, cheap to manufacture, that may be readily assembled, and that is not likely to get out of order.

Other and further objects and advantages of the invention will appear from the description and the accompanying drawings in which,

Fig. 1 is a vertical section of a portion of an engine showing my invention applied thereto;

Fig. 2 is a vertical section of a portion of an engine showing the position of the sealing strip during the initial movement in the assembling of the engine.

Fig. 3 is a similar view showing the position of the sealing strip after the engine has been assembled; and

Fig. 4 is an elevation of the sealing strip with parts in section and parts broken away.

Referring to the drawings, the reference numeral 1 designates an internal combustion engine having one or more cylinders which may be of any type, but as here shown is of the L type of cylinder, i. e., one in which the valves are located laterally of the cylinder.

As shown the engine is provided with the usual carburetor 2, intake 3, exhaust manifold 4, exhaust valve 5, and piston 6, all of which may be of the usual or any well known construction. The jacket or casing 7 is provided at its upper end with an inwardly extending support 8, which is provided with a circular opening 9, having the counterbore 10 therein. A cylinder sleeve 11, having a comparatively thin wall, extends through the opening 9, and is provided with a flange 12, which is adapted to seat in the counterbore 10. The cylinder 11 is spaced from the casing 7 for the purpose of forming

a receptacle or jacket for the cooling fluid.

Suitable means are provided for sealing the joint between the flange 12 and the casing 7. Any appropriate means may be provided for this purpose. As shown, the outer edge of the flange 12 is bevelled for the purpose of compressing and distorting a suitable packing or sealing ring or gasket 13. When the cylinder 11 is in position in the water jacket the upper surface of the same is flush with the upper surface of said jacket. The cylinder head 14 is adapted to be secured to the water jacket 7 by any suitable means such as the bolts 15. The head is so arranged that it overlaps the joint between the cylinder 11 and the water jacket 7, so that when the bolts 15 are screwed home, the flange 12 will distort the packing 13, and clamp the same in the counterbore 10 to seal said joint.

The lower end of the casing 7 is provided with an internal flange 16 having an opening 16^a in which is adapted to engage the lower tapered end 17 of the cylinder 11. A groove 18 is provided on the inner peripheral surface of the flange 16 about said opening.

In the use of an engine having removable sleeves, it is customary in the commercial manufacture of the same to provide sufficient clearance between the lower ends of the cylinders and the walls of the openings in the casing for the purpose of accommodating the relatively greater expansion of the cylinder walls than the casing in order that the said walls, which are relatively thin and consequently readily heated may not become distorted, thereby distorting the bore and materially affecting the efficiency of the engine during its operation. With the provision of clearance, it becomes necessary to provide a sealing gasket to prevent leakage of water from the jacket to the crank case of the engine. The gasket to be effective must be made from some material that will not deteriorate with heat or moisture and which, further, will have some adhering tendencies in order to form a proper seal. It has been found by experiment that certain types of resilient material form an excellent seal.

Rubber is well adapted for this purpose because it will not only adhere to the material forming the joints, but will greatly resist deterioration due to heat and moisture. Moreover, annular gaskets made from

it may be made smaller in diameter than the cylinders on which they are to be employed, thereby insuring a water tight joint between the gaskets and the cylinders. But since 5 rubber is substantially non-compressible, gaskets made from it cannot be compressed unless provision is made for its distortion. By providing recesses in the body or walls 10 of the gaskets to permit distortion of the material, they may also be made with a thickness greater than their retaining grooves, whereby when the parts are assembled the gaskets may be placed under 15 both tension and compression, thereby insuring tight joints between the joint members at all temperatures and under all conditions, and at the same time permitting the free expansion and contraction of the members forming the joint, without distorting either of the members.

As shown on the drawings, the gasket 20 is of rubber and recesses are formed in the same in any suitable manner as by providing the peripheral wall of the gasket 25 with parallel projections or ribs 21, extending circumferentially thereof or longitudinally about the same.

In assembling the engine, the gaskets 13 and 20 are placed in the counter bores 10 and grooves 18, respectively and the cylinders are then forced to position in the casing 7, the lower tapered ends of said cylinders expanding said gasket 20 against the bottom walls of the grooves 18.

35 By making the internal diameter of the gasket smaller than the external diameter of the cylinder and its thickness greater than the depth of the retaining groove, as indicated in Fig. 2, the gasket will be under 40 both tension and compression, when the cylinder is forced downwardly to its assembled position. This arrangement will

not only form a water-tight joint between the cylinder and the casing as indicated in Fig. 3, but the resilient gasket 20 will permit both radial and longitudinal expansion 45 of said cylinder without distorting the same.

While the gasket 20 is described as being of rubber, it is understood that it may be made of other material, having the properties 50 indicated above.

It is thought from the foregoing taken in connection with the accompanying drawings that the construction and operation of my device will be apparent to those skilled 55 in the art; and that changes in size, shape, proportion and details of construction may be made without departure from the spirit and scope of the appended claims.

I claim:

60 In a device of the class described an engine casing provided with internal flanges at its upper end and adjacent its lower end, said flanges having alined openings there-through, the peripheral wall of the lower of 65 said openings being provided with a recess, a cylinder having a tapered lower end removably mounted in said openings, a cylinder head engaging the upper end of said cylinder to force it downward, an annular 70 rubber gasket provided with parallel ribs on its outer periphery seated in said recess, the external diameter of said gasket being substantially that of said groove and its internal diameter less than the external diameter 75 of said cylinder, whereby when said cylinder is seated in said openings, said gasket is placed under both compression and tension for forming a water tight joint between said cylinder and one of said 80 flanges.

In testimony whereof I affix my signature.

ARTHUR A. BULL.