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CYLINDER-CRANKCASE ASSEMBLY

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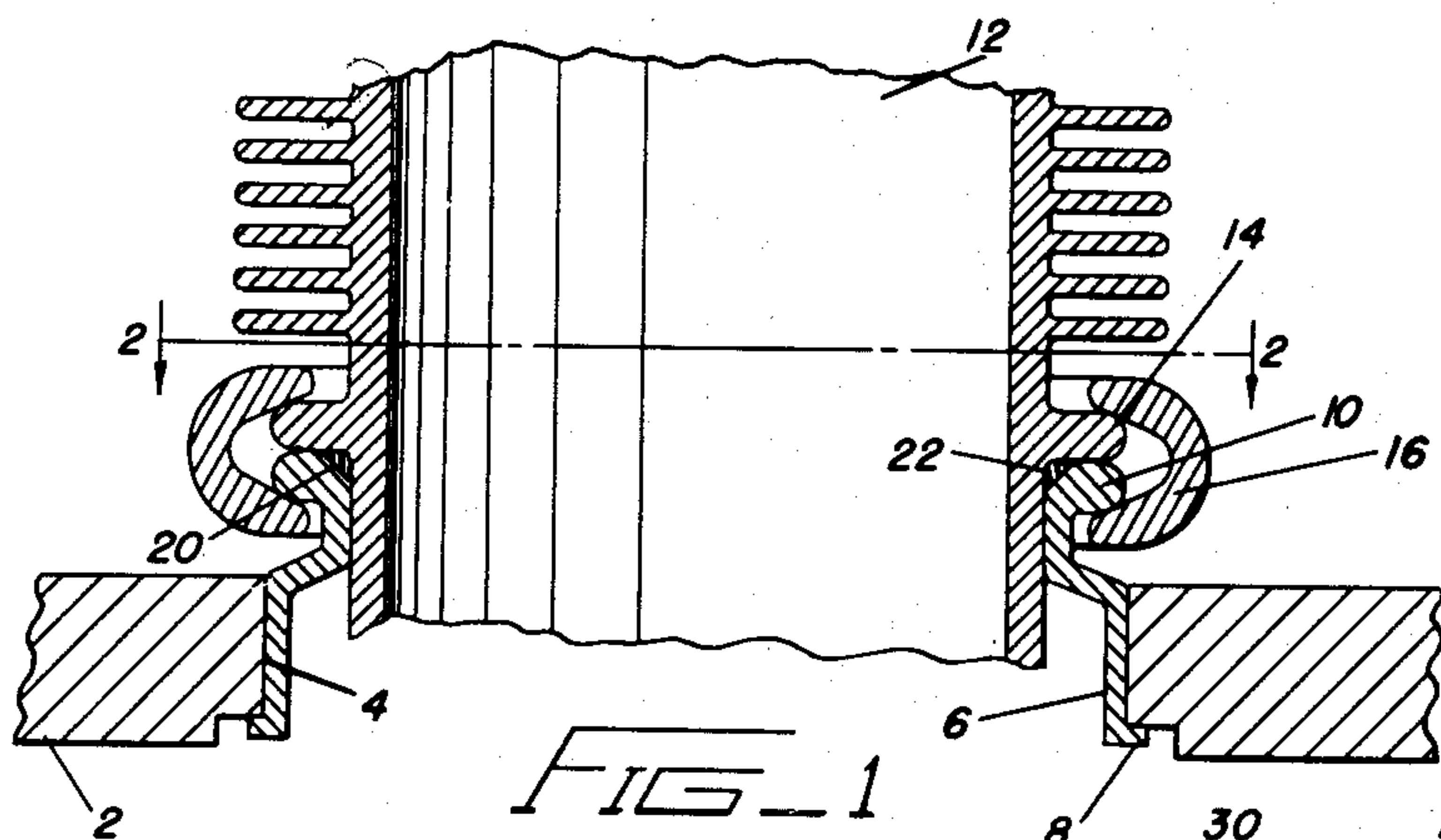


FIG. 1

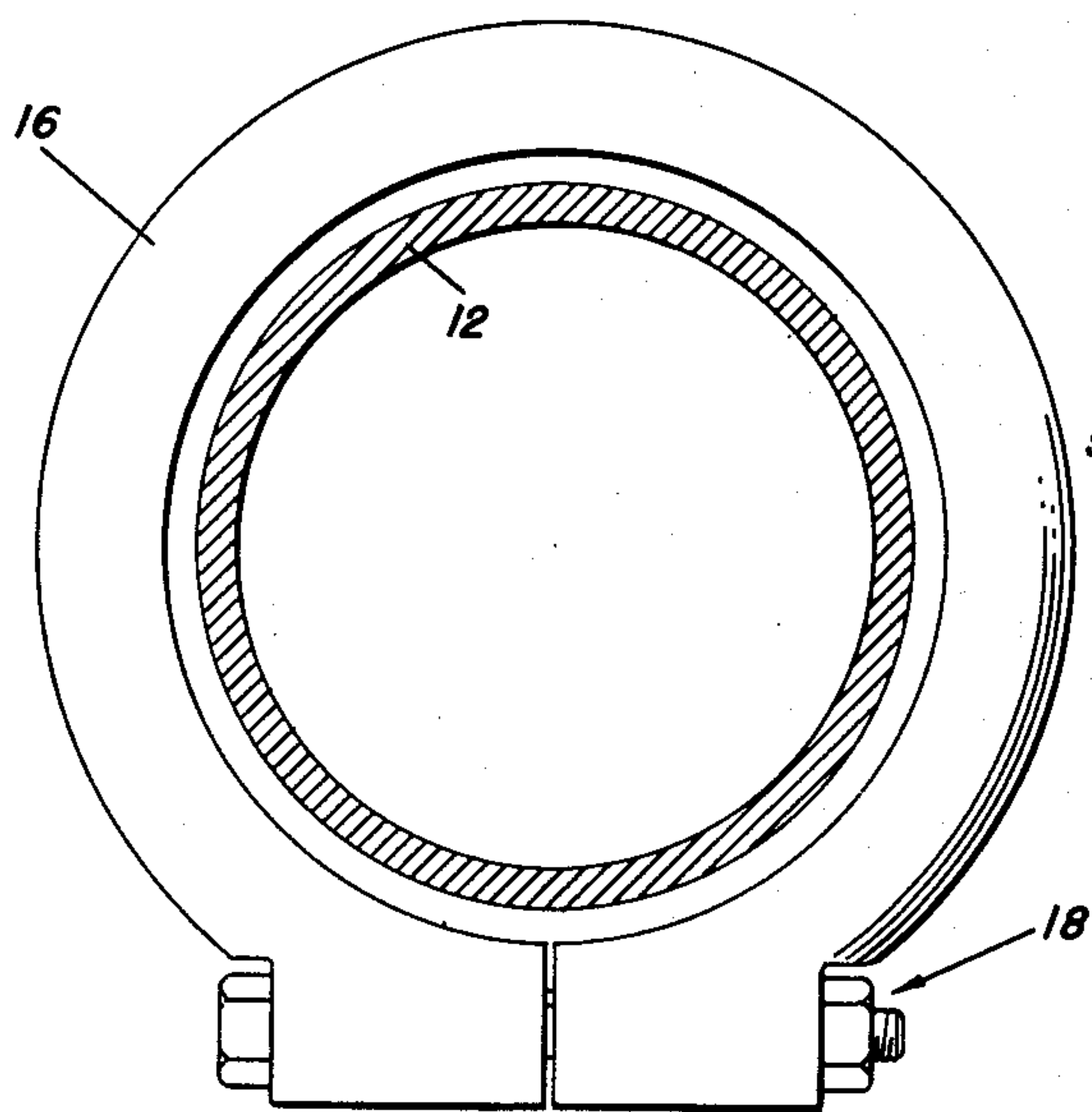


FIG. 2

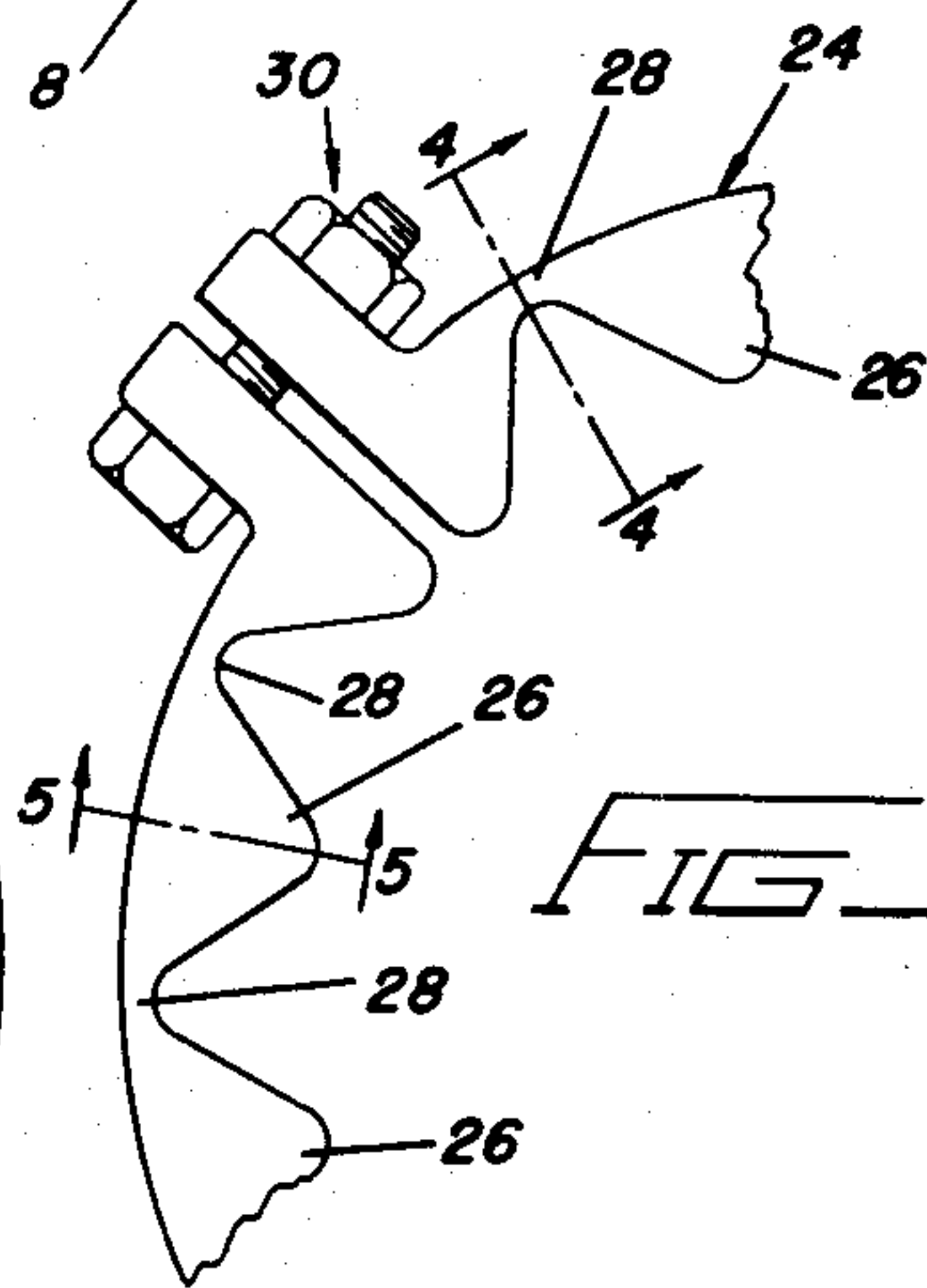


FIG. 3

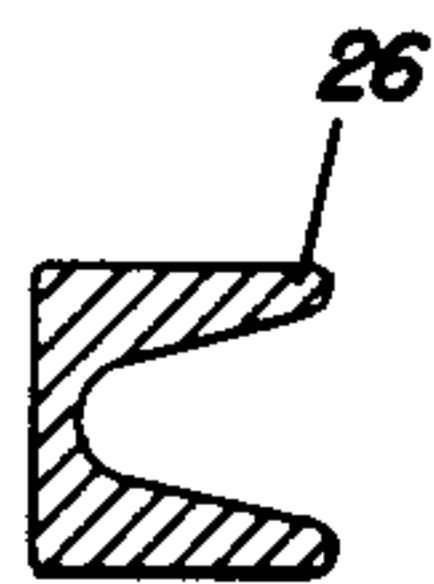


FIG. 5

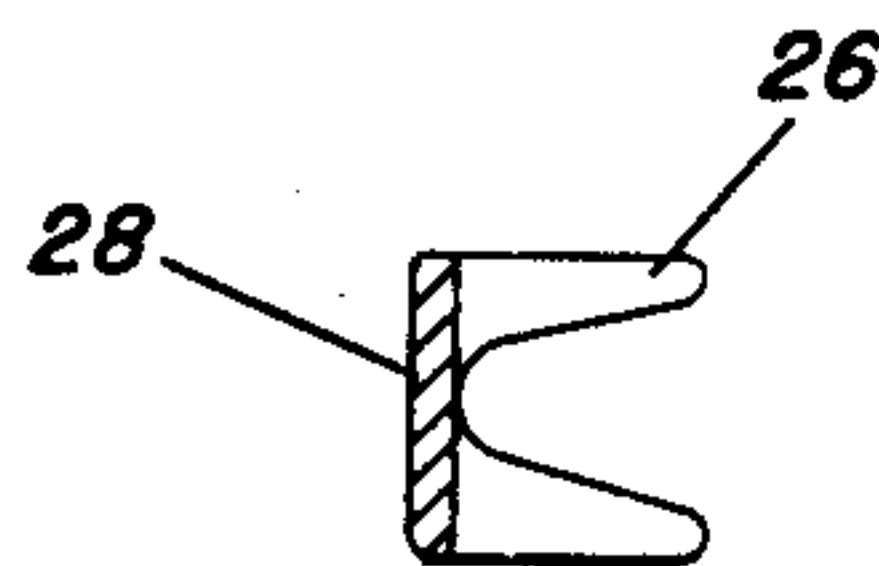


FIG. 4

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CYLINDER-CRANKCASE ASSEMBLY

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2 Claims. (Cl. 121—194)

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This invention relates to internal combustion engines, especially to an internal combustion engine having readily removable cylinders.

It has long been known that it is desirable to make the cylinders of internal combustion engines readily removable from the crankcase. The problem is to provide an engine so designed that the mechanical functioning and efficiency will not be impaired.

It is an object of this invention to provide an internal combustion engine with readily removable cylinders which nevertheless remain tightly in place during normal operation of the engine.

In the drawings:

Fig. 1 is a longitudinal sectional view through a portion of an internal combustion engine embodying this invention.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a plan view showing a coupler made according to the invention, but embodying a different form of the invention from that shown in Figs. 1 and 2.

Fig. 4 is a view in section on line 4—4 of Fig. 3, and

Fig. 5 is a view in section on line 5—5 of Fig. 3.

A portion of a crankcase 2 is shown as having an opening 4 therethrough to receive an engine cylinder. A sleeve 6 has a pressed fit in the opening 4. A flange 8 is provided on sleeve 6 immediately adjacent the crankcase at one end of opening 4. A second flange 10 is provided on the sleeve 6 near the other end of the opening. The flange 10 is preferably offset inwardly so that its outside diameter is no larger than the diameter of opening 4.

An engine cylinder 12 extends through the sleeve 6 and is provided with a flange 14 adjacent and in contact with the flange 10. A coupler 16 having a wedge-shaped cross section encompasses the two adjacent flanges and holds them tightly together. The coupler 16 entirely surrounds the cylinder flange and the sleeve flange and is clamped together at its ends by any suitable fastening means such as the nut and bolt assembly 18.

As is best seen in Fig. 1, the flange 10 is chamfered at 20, and a resilient member 22 is compressed between the two adjacent flanges, lying in the space formed by the chamfer. The resilient member 22 may be any satisfactory sealing material such as a conventional rubber O-ring.

In Figs. 3 to 5 inclusive, there is shown another embodiment of the coupler. In this embodiment, the coupler 24 consists of alternating

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maximum cross sections 26 and minimum cross sections 28. The maximum cross sections 26 provide the coupling action necessary to hold the two adjacent flanges 10 and 14 tightly together, as is best seen in Fig. 5. The minimum cross sections 28 serve merely to join the adjacent maximum cross sections 30. The coupler 24 is held together at its ends by any suitable fastening means such as the nut and bolt assembly. The coupler 24 has an advantage of flexibility over the coupler 16 of Figs. 1 and 2.

Operation

In assembling an engine embodying this invention, the sleeve 6 is pressed into the opening 4 of the crankcase from the inside. The rubber O-ring 22 or other suitable gasket is put in place on the cylinder 12 adjacent the under side of flange 14, and the cylinder 12 is thereupon put in place inside sleeve 6. The coupler 16 or 24 is then slipped over the two adjacent flanges 10 and 14 and is clamped in place.

When it becomes necessary to remove the cylinder for repair or replacement, it is readily removed simply by removal of the coupler 16 or 24, and is easily replaced after it has been repaired, or by a new cylinder if that should be necessary.

I claim:

1. In an internal combustion engine a crankcase having an opening therethrough, a tightly fitting sleeve in the opening and projecting outwardly thereof, a flange on the inner end of said sleeve adapted to be engaged with an internal surface of said crankcase at the inner end of the opening, a second flange on the outer end of said sleeve externally of the opening, a cylinder extending through the sleeve and engaged with the internal surface of the sleeve, a flange on the cylinder and seated on the second sleeve flange, sealing means compressed between the aforesaid two adjacent flanges, and a clamping ring having a substantially V-shaped groove encompassing the two aforesaid flanges and collapsible to urge them tightly together, said ring provided with alternate arcuate portions of a maximum cross sectional area and a minimum cross sectional area of greater flexibility than said section of greater area.

2. In an internal combustion engine, a crankcase having an opening therethrough, a tightly fitting sleeve in the opening and projecting outwardly thereof, a flange on the inner end of said sleeve adapted to be engaged with an internal surface of said crankcase at the inner end of the opening, a second flange on the outer end of said

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sleeve externally of the opening, a cylinder extending through the sleeve and engaged with the internal surface of the sleeve, a flange on the cylinder and seated on the second sleeve flange, sealing means compressed between the aforesaid 5 two adjacent flanges, and a clamping ring having a substantially V-shaped groove encompassing the two aforesaid flanges and collapsible to urge them tightly together, said ring provided with alternate arcuate portions of a maximum cross-sectional area and a minimum cross sectional area of greater flexibility than said section of greater area, said V-shaped grooved portion of said clamping ring contained only in said ring 10 portion of maximum cross sectional area, said cross-section of minimum area comprising flexi-

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ble arcuate cylindrical bands joining the portions of V-shaped cross section of maximum area.

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