

May 27, 1930.

A. T. KASLEY

1,759,946

INTERNAL COMBUSTION ENGINE

Filed March 31, 1927

2 Sheets-Sheet 1

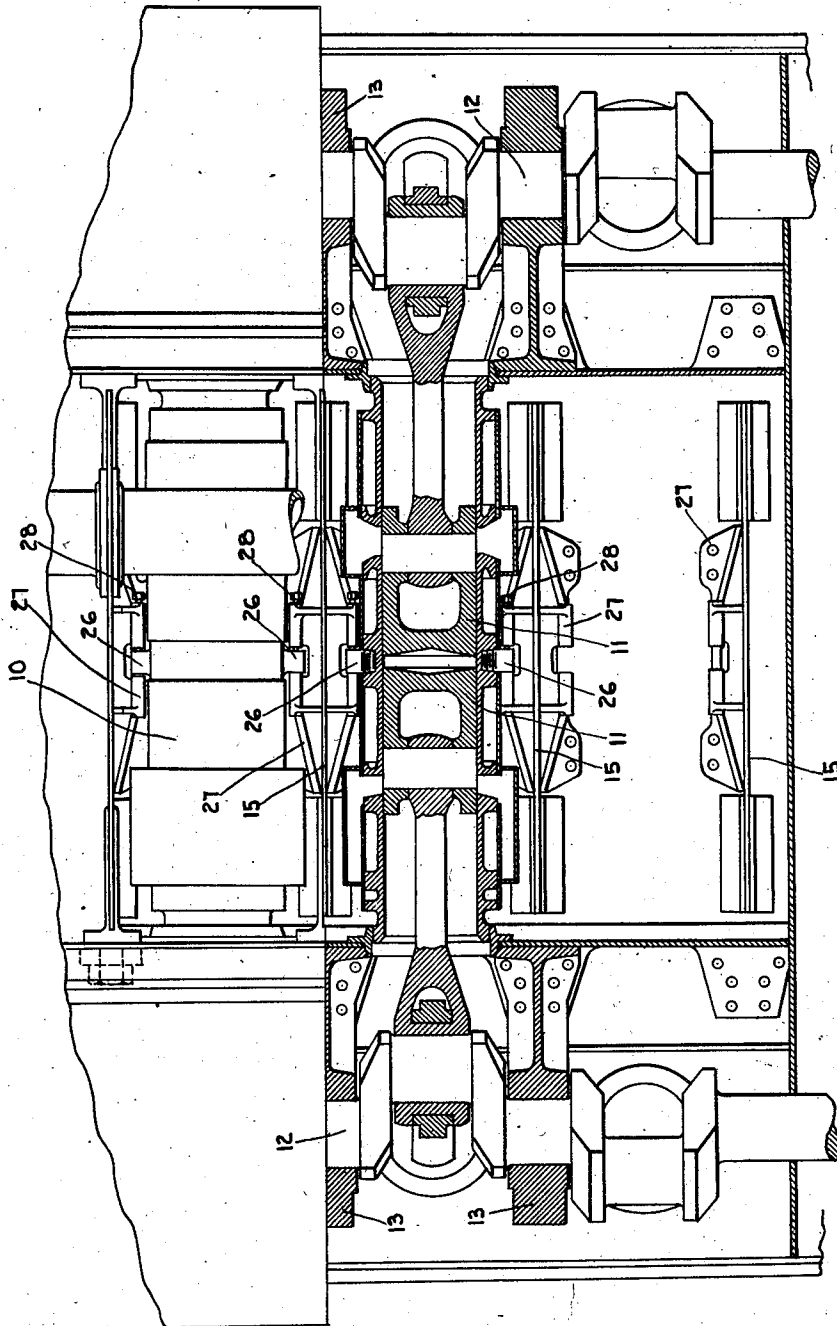


Fig. 1.

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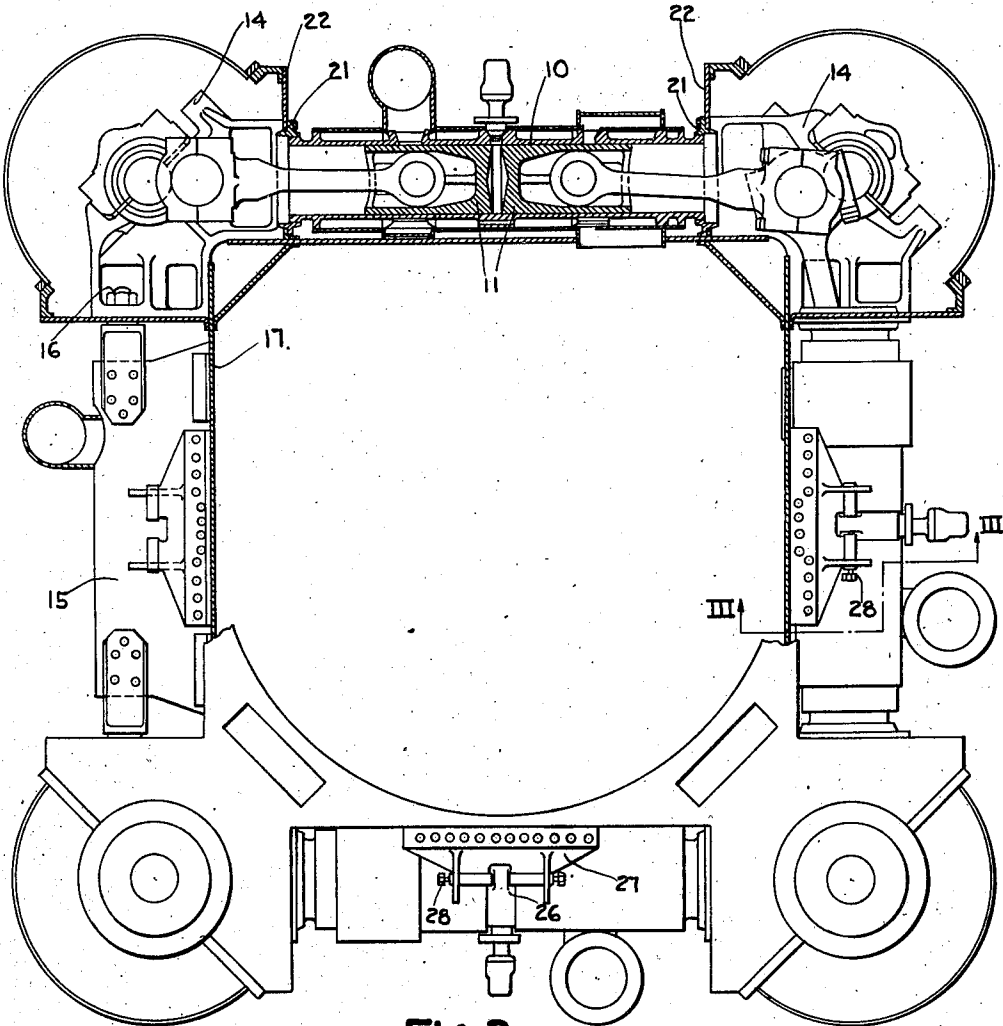


Fig. 2.

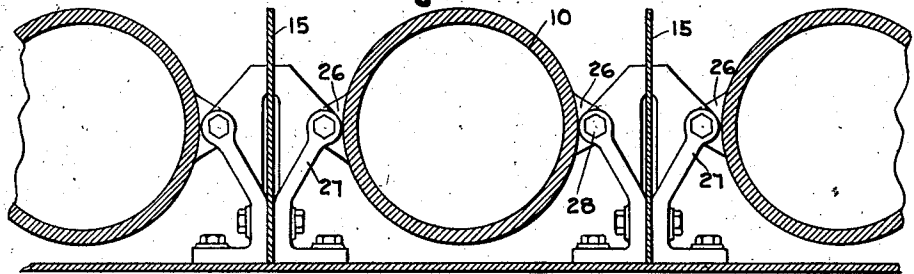


Fig. 3.

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UNITED STATES PATENT OFFICE

ALEXANDER T. KASLEY, OF MOORES, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA

INTERNAL-COMBUSTION ENGINE

Application filed March 31, 1927. Serial No. 179,766.

My invention relates to reciprocating engines, more particularly to multi-cylinder internal combustion engines of the Diesel type, and has for its object the provision of improved means for mounting the cylinders of apparatus of the character designated which shall be effective to visibly indicate excessive friction occurring in any of the cylinders.

Apparatus embodying features of my invention is illustrated in the accompanying drawings forming a part of this specification, wherein:

Fig. 1 is a fragmentary view of Diesel engine apparatus showing my invention applied thereto;

Fig. 2 is a view, partly in plan and partly in section, and showing one of the cylinders in section; and,

Fig. 3 is a sectional view through a cylinder and its retaining means taken along the line III—III of Fig. 2.

In the operation of multi-cylinder engines, particularly internal combustion engines of the Diesel type, difficulties have been encountered at times due to excessive friction or sticking of a piston within a cylinder, causing the engine to stop. On such occasions it has heretofore been extremely difficult to determine in which particular cylinder of the multi-cylinder unit the excessive friction was occurring and it became necessary to perhaps dismantle the whole engine before the cylinder in which the trouble was located could be discovered.

The above difficulty is entirely obviated in accordance with my invention by the provision of an improved mounting for the cylinders wherein they are each anchored against longitudinal movement at one point only, and wherein the anchoring means includes a yieldable member, which, upon excessive friction between a cylinder and a piston, yields and visibly indicates the cylinder wherein the excessive friction is occurring.

My invention is particularly applicable to Diesel engines of the type illustrated, described and claimed in the application of Herbert T. Herr, Serial No. 102,044, filed April 14, 1926, and assigned to the Westinghouse Electric Manufacturing Company,

though it will be obvious that it has a wide range of applicability in the art and must not be construed to be limited only to the particular type of engine shown.

Referring now to the drawings for a better understanding of my invention, I show, in Fig. 1, a Diesel engine comprising a plurality of cylinders 10 disposed in parallel relation and each having operating therein opposed pistons 11. The pistons 11 are connected to crank shafts 12 at the opposite ends of the cylinders and extending transversely of the cylinders. As seen in Fig. 2, the cylinders may be arranged in the form of a hollow square so as to define a polygonal structure, or they may be arranged as one or more sets of opposed piston cylinders as viewed in Fig. 1. The crank shafts 12 are supported in suitable bearings 13, the bearings being supported by suitable castings or bearing supporting structures 14. The opposed castings or bearing supporting structures are joined together by tension members 15, which, in the example shown in the drawing, consist of plate members secured by bolts 16 to the bearing supports. The bearing supports 14 are also preferably joined to side plates 17 of the prismatic supporting structure.

The tension members 15 serve to resist the working forces of the engine, so that the only stresses to which the cylinder walls are subjected are those resulting from pressure within the cylinders.

Each of the cylinders 10 is supported, as may best be seen from Fig. 2, by a pair of rings 21 arranged at the opposite ends thereof and slidable with respect thereto. The rings 21 are bolted or otherwise suitably secured to stationary plate members 22 arranged adjacent both ends of each of the cylinders, each side plate 17 having a pair of plates 22 secured thereto adjacent to lateral margins thereof. This form of support for the cylinders accomplishes two very useful purposes. It permits the ready expansion of the cylinders due to changes in temperature therein and also permits the ready removal of a cylinder, it only being necessary, after the pistons are removed and pipes disconnected, to detach the rings 21 from the

plates 22 in order to effect the removal of a cylinder.

The tension members 15, previously described, are arranged on each side of each of the cylinders so that there are two of said tension members adjacent each cylinder. Centrally of each of the cylinders 10, there is provided a lug 26, which may be formed integrally with the cylinders or secured thereto. On each of the adjacent tension members 15, there is provided bifurcated retaining members 27, which are arranged to straddle the lugs 26 in order to restrain the cylinders 10 from longitudinal movement. The bifurcations on the members 27 are made so as to provide clearance with respect to the lugs 26. The lugs 26, and consequently the cylinders 10, are positioned with respect to the retaining means 27 by means of pins 28 which are threaded through properly arranged holes in one side of each of the bifurcated members 27 and which have their ends bearing against the lugs 26.

The pins 28 are only made strong enough to withstand the normal frictional resistance existing between the pistons 11 and the walls of the cylinders 10. Should one of the pistons become stuck in a cylinder, or should excessive friction arise between a piston and its cooperating cylinder, the associated pins 28 are crushed allowing the cylinder to become loose with respect to the retaining means 27. The retaining pins 28 are visible from the exterior of the engine. Therefore, the particular cylinder in which the trouble exists may be readily located, as such a cylinder would move longitudinally back and forth as determined by the clearance permitted by the crushed pin or pins and noise or chatter would ensue. These things would readily and surely warn one of trouble.

The clearance between the lugs 26 and the furcations of the bifurcated members 27 is preferably only sufficient to serve as an indication of excessive friction in a cylinder when the pins 28 are crushed, and is not so wide as to permit excessive longitudinal movement of the cylinder. By thus limiting the clearance by a predetermined amount, the sticking of a piston and the consequent crushing of the pins 28 and loosening of a cylinder does not permit such excessive movement of the cylinder as would endanger necessary pipe connections thereto.

From the foregoing, it will be apparent that I have devised a new and improved means for supporting the cylinders of a multi-cylinder internal combustion engine whereby upon excessive friction occurring between a cylinder and a piston the trouble may be readily located, and whereby the cylinder is free to contract and expand due to temperature variations when the engine is working.

While I have shown my invention in one

form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications, without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. In a multi-cylinder reciprocating engine, the combination with a cylinder and a piston therein, of yieldable means cooperating between the cylinder and a stationary part of the engine structure whereby upon excessive friction between the cylinder and the piston said yieldable means is effective to indicate said excessive friction.

2. In a reciprocating engine, a cylinder, a piston in the cylinder, means permitting longitudinal movement for supporting the cylinder and maintaining it in proper alignment, and yieldable means for restraining the cylinder against longitudinal movement.

3. In an internal combustion engine, the combination with a supporting structure, of a cylinder, retaining elements cooperating between the cylinder and the supporting structure for resisting longitudinal movements of the cylinder and having a predetermined clearance space therebetween, and yielding means normally occupying said clearance space.

4. In an internal combustion engine, the combination with a supporting structure, of a cylinder, retaining elements cooperating between the cylinder and the supporting structure for resisting longitudinal movements of the cylinder and having a predetermined clearance space therebetween, and yielding means including crushable elements normally occupying said clearance space.

5. In a multi-cylinder reciprocating engine, the combination with a cylinder and a piston disposed therein for reciprocation, of means for supporting the cylinder including means visible from the exterior thereof for indicating when excessive friction exists between the piston and the cylinder.

6. In a Diesel engine having a plurality of cylinders with opposed pistons therein, the combination of means independent of the cylinders for resisting the working forces of the engine, means for mounting the cylinders and longitudinally slidable with respect to said cylinders, and yieldable retaining means for holding the cylinder against longitudinally movement.

7. In a Diesel engine having a plurality of cylinders with opposed pistons therein, the combination of means independent of the cylinders for resisting the working forces of the engine, means for mounting the cylinders and longitudinally slidable with respect to said cylinders, and yieldable retaining means visible from the exterior of the engine for

holding the cylinders against longitudinal movement.

8. In a Diesel engine having a plurality of cylinders with opposed pistons therein, the combination of means independent of the cylinders for resisting the working forces of the engine, means for mounting the cylinders and longitudinally slidable with respect to said cylinders, and centrally disposed yieldable retaining means including a crushing pin visible from the exterior of the engine for holding the cylinders against longitudinal movement.

9. In a Diesel engine having a plurality of cylinders with opposed pistons therein, the combination of means independent of the cylinders for resisting the working forces of the engine, means for mounting the cylinders and longitudinally slidable with respect to said cylinders, lugs on the cylinders, retaining means secured to a stationary part of the engine structure and cooperating with the lugs for holding the cylinders against longitudinal movement, and a yieldable member cooperating with the retaining means and the lugs adapted to yield and permit displacement of the cylinders upon excessive friction between a cylinder and a piston.

10. In a multi-cylinder Diesel engine of the opposed piston type, the combination of crank shafts connected to the pistons, bearings for the crank shafts with bearing supports therefor, tension members extending between the bearing supports and parallel to said cylinders, lugs on the cylinders, bifurcated retaining means carried by the tension members and straddling the lugs on the cylinders and having clearance with respect to said lugs, and crushing pins extending through each of the retaining means on one side thereof and bearing against the lugs for holding the cylinders in place.

11. In a multi-cylinder Diesel engine of the opposed piston type, the combination of a plurality of cylinders disposed in side by side relation, a pair of crank shafts for the pistons and extending transversely across the ends of the cylinders, bearings and bearing supports for the crank shafts, tension members extending between the bearing supports longitudinally of the cylinders for resisting the working forces of the engine, removable rings supporting each end of each of the cylinders and slidable with respect to the cylinders, and centrally disposed retaining means for each of the cylinders secured to the tension members and including a crushing pin whereby upon excessive friction between a cylinder and its cooperating piston, said crushing pin yields and indicates the cylinder wherein said excessive friction exists.

12. In an engine, the combination with a cylinder having a piston reciprocating

therein, of means for supporting the cylinder and arranged to retain the cylinder in a fixed position laterally, and means for retaining the cylinder in a fixed position longitudinally, said last-named means being yieldable and providing for longitudinal movement of the cylinder upon the creation of excessive resistance to movement between the piston and the cylinder.

In testimony whereof, I have hereunto subscribed my name this 22nd day of March, 1927.

ALEXANDER T. KASLEY.

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