March 10, 1936. G. J. WOHANKA 2,033,601

ENGINE CONSTRUCTION

Filed Sept. 15, 1933

Fig. 1

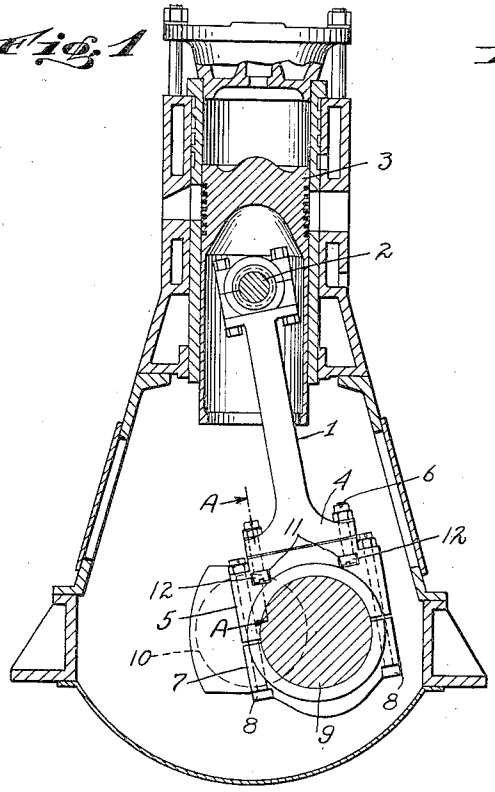


Fig. 2

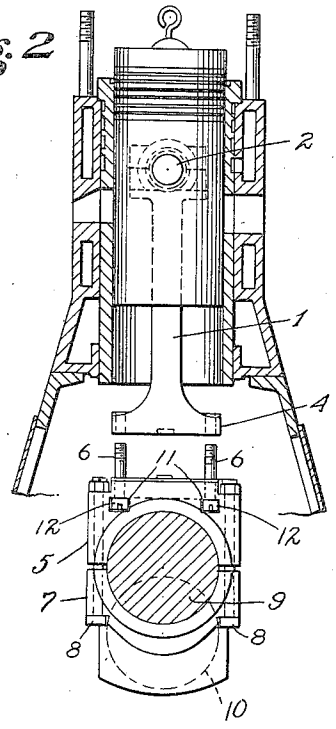


Fig. 4

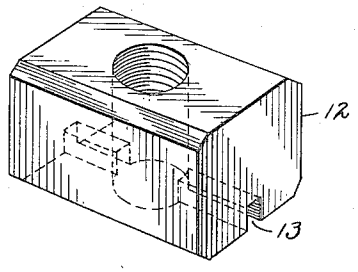
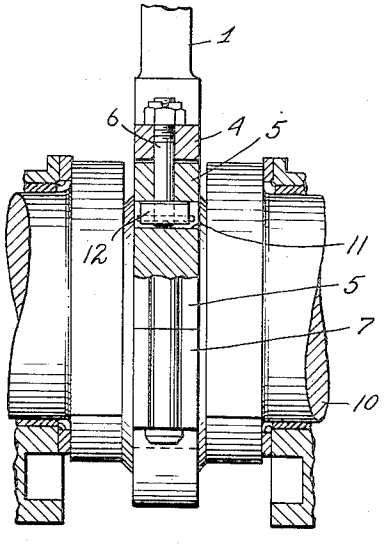


Fig. 3



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ENGINE CONSTRUCTION

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Application September 15, 1933, Serial No. 689,555

2 Claims. (Cl. 74—579)

The invention relates to engine construction and more particularly to large sized oil-burning or Diesel engines where the crank-shafts are subject to heavy stresses and are required to be of correspondingly large diameters with proportionately heavy crank-pins. In such engines the process of removing the pistons, as sometimes necessary for one reason or another, is an arduous and time-consuming task, especially where the frame construction or crank enclosure does not permit its removal through the lower end. The piston must then be removed upwardly and the connecting-rod must be disconnected at the piston-pin end, because the crankshaft end is ordinarily much too large to permit the rod to be hauled up, with the piston, through the cylinder. This work, performed within the restricted space inside the piston skirt is slow and difficult and also entails the danger of the piston or other parts falling on the workman.

The object of the present invention is to reduce the delay and danger incident to such ordinary methods of piston removal and consists in the combination with the connecting-rod of a firm but separable junction between the shank of the rod and its crank-pin bearing-box with the part of the joint on the piston side, of such dimensions as will pass through the cylinder, so that the piston with the connecting-rod hanging on it can then be withdrawn upwards, the crank-pin bearing-box remaining undisturbed on its crank-pin. By this method neither the piston-pin bearing, nor the crank-pin bearing, has to be disturbed and the whole process of repair is materially shortened.

The drawing illustrates the invention more or less schematically and in a conventional single cylinder type of engine.

Figure 1 is a longitudinal section of such an engine;

Figure 2 represents the same in process of piston removal;

Figure 3 is a partly sectional view of the crank pin box and the separable joint referred to, and

Figure 4 is a large scale perspective of the anchor nut which forms part of the joint.

The general construction of the engine is not important as above indicated and may be, for example, as shown in the drawing. The connecting-rod 1 is pivotally connected to the piston-pin 2 within the skirt of the trunk piston 3 in the usual way and by any suitable form of piston-pin bearing. Its other end terminates in a transverse foot flange 4 symmetrically formed thereon and provided with bolt holes. This flange is fitted to and bolted securely upon the top face of the upper half 5 of the crank-pin box by the stud bolts 6, a mortise-type joint being indicated and preferred. The lower half 7 of the box is bolted by a separate set of bolts 8 to the top half of the box and around the crank pin 9, with of course the usual brasses included and properly adjusted. The dotted line circle marked 10 of Figure 1 represents the crank shaft.

I have found that within the dimensional relations necessary between cylinder and crank shaft diameter in engines of the class to which this invention relates, and which includes those in which more than one connecting rod is journalled on a single crank pin, it is possible to make the connecting-rod foot flange 4 small enough in its over-all dimensions to pass easily through the engine cylinder while yet preserving an adequate factor of safety for the connecting rod as a whole. The invention is based on the discovery of this possibility and results in substantial advantages in these engines inasmuch as by the simple process of removing the nuts from the stud bolts 6 the piston and its connecting rod can be hoisted through and out of the top of the cylinder without disturbing the adjustment of either the crank-pin or the piston-pin bearing and can be reassembled with equal dispatch and without having to readjust such bearings, thereby avoiding much of the delay and loss of time, dockage fees, etc. now incident when a piston requires removal. The added reciprocating mass represented by the foot flange 4 and its bolts is insignificant in comparison to these advantages.

In order that the joint may be incorporated in the structure without impairing the strength of the crank-pin box, the stud bolts 6 occupy holes in the box which do not pierce the crank-pin space of the box; that is to say, the hole for each stud bolt 6 terminates in a slot 11 cut into or through the top half of the box above the crank-pin brass therein and the lower end of the stud bolt 6 is threaded into a block or nut 12 fitted snugly into this cross slot and locked to the nut by a cotter then introduced into and occupying the slot 13 in the nut so as to prevent relative rotation. By this means an adequate anchorage of the stud bolts is accomplished without in any way weakening the box for the strains it has to carry.

It will be apparent that the invention is useful also in the type of engines in which there is room for lower end removal inasmuch as the labor of reassembling and adjusting the crank-pin bearing box will in any event be eliminated.

Having described the invention in reference to one of its forms the following is claimed:

1. In an oil engine having a crank shaft with crank-pin, a crank-case for said crank shaft and crank-pin, a cylinder mounted on and communicating with the interior of said crank-case, a removable head for said cylinder, said crank-case having an opening providing access to the crank shaft therein from outside the engine, a trunk piston reciprocating in said cylinder, a connecting rod wholly contained in said cylinder and crank-case and operatably associated with both said piston and crank shaft, said connecting rod comprising a shank and upper and lower bearing blocks, bolts attaching said blocks together around said pin, to form a bearing box of such size that it will not pass through the cylinder, a separable but rigid joint formed in said connecting rod adjacent said box and comprising a foot flange on the rod having an over-all size less than said box and adapted to pass through the cylinder when the head is removed, the box remaining on the crank-pin, said foot flange being fitted to the top surface of said bearing box, and clamp bolts for securing said flange to said box, said clamp bolts being independent of the bolts by which the parts of said bearing box are held together.

2. In an engine having a crank-case, a cylinder with a removable head mounted on said crank-case, a trunk piston slidable in said cylinder and accessible from said crank-case, a crank shaft, a connecting rod operatively associated with both said piston and crank shaft, the said connecting rod comprising a shank, upper and lower bearing blocks, bolts securing said blocks together on said crank shaft to form a bearing box having overall dimensions greater than that of the cylinder diameter and a separable but rigid joint between said shank and bearing box comprising a flange on said shank, the flange having an overall size less than said cylinder diameter and adapted to pass through the cylinder when the head is removed, the box remaining on the crank shaft, cross slots in the upper bearing block, nuts in said slots and removable bolt means anchored in said nuts securing said flange to said bearing box.

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