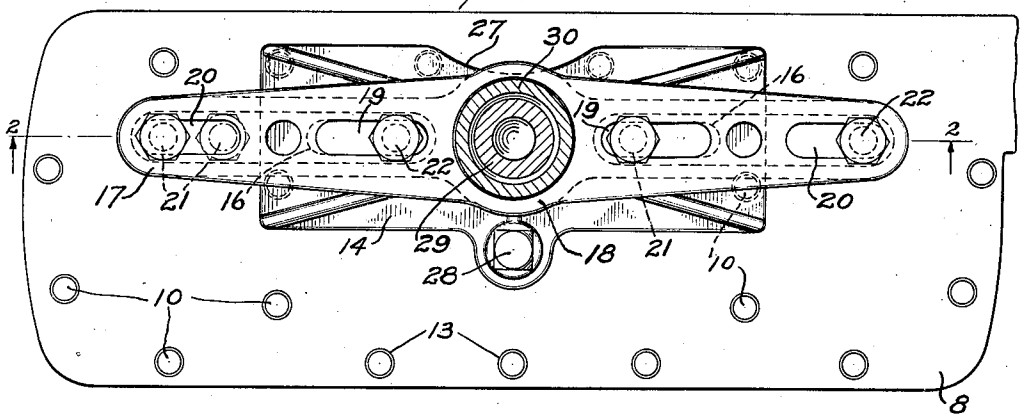
Jan. 21, 1941. E. M. PFAUSER ET AL 2,229,256

CYLINDER HEAD REMOVER

Filed Jan. 19, 1939

Fig. 1.



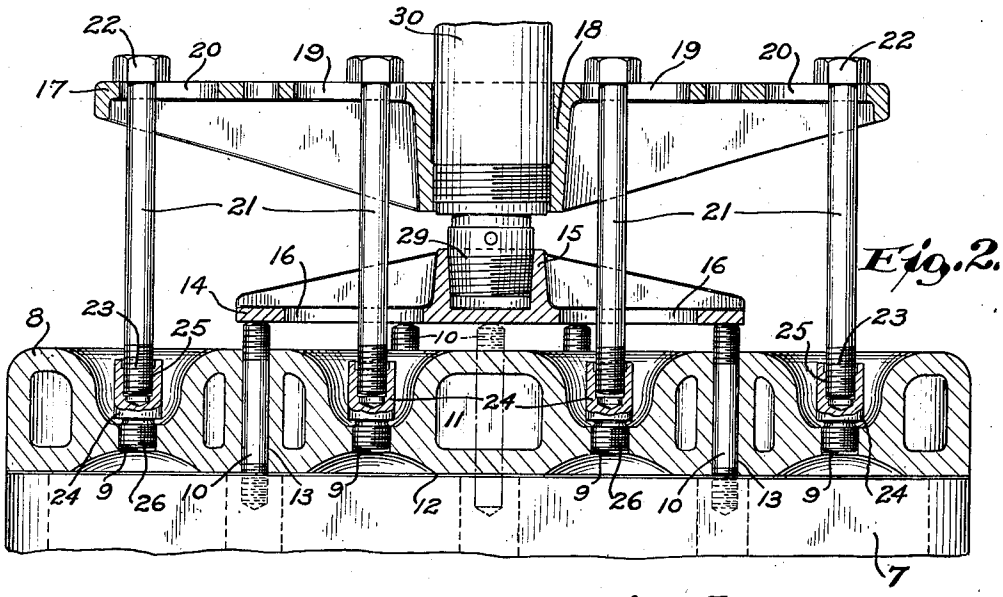


Fig. 2.

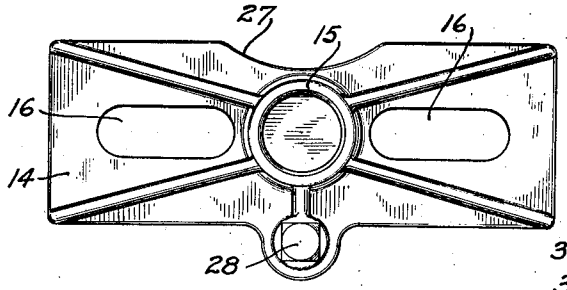
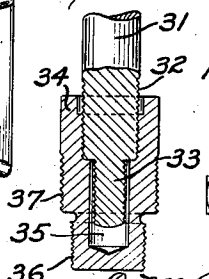


Fig. 3.

Fig. 5.



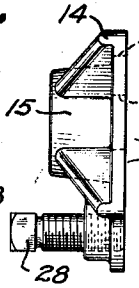


Fig. 4.

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CYLINDER HEAD REMOVER

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Application January 19, 1939, Serial No. 251,720

2 Claims. (Cl. 29—84)

Our present invention relates generally to improvements in the art of dismantling machinery, and relates more particularly to improvements in the construction and operation of apparatus for effecting removal of snug fitting motor parts such as the cylinder heads of internal combustion engines.

In general, an object of our invention is to provide simple and effective equipment for expediting removal of machine parts such as the cylinder heads of internal combustion engines.

Automobile repair-men have heretofore frequently encountered considerable difficulty in attempting to effect removal of motor cylinder heads which had not been removed for extended periods of time. These cylinder heads are normally held in place by means of numerous snug fitting parallel studs, and are firmly clamped against leak-proof gaskets. The studs and heads usually become rusted or corroded, and the gaskets stick tenaciously to the head and cylinder, thus making it extremely difficult to withdraw these heads from the parallel fixed studs. Because of the use of numerous retaining studs of various lengths, which are spaced differently in different sizes and styles of engines, and also because the threading in the spark plug openings affords practically the only means of applying the enormous pull required to effect initial withdrawal of stubborn cylinder heads, it has heretofore been impossible to readily remove these heads under adverse conditions without damaging or marring either the cylinders or the clamping studs secured thereto. It required great skill and care and a large assortment of tools, with the prior methods, in order to effect removal of so-called frozen cylinder heads from their normal moorings, and it also consumed an excessive amount of time and in many cases the work could not be done at all by the ordinary garage mechanic, without causing damage to the cylinder heads.

It is therefore a more specific object of our present invention to provide improved instrumentalities for effecting quick and convenient removal of even the most stubborn cylinder heads, from their cylinder blocks and retaining studs.

Another specific object of our invention is to provide new and useful cylinder head removing equipment having relatively few and simple parts, and which can be effectively employed for removal of various types of heads having different numbers of clamping studs and different sizes of spark plug openings.

A further specific object of the invention is to provide an improved cylinder head remover which is especially adapted for operation by means of a standard power jack or ram, and which may be applied and manipulated by any mechanic.

Still another specific object of the present invention is to provide improved apparatus for facilitating removal of cylinder heads or the like with the aid of the threaded spark plug openings and retaining studs, and which will insure withdrawal of the heads parallel to the stud axes.

An additional specific object of our invention is to provide universally applicable cylinder head removing equipment, which is durable in construction and which may be manufactured and sold at moderate cost.

These and other specific objects and advantages of the present invention will be apparent from the following detailed description.

A clear conception of an embodiment of our invention, and of the mode of applying and of utilizing the improved apparatus for the removal of cylinder heads, may be had by referring to the drawing accompanying and forming part of this specification, wherein like reference characters designate the same or similar parts in the several views.

Fig. 1 is a top view of a cylinder head and of our improved head removing apparatus, showing the hydraulic actuating ram in section;

Fig. 2 is a longitudinal vertical section through the head and apparatus of Fig. 1, taken along the line 2—2;

Fig. 3 is a top view of the lower stud engaging member or plate removed from the actuating ram;

Fig. 4 is a side view of the lower plate; and

Fig. 5 is an enlarged central vertical section through one of the universal spark plug fittings.

While we have shown and described the invention as being applied to a particular type of cylinder head having a specific number of attaching studs, and as being operable by means of a hydraulic ram, it is not our intention to thereby unnecessarily restrict the scope or utility of the improvement.

Referring to the drawing, the ordinary internal combustion engine for propelling automobiles or the like, comprises in general a multiple cylinder block 7 having a one-piece cylinder head 8 provided with internally threaded spark plug openings 9, the head 8 normally being clamped to the block 7 by means of a series

of studs 10 and nuts coacting with the studs, see Fig. 2. The head 8 is usually provided with a cooling jacket 11 and coacts with the cylinder block 7 through a leak-proof gasket 12, and the studs 10 are disposed parallel to each other and snugly fit bored holes 13 penetrating the head 8.

Our improved apparatus for facilitating removal of such cylinder heads 8, utilizes the threaded spark plug openings 9 and the upper ends of several of the fixed studs 10 to effect breaking of the seal afforded by the gasket 12 and the corrosion between the studs and stud openings in the cylinder head. This improved apparatus is shown assembled in Figs. 1 and 2, and comprises a lower stud engaging member or plate 14 having an internally threaded central boss 15 and alined opposite side slots 16; an upper cross-member or beam 17 provided with an internally threaded central hub 18 and two sets of alined slots 19, 20 on opposite sides of the hub; tension elements or bolts 21 having upper heads 22 adapted to coact with the beam 17 and being provided with lower threaded ends 23; and spark plug adapters 24 having internally threaded sockets 25 cooperable with the threaded lower ends 26 which are cooperable with the spark plug openings 9.

The lower plate 14 has a plane lower stud engaging face, and besides being provided with the boss 15 and slots 16, this plate may be provided with a cut-out 27 for clearance purposes when applied to certain types of standard cylinder heads, and with one or more adjustable stud engaging screws 28 adapted to coact with short studs also used in certain types of cylinder assemblages. The threaded boss 15 is formed for coaction with one of the relatively movable elements 29 of a standard power applying jack or ram, and the threaded hub 18 of the uper beam 17 is formed for similar and simultaneous coaction with the other jack element 30, so that relative movement of the elements 29, 30 will produce similar relative movement of the plate 14 and beam 17. Both the plate 14 and the beam 17 are reenforced by ribbing as shown, and when these parts have been properly assembled, the slots 16 of the lower plate should be in approximate vertical alinement with the inner slots 19 of the upper beam.

The bolts 21 shown in Figs. 1 and 2 are standard machine bolts having their lower ends 23 provided with special threading adapted to fit one size of spark plug opening 9, and when our equipment is being used to remove a head 8 having that particular size of opening 9, the adapters 24 need not be used as the bolts 21 may then be screwed directly into the threaded openings 9. In the assemblage shown in Fig. 1 and 2, the spark plug openings 9 are too large to coact directly with the threaded ends 23, and the lower end 26 of each adapter 24 is therefore formed to properly coact with these larger openings 9. In cases where the assemblage is to be used on cylinder heads 8 having still smaller and larger spark plug openings 9, special bolts 31 and adapters 34 such as shown enlarged in Fig. 5, may be provided. The special bolts 31 have threading 32 which corresponds to the threading on the ends 23 of the bolts 21, and the extreme lower end 33 of each bolt 31 is of reduced diameter and is threaded to fit the smallest spark plug openings 9. The bolt end 33 is freely insertible within the unthreaded socket 35 of the adapter 34, and the lower end 36 of each adapter 34 is threaded to fit a spark plug opening 9 of the size shown in Fig. 2. The medial enlarged portion of each adapter 34 is provided with larger threading 37 adapted to fit the largest size spark plug openings 9, so that the special bolt 31 and adapter 34 may be used in conjunction with four different sizes of spark plug openings 9.

When utilizing our improved apparatus to effect release of a firmly confined cylinder head 8 such as shown in Fig. 2, the upper clamping nuts should first be removed from the studs 10. The equipment should then be applied to the jack or ram elements 29, 30 and associated with the cylinder head 8 in the manner shown in Figs. 1 and 2, that is, with the lower face of the plate member 14 engaging the upper extremities of several of the studs 10, and with the bolts 21 connecting the upper beam member 17 with the cylinder head in alinement with the spark plug openings 9. By virtue of the provision of the slots 16, 19, 20, the bolts 21 may obviously be positioned in alinement with the openings 9 even if these openings are spaced apart different distances, and this adjustment is clearly indicated at the left of Fig. 1. After the equipment has been thus properly applied to a cylinder and cylinder head, the jack elements 29, 30 may be caused to move apart. The plate member 14 will then exert downward pressure against the fixed studs 10, and the beam member 17 will subject the bolts 21 to tension and will thus exert an upward pull upon the head 8. By applying sufficient force to the jack, the seal afforded by the gasket 12 and the retarding effect produced by corrosion between the studs and stud openings in the cylinder head, will soon be broken, and the head 8 will be moved upwardly along the studs 10. When the head 8 has been moved away from the cylinder block 7 to a slight extent, it is a relatively easy matter to thereafter lift the head from the studs 10, and complete removal of the head 8 may therefore be effected after the seal has been broken, by merely lifting the jack and the releasing apparatus together with the head 8, manually off of the studs in an obvious manner. Due to the fact that the bolts 21 are located on opposite sides of the center line of the jack, and are also disposed in true alinement with the spark plug openings 9, and also due to the fact that the plate member 14 is of sufficient size to coact with studs 10 on opposite sides of the jack, the withdrawal of the head 8 may be accurately effected in a direction parallel to the stud axes. Possible tilting and damaging of the studs 10 is thus positively avoided, and initial release of the head is made possible with minimum effort.

In case the application of downward pressure against the studs 10 is not sufficient to prevent tilting of the member 14, the set-screw 28 may be manipulated to bring the same into coaction either with a short stud or with some other portion of the cylinder 7, thereby providing an additional contact point against which releasing pressure may be applied. In the event that the spark plug openings 9 are not of proper size to receive the threaded ends 26 of the adapters 24, the adapters may be removed and the bolt ends may then be applied directly to the spark plug openings. The special bolt 31 and adapter 34 of Fig. 5 will obviously permit application of the bolt ends to any standard size of spark plug opening, and the adapters are furnished only in order to permit greater flexibility in use. The hydraulic ram shown in the drawing may obviously be replaced by any other type of jack, although it has been found that great power is

available with the hydraulic jack and the apparatus has actually been utilized to remove cylinder heads which could not be loosened with any other available equipment.

From the foregoing detailed description it will be apparent that our invention provides an improved cylinder head release assemblage which is extremely simple, durable and compact in construction and which may be readily applied to standard engine cylinders and manipulated to release even the most stubbornly retained cylinder heads. The equipment can be quickly applied to and removed from a cylinder head and the various adjustments provided will permit attachment of the assemblage to engines of different types and shapes. The power is effectively distributed so as to insure withdrawal of the heads parallel to the retaining stud axes, and the equipment shown in the drawing is applicable to any standard type of automobile motor now on the market. The apparatus may obviously be manufactured and sold at moderate cost and can also be manipulated by any ordinary mechanic.

It should be understood that it is not desired to limit this invention to the exact details of construction or to the precise mode of use of the apparatus herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

We claim:

1. A cylinder head remover, comprising, a pair of elongated beam members each having a central socket and a plane surface disposed perpendicular to the common axis of said sockets, a jack having elements relatively movable along said axis and attached to said members at said sockets, and a plurality of tension rods suspended from one of said members and extending past the other, all of said tension rods having headed ends coacting with the plane surface of the suspension member and passing through adjusting slots in said member, and the rods nearest said axis passing through alined slots in said other member and beyond the plane surface thereof while the rods farthest from said axis are located beyond the extreme ends of said other member.

2. A cylinder head remover, comprising, upper and lower elongated beam members each having a central screw threaded socket and a plane surface disposed perpendicular to the common axis of said sockets, a jack having inner and outer elements relatively movable along said axis and attached respectively to the threaded sockets of said lower and upper members, and a plurality of bolts suspended from said upper member and depending beyond the lower member, all of said bolts having heads coacting with the plane surface of said upper member and passing through adjusting slots therein, and the bolts nearest said axis passing through alined slots in said lower member while the bolts farthest from said axis are located beyond the extreme ends of said lower member.

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