Jan. 3, 1933. C. M. MARSHALL ET AL 1,892,900

VALVE PULLER

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Fig. 1

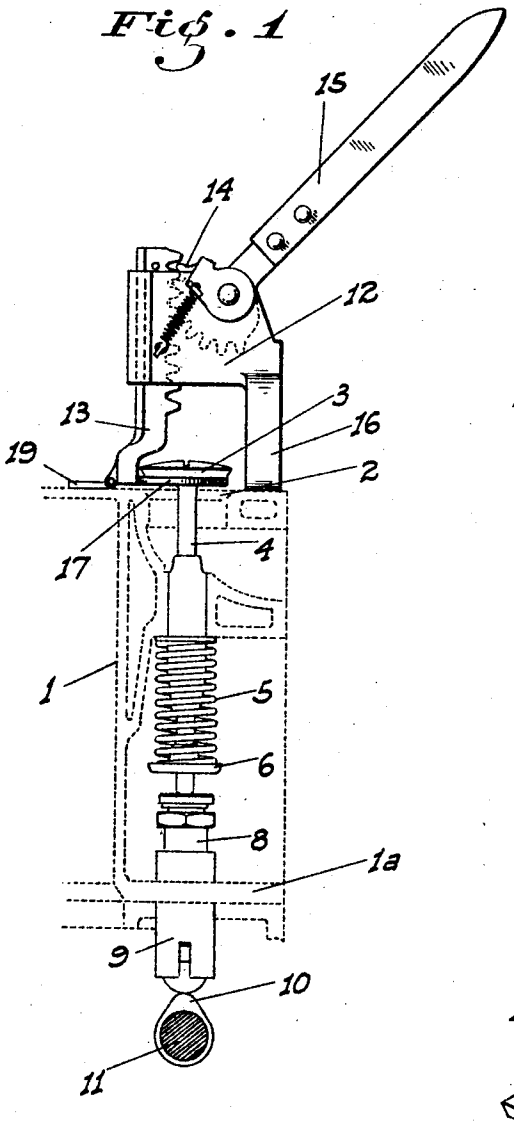


Fig. 4

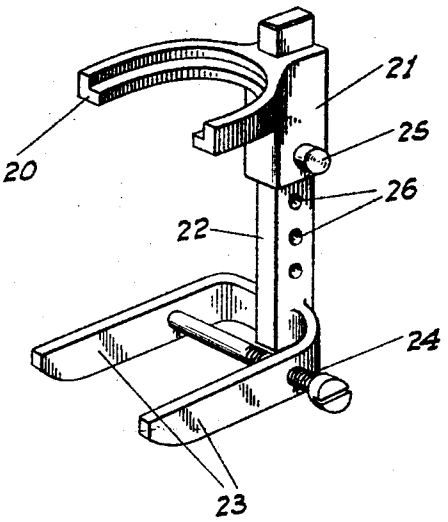
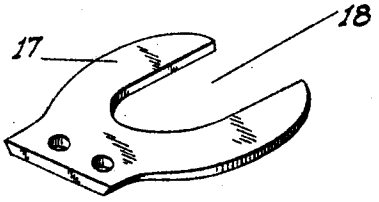


Fig. 5



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Fig. 2

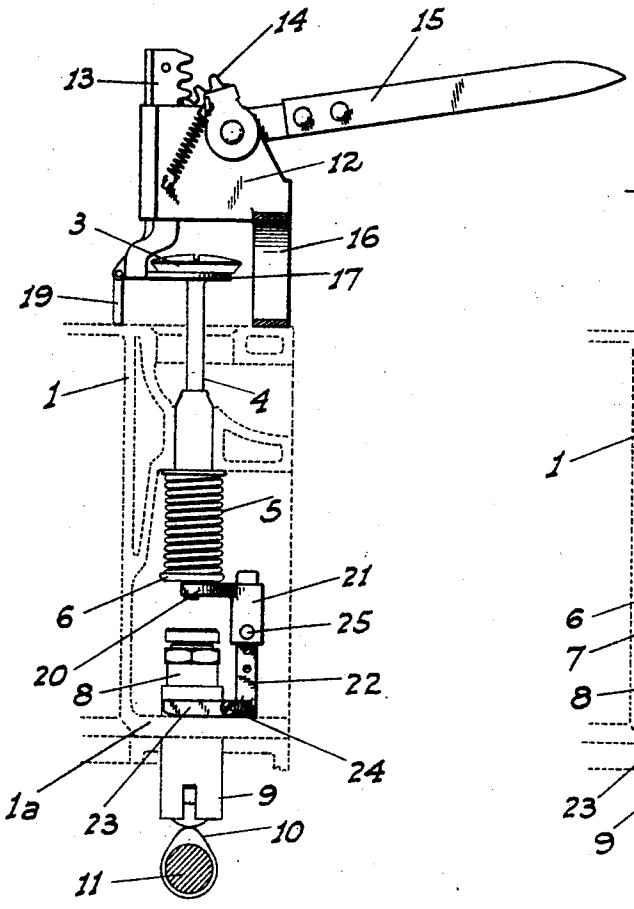
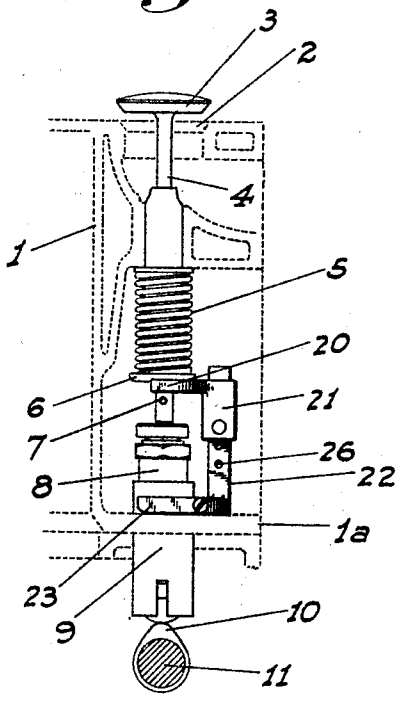


Fig. 3



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UNITED STATES PATENT OFFICE

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VALVE PULLER

Application filed April 11, 1930. Serial No. 443,353.

This invention relates to valve pullers or removers for the poppet valves of gas engines. The principal object of the invention is to provide a tool for the purpose consisting of two separate units, one to lift the valve and spring by engagement with the head of the valve, and the other to then engage the lifted spring cup and hold the same raised. This permits the valve to be then lowered without lowering the spring cup, so as to expose the cup holding pin or keeper in the clear for ready removal. This operation, as is well known, then permits the withdrawal of the valve from association with the spring and guide.

The tool therefore operates on the valves where the most open and unobstructed space is available, namely—on top of the cylinder block. No interference with the operation of the lifting unit of the tool is therefore had by reason of the close proximity of the push rods and their guides to the lower ends of the valve stems, or of the clamped space adjacent such ends which renders it a hard matter to insert and use the usual form of pivoted-handle lifting tool.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects are accomplished by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a side elevation of a valve and its cooperating parts, as mounted in position in an engine, showing the initial engagement of the lifting unit therewith.

Fig. 2 is a similar view showing the valve lifted and the cup holding member placed in position.

Fig. 3 is a similar view with the lifting tool removed, the spring cup being seated on the holder and the valve being depressed to expose the keeper.

Fig. 4 is a perspective view of the holding unit detached.

Fig. 5 is a perspective view of the valve-head engaging member of the lifting tool detached.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 denotes the cylinder block of an engine, with its head removed, which block is provided with a seat 2 for the valve 3 from which a stem 4 depends. Disposed about the stem below the passaged portion of the block is a spring 5 which seats at its lower end in a cup 6. The cup is held against lowering movement on the stem by a suitable keeper which in the present instance is shown as being a cross pin 7 projected through the stem and normally hooded by the cup. The lower end of the valve stem is engaged by the upper end of the push rod 8 which is slidable in a guide sleeve 9 mounted in the lower block flange 1*a*. The push rod on its lower end is engaged by the cam 10 on the camshaft 11. These parts are all standard in one form or another in all L or T head gas engines and the improved pulling tool, which will now be described, may be used in connection with all such engines as are provided with removable cylinder heads.

This puller comprises a sleeve member 12 slidable in which is a vertical rack stem 13. The teeth on this stem are engaged by a segmental gear 14 fixed in connection with a lever handle 15 which is pivoted on the sleeve. The side of the sleeve opposite the rack teeth is provided with a depending and hollow foot member 16 adapted to rest on the top of the block, to one side of the valve and to then support the sleeve some distance above the normal position of the valve head. Projecting horizontally from the lower end of the stem 13, below the sleeve and extending in the direction of the foot, is a rigid and relatively thin plate 17 provided with a slot 18 open to the side of said plate nearest the foot. This plate is adapted to pass under the valve head so that the stem is received in the slot. The plate is preferably made separate from the rack stem and is rigidly secured thereto for the purposes of convenience of manufacture. This is because while the rack may be a casting, the plate should be of hardened steel in

order to be capable of being made thin, as is necessary, and yet have ample strength to resist bending. Hinged to the bottom of the rack at the back edge or opposite the plate is a rigid flap 19 adapted, when the plate and rack have been raised a certain distance, to then depend vertically and engage the cylinder block to support the rack against downward movement from such position. In operating this unit of the tool, the engine is first turned over so that the cam will raise the valve clear of its seat. This leaves sufficient clearance between the top of the block 1 and the valve head for the insertion of the thin plate 17. With the foot 16 resting on the cylinder block, the lever 15 is then depressed, which causes the rack and plate to be raised. The lever is thus manipulated until the rack has been raised a sufficient distance to enable the flap 19 to move to a vertical supporting position, as shown in Fig. 2, in which position of the tool the valve has been lifted some distance beyond its normal or cam-lifted position, as will be evident. The tool is then left in that position until the lower spring cup supporting unit has been mounted in place.

This unit comprises an upper cup locating and seating member 20 of substantially semicircular form and open on one side and provided at its opposite side with a vertical sleeve 21. This sleeve is slidable but nonturnable on a rigid vertical post 22, from the lower end of which spaced horizontal feet 23 project in the same direction as the spring seating member 20. The feet are adapted to rest on top of the flange 1*a* under the valve and to straddle the push rod guide 9.

To enable the same unit to be used in connection with engines having push rods or guides of different diameters, said feet are preferably made of spring material, yieldable in a horizontal plane, and are provided with an adjusting screw 24, by which the feet may be separated beyond their normal spacing if desired. The sleeve 21 is provided with a removable pin 25 adapted to engage any one of a row of holes 26 in the post, so that the spacing between the member 20 and the feet 23 may be adjusted to suit the spacing of the cooperating parts of different engines. The parts 20 and 23 are initially set so that the distance therebetween is slightly less than the distance between the flange 1*a* and the cup 6 when the valve is fully lifted by the tool, as above described. This enables the holding unit to be freely slid into place relative to the cup as indicated in Fig. 2.

The lifting unit is then disengaged from the valve which is done by further depressing the handle 15 so as to apply a lifting pressure to the rack sufficient to release the flap 19 from holding engagement with the cylinder block. The flap may then be turned aside and the plate lowered and removed from engagement with the valve. The valve is then free to be lowered but the spring and its cup are held in a raised position by the lower supporting unit. The lowering of the valve therefore exposes the keeper 7 below the cup and supporting member 20 and it is then in position where it may be easily withdrawn to allow the valve to be removed. The holding unit is left in place until the valve and its keeper have been replaced. It may then be removed from holding engagement with the spring cup either by forcibly pulling said unit away, or by applying the lifting tool to the valve so that the keeper will engage the cup and the strain on the holding unit is relieved, thus allowing the latter to be slid clear of the cup.

The lifting tool is then manipulated so as to lower the valve and associated parts to their normal position. The latter procedure is preferably carried out when the keepers are of that character which would cause them to be displaced from the valve stem by the jar incident to the forcible pulling of the holding unit clear of the spring cup.

While only one holding unit is actually necessary for cooperation with the lifting unit, it is preferable to have as many holding units on hand as there are valves of a kind in the engine. This permits all the valves to be removed and reground at the same time, as will be evident. One lifting unit however is ample for all needs.

From the foregoing description it will be readily seen that there has been produced such a device as substantially fufills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described the invention what is claimed as new and useful and desired to secure by Letters Patent is:

1. A device for pulling a gas engine valve, said valve having a head and a stem, said device comprising a member for engagement with the under side of the valve-head, a vertical stem upstanding from said member to one side of the same, means mounted in connection with the stem for raising the same relative to the cylinder block in which the valve is mounted, whereby to lift the valve and a flap hinged on the lower end of the stem for swinging movement in a vertical plane; the flap being adapted when depending vertically to engage the cylinder block and hold the stem supported in a raised position.

2. A device for pulling a gas engine valve, said valve having a head and a stem, said device comprising a member for engagement with the under side of the valve-head, a ver-

tical stem upstanding from said member to one side of the same, a sleeve in which said stem is slidable, a foot on said sleeve to support the same from the top of the cylinder block in which the valve is mounted in spaced relation to the valve, means cooperating with the stem for raising the latter relative to the sleeve and an element mounted in connection with the stem and arranged to engage the block in a manner to support said stem therefrom only when the stem has been raised a predetermined distance.

In testimony whereof we affix our signatures.

CLARENCE M. MARSHALL.
JAMES E. MAHIN.