Sept. 27, 1932. E. J. BARTO, JR 1,879,024

VALVE JACK OR PROP

Filed Aug. 3, 1931

Fig. 1.

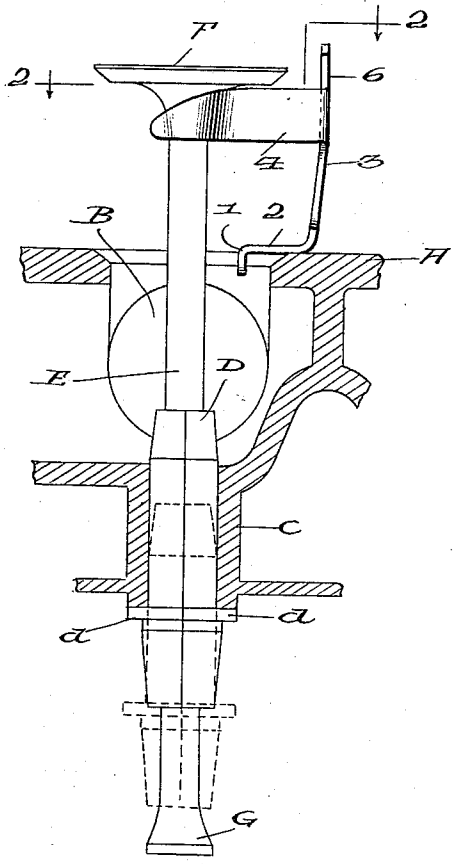


Fig. 3.

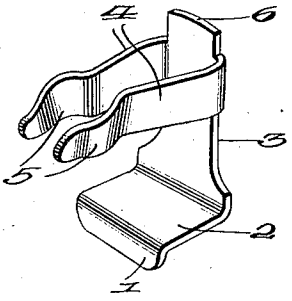
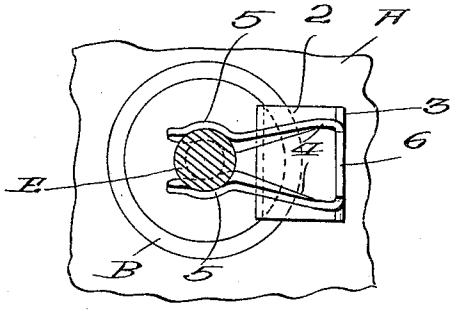


Fig. 2.



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UNITED STATES PATENT OFFICE

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VALVE JACK OR PROP

Application filed August 3, 1931. Serial No. 554,928.

This invention relates to valve jacks or props for use in connection with the replacement or reassembly of the valve and associated parts after the grinding of the valves or after any operation in which the valves are, or a valve is, removed.

In one make of automobile now in very wide use in this country the valve-stems of the internal combustion engine thereof are formed with enlarged or mushroom type lower ends and in order that they may be removed and the valve separated from all other parts, the valve guide is made large enough in internal diameter to permit the withdrawal therethrough of said enlarged lower end of the valve-stem and a split bushing comprising two semi-cylindrical cooperating members in operative assembly is positioned in the valve guide and receives the intervening portion of the valve-stem between the opposed concave semi-circular faces of said members, said bushing members being provided with laterally extending shoulders or flanges or means to engage the lower end of the valve guide and limit the upward movement of said bushing members.

Of course, it is to be borne in mind that the present day internal combustion engine as found in the usual automobile is of multi-cylinder construction, being of four cylinders or more and each fourcycle engine of the poppet valve type has at least two poppet valves for each cylinder. In connection with the task of grinding the valves it is usual practice now in the interest of efficiency to perform each step or operation as to all of the valves of the engine before taking up the next step as to any of the valves, that is to say, first all the valve springs are lifted and the usual retaining means removed and, in the construction of engine particularly in mind, the valve springs are removed all as one step or operation; as the next step, all of the valve guide bushings are removed; next, the valves are ground; next, all of the valve guide bushings are replaced and next, and as a single step, all of the valve springs are replaced and the retaining means therefor placed on the valve stems.

By following the above procedure it is manifest that efficiency is greatly promoted, because the mechanic selects the necessary tool for the particular step or operation and completes all operations necessary before laying it aside to take up the tool required for the next step.

However, it has been found in actual practice that where the valve-stem, valve guide and valve guide bushings have all been cleaned up and freed from gummy oil and carbon incident to the valve grinding operation, when the valve guide bushings were replaced about the valve-stem and shoved up into the valve guide, they would drop out of position and so could not all be replaced as a single step before commencing the step of reinserting the springs, and this fact has resulted in loss of time and efficiency.

The present invention has been developed with the foregoing considerations in mind and with the view of providing means to prevent the valve guide bushings from dropping out of position after they have once been replaced.

In this application I show and describe only the preferred embodiment of my invention simply by way of illustration of the practice thereof, as by law required. However, I recognize that my invention is capable of other and different embodiments and that the several details thereof may be modified in various ways, all without departing from my said invention. Therefore, the drawing and description herein are to be considered as merely illustrative and not as exclusive.

In the accompanying drawing:

Figure 1 represents a sectional view through a fragmentary portion of an engine block showing a valve-stem with its head and foot and the valve guide bushing in elevation, and a valve prop or jack embodying my invention operatively applied about the valve-stem and between the valve head and the top of the engine block, the dotted line position of the valve guide bushing illustrating the lowest position to which it is permitted to drop by the enlarged lower end of the valve-stem when my invention is em-

ployed to hold the valve-stem in raised position;

Figure 2, a sectional view on the line 2—2 of Fig. 1, looking in the direction of the arrows; and

Figure 3, a perspective view of the jack or prop of my invention by itself.

In the accompanying drawing in all views the device has been drawn to actual full-size scale of a commercial embodiment of the jack or prop which has been in actual use with very satisfactory results. Also in all of said views all parts of the valve, that is the valve head, stem and foot, and also the valve guide bushing, the bore of the valve guide and the valve port have been made to actual full-size scale as found in the present Model A Ford passenger car. There has been no attempt in the drawing to make the thickness of the walls or portions of the engine block to any definite scale.

In the accompanying drawing: A designates generally the engine block; B, one of the usual valve ports; C, one of the usual valve guides; D, one of the usual split valve guide bushings having annularly extending radially disposed stop flanges or shoulders *d*, the said two semi-cylindrical members of said bushing having cooperating opposed semi-circular inner faces together snugly slidably receiving between them the valve-stem E; F designates the usual valve head and G the enlarged or mushroomed lower end of the valve-stem. The valve guide bushing elements D are shoved upward about the valve-stem E and in the valve guide C until the flanges or shoulders *d* strike against the lower end of said valve guide E and normally under operative conditions are held in such position by the upper end of the valve spring, not shown, which bears against the lower faces of the shoulders *d*.

All of the construction and features described in the immediately preceding paragraph are old and well known as embodied in the Model A Ford automobile and form no part of my present invention, but are thus briefly referred to in order to promote a quicker and more intelligent understanding of my invention.

The jack or prop of my present invention in its most preferred form consists of a preferably sheet metal stamping having a vertically disposed body portion or post 3, a generally horizontally disposed or extending base or foot 2; a stop flange 1 extending vertically downward from the extreme end of the foot or base 2; a pair of substantially horizontally disposed opposed resilient arms or fingers 4 preferably having their free end portions formed with opposed cooperating arcuate jaw portions 5; and, preferably, an upward extension 6 of the body portion to facilitate the ready removal of the jack or prop from operative position.

In use the foot or base 2 will rest upon the top of the engine block A and extend over a small portion of the corresponding port B with the stop flange 1 extending down into, and engaging with its side edges, the inner wall of the port B so as to prevent any sliding or skating of the jack or prop as a whole on the top of the engine block.

Also, this construction of the foot 2 and flange 1 permits the jack or prop to be easily rocked backward in a radially outward direction with respect to the valve-stem E by a finger pull or pressure on the upper extension 6 so as to quickly and easily pull the arms 4 from about the valve-stem and move the jack or prop out of position wherein it otherwise would interfere with the dropping down of the valve when desired.

The distance between the lower face of the foot or base 2 and the upper edges of the arms 4, or more accurately speaking, between the lower face of the base of foot 1 and the uppermost operative portion of the concave and inclined cooperating jaws 5 will be so calculated with relation to the length of the cylindrical portion of stem E, with relation to the length of valve guide bushing D, and with relation to the length of the bore of guide C, that when the jack or prop is operatively applied between the valve head and the top of the cylinder block A with the jaws 5 about the stem E, the valve guide bushing D may drop down until its lower end engages and is stopped by the upper portion of the enlarged or mushroomed lower end G of the valve-stem and in such position the semi-cylindrical portions of the cooperating elements of said bushing D, together making up a cylindrical surface, will still extend into the bore of the guide C which will confine said elements in a radial direction so that they cannot spread to pass further down beyond said enlarged end portion G.

The prop or jack will preferably be made of a suitable gage or thickness of sheet metal; will preferably be made of sheet metal having some resiliency so as to give a certain springiness to the legs or arms or fingers; will preferably be of a single integral piece of metal as to each embodiment; and preferably will be of such construction as to readily lend itself to large quantity production by simple sheet metal stamping operations.

However, it is not essential that the invention shall be embodied in resilient sheet metal, or in sheet metal or in metal, or that it shall be resilient, nor is the exact form of great importance, it sufficing, considering my invention in its broader aspects, if the embodiment of the invention be of such construction that it will function to hold the valve-stem raised to such a point that the split bushing D as confined by the guide C will be prevented by the enlarged or mush-

roomed end G of the valve-stem from dropping out of the guide C.

Preferably the arcuate opposed jaws 5 are inclined to the vertical, so as to flare upwardly and outwardly, the degree of flare corresponding approximately to the opposed face of the portion defining the junction of the head F and stem E, about which portion said jaws 5 are applied in use. The yielding grip of said jaws 5 serves as a stop to prevent unintentional movement of all portions of the jack or prop in a direction radial with relation to the corresponding stem E.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. A valve jack for use in connection with internal combustion engines having valve stems with mushroom-type or enlarged lower end portions, cooperating valve stem guides respectively formed with cylindrical bores, and split valve guide bushings respectively each composed of a pair of cooperating members together having a composite cylindrical external face portion adapted to be shoved endwise into their respective guide and to make a snug fit in the cylindrical bore thereof and to make a snug sliding fit about the medial portion of the corresponding valve-stem, said jack consisting of a resilient integral sheet metal piece formed with a vertical post; a pair of resilient arms extending substantially perpendicular to said post and formed with cooperating opposed arcuate upwardly outwardly flaring jaw portions adjacent their respective free end portions, said jaws being adapted to yieldingly clamp about a valve-stem and to receive and support the upwardly outwardly flaring portion of said stem defining the junction between the valve head and stem; a base extending from the lower portion of said post in the same direction as, and substantially parallel to, and below, said arms and adapted to rest on the top of the engine block adjacent to, and partially extending over, a valve port opening; and a substantially vertical flange substantially of the same width as, and extending downward from the free end portion of, said base and adapted to engage with its side edges the adjacent portions of the inner wall of said valve port opening to prevent radially outward movement of said base with relation to the valve port opening beyond a certain point and also to prevent sliding movement of the jack on the engine block; the distance, in a direction parallel to said post, between the bottom face of said base and the operative or supporting faces of said jaws being such, in relation to, the length of said valve-stem, the length of said guide, the length of said bushing, and the length of the cylindrical portion of said bushing, that when the jack has been operatively positioned with its jaws embracing and supporting the upper portion of the valve-stem and with its base resting on the top of the engine block and when the bushing has dropped down on the stem until the lower end of said bushing engages and is stopped by the upper part of the enlarged lower end portion of the valve stem, a part of the cylindrical portion of said bushing will extend within the cylindrical bore of said guide which snugly embraces the members of said bushing and confines them, thus preventing any radial separation thereof such as would be necessary for them to pass over and downward beyond the enlarged lower end of the valve-stem.

2. A valve jack for use in connection with internal combustion engines having valve stems with mushroom-type or enlarged lower end portions, cooperating valve stem guides respectively formed with cylindrical bores, and split valve guide bushings respectively each composed of a pair of cooperating members together having a composite cylindrical external face portion adapted to be shoved endwise into their respective guide and to make a snug fit in the cylindrical bore thereof and to make a snug sliding fit about the medial portion of the corresponding valve-stem, said jack consisting of a vertical post; a pair of resilient arms extending substantially parallel to each other and in a plane substantially perpendicular to said post and formed with cooperating opposed arcuate jaw portions adjacent their respective free end portions, said jaws being adapted to yieldingly clamp about a valve-stem; a base extending from the lower portion of said post in the same direction as, and substantially parallel to, and below, said arms and adapted to rest on the top of the engine block adjacent to, and partially extending over, a valve port opening; and a substantially vertical flange substantially of the same width as, and extending downward from the free end portion of, said base and adapted to engage with its side edges the adjacent portions of the inner wall of said valve port opening to prevent radially outward movement of said base with relation to the valve port opening beyond a certain point and also to prevent sliding movement of the jack on the engine block; the distance, in a direction parallel to said post, between the bottom face of said base and the operative or supporting faces of said jaws being such, in relation to the length of said valve-stem, the length of said guide, the length of said bushing, and the length of the cylindrical portion of said bushing, that when the jack has been operatively positioned with its jaws embracing and supporting the upper portion of the valve stem and with its base resting on the top of the engine block and when the bushing has dropped down on the stem until the lower

end of said bushing engages and is stopped by the upper part of the enlarged lower end portion of the valve-stem, a part of the cylindrical portion of said bushing will extend within the cylindrical bore of said guide which snugly embraces the members of said bushing and confines them, thus preventing any radial separation thereof such as would be necessary for them to pass over and downward beyond the enlarged lower end of the valve stem.

3. A valve jack for use in connection with internal combustion engines having valve stems with mushroom-type or enlarged lower end portions, said jack comprising a vertical post; a pair of resilient arms extending substantially parallel to each other and in a plane substantially perpendicular to said post and operatively straddling the valve-stem; a base extending from the lower portion of said post and adapted to rest on the top of the engine block adjacent to a valve port opening; and a flange extending downward from said base and adapted to engage an adjacent portion of the inner wall of said valve port opening; the distance, in a direction parallel to said post, between the bottom face of said base and the supporting faces of said arms being such, in relation to the length of said valve stem, the length of the guide, the length of said bushing, and the length of the cylindrical portion of said bushing, that when the jack has been operatively positioned and when the bushing has dropped down on the stem until the lower end of said bushing engages and is stopped by the upper part of the enlarged lower end portion of the valve-stem, a part of the cylindrical portion of said bushing will extend within the cylindrical bore of said guide.

In testimony whereof, I have signed my name to this specification at Lancaster, Pennsylvania this 29th day of July, 1931.

EDWARD J. BARTO, JR.