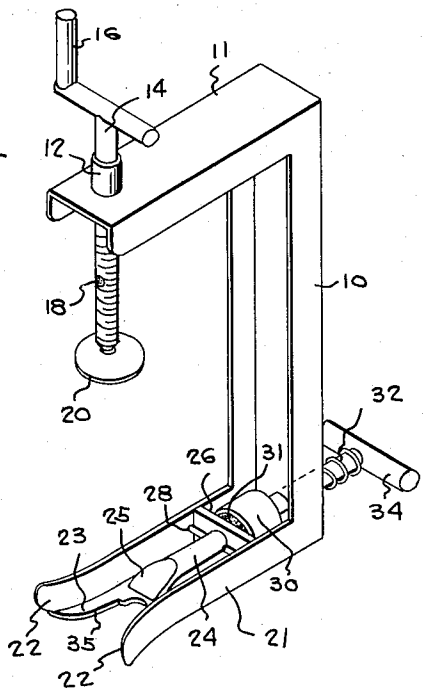
Dec. 27, 1960 F. GRIBBLE 2,965,958

VALVE LIFTING TOOL

Filed May 24, 1957

FIG-1



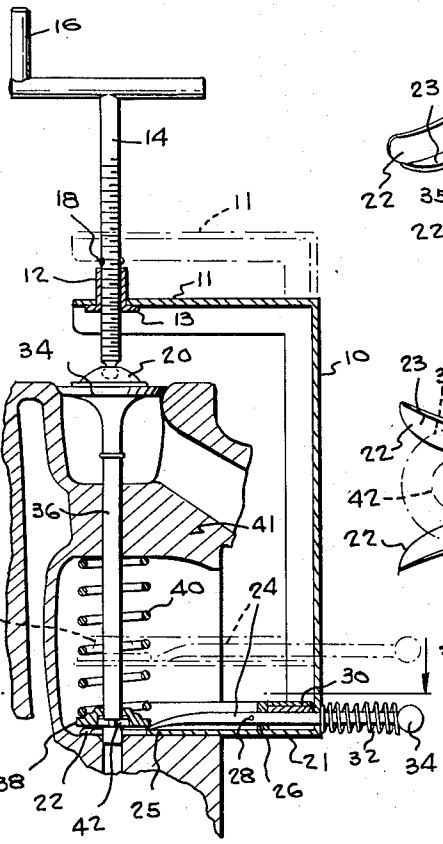
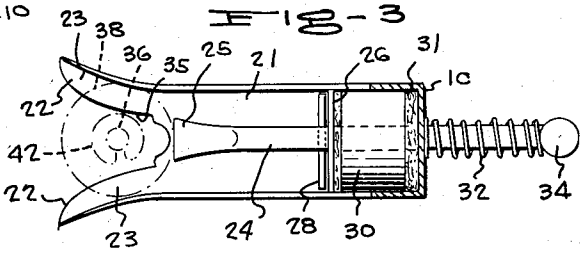


FIG-2

FIG-3



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VALVE LIFTING TOOL

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2 Claims. (Cl. 29—217)

This invention, a tool for lifting the valve of internal combustion engines of the type used in power lawn mowers, is adapted for facilitating maintenance, repair, and replacement operations of the valves of engines of this type.

Difficulty has been experienced in performing operations of the character described above, due to the fact that it is necessary to elevate the valve, together with the conventional retainer and the spring abutting the retainer, with a view to insertion or removal of the valve keeper.

The main object of the present invention is to provide a tool that will eliminate the difficulties hereinbefore experienced.

Among more particular objects are the following:

To design the tool so that it can be manufactured at very low cost;

To so form the tool that the removal or replacement of a valve can be effected in a very short time and with maximum ease;

To permit use of the tool with valves that are incorporated in different makes of engines;

To effect the desired operation on the valve without the use of any other tools and without requirement of special skills; and

To perform the desired operations without danger of any damage to any component of the valve assembly and without requirement of modification or redesign of said assembly.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawing, in which like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a perspective view of a valve lifting tool according to the invention;

Figure 2 is a longitudinal sectional view therethrough showing the same in use during the lifting of a valve, the valve being shown in place in an engine only a portion of which is shown, the dotted lines showing the tool in a raised position during a second stage of the operation; and

Figure 3 is an enlarged horizontal sectional view substantially on line 3—3 of Figure 2.

The tool constituting the present invention includes a rigid, C-shaped, channeled frame **10** having an upper leg **11** extending horizontally from the bight of the frame and formed adjacent its distal end with an opening in which is fixedly engaged an internally threaded sleeve **12** projecting upwardly from leg **11** and formed at its lower end with an outwardly directed flange **13** bearing against the underside of the leg, the sleeve being press-fitted in the opening.

A threaded stem **14** is threadedly engaged in the sleeve, for axial movement in a path parallel to the bight of the frame. The outer end of stem **14** is integral or otherwise rigid with a handle **16**, and in a preferred embodiment, intermediate its ends the stem has a diametrically extending opening **18** in which is engaged an oil-soaked, felt

wick. On its lower end, stem **14** has a swiveled foot **20**.

The lower leg **21** of the frame is formed at its distal end with lifting jaws **22** integral with the body portion of the leg **21**, and having coplanar ledge portions **23** lying in a plane normal to the axis of the threaded stem or screw **14**.

An elongated, straight lifting plunger **24** has its length arranged parallel to the side walls of the lower leg **21**, said plunger being disposed medially between said side walls. Plunger **24**, at one end, has a flattened tip **25** which flares in a direction toward the extremity of the plunger, said tip **25** (see Figure 2) being disposed in a plane oblique to the length of the plunger, that is, the flattened tip declines in a direction forwardly from the body portion of the plunger, for a purpose to be made presently apparent.

Intermediate its ends, the plunger **24** is slidable in an opening formed in a transverse partition **26** provided in the leg **21** adjacent bight **10**. Forwardly of the partition, there is extended diametrically through the plunger a cross pin **28**, the extremities of which are disposed in substantially slidably contacting relation to the inner surfaces of the side walls of the leg **21**. In this way, when the plunger is advanced from its normally retracted position shown in Figures 1 and 3, the pin **28** will hold the plunger against lateral displacement, and will guide it in a straight line during its advancing movement. Further, the pin **28** serves as a stop, limiting retraction of the plunger by engaging the partition **26** in the manner particularly well shown in Figure 3.

In the space between the bight of the frame and the partition **26**, there is extended about the plunger a U-shaped spring clip **30**, enclosing a felt wick **31**, which is oil-soaked, so as to continuously oil the plunger.

In the lower end of the bight, there is provided a guide opening for the plunger, in which the plunger is slidable, with the plunger having an outer end portion projecting rearwardly from the bight as shown in Figures 1 and 3. Circumposed about the rearwardly projecting portion is a compression, coil spring **32**, held under compression between the bight of the frame and a cross head **34** provided upon the rear extremity of the plunger to serve as a handle.

As will be noted, between the ledge portions **22** there is defined a space **35**, said space being in the form of a flaring recess, which is adapted to receive the lower portion of the valve stem **36** of the valve assembly of the engine. It will be understood, in this connection, that the valve stem **36** is not part of the present invention, and instead constitutes part of a conventional valve assembly of a light internal combustion engine of the kind previously referred to briefly herein.

The valve stem at its upper end is rigid with the valve head **34**, and loosely receiving the lower portion of the stem **36** is a disc-shaped valve retainer **38**, a spring **40** being held under compression between the retainer **38** and the adjacent portion of the block **41**.

Designated at **42** is a conventional valve keeper of the C-type. The invention can be used to equal advantage in insertion or removal of a pin-type valve keeper, however, as will be made clearly apparent hereinafter.

In use, one holds the bight of frame **10** with four fingers of the hand, and pushes the plunger pin forwardly against the restraint of spring **32**, with the palm of the hand.

The plunger, at its tip, is adapted to move into the plane of the ledge portions **23**, in the recess **35**, and to this end, may have a slightly loose fit within the guide openings of partition **26** and the bight of the frame. As a result, and assuming that the valve keeper **42** has previously been removed for the purpose of repair or replacement of the valve assembly, and assuming further

that the valve spring **40** has forced the retainer **38** downwardly so that it rests on the bottom of the valve chamber, the tip **25** will start to move under the retainer **38** when the plunger is advanced. The ledge portions **23**, it may be noted from Figure 2, will at this time be flat upon the bottom surface of the valve chamber.

With the tip of the plunger **24** under the retainer **38**, the entire tool is shifted toward the valve, that is, horizontally to the left in Figure 2. Now, the ledge portions **23** will begin to move under the retainer **38** which has been cammed upwardly by the inclined top surface of the tip **25** to an extent such as to locate the retainer slightly above the common plane of the ledge portions **23**, as clearly shown in Figure 2.

As soon as the jaws or ledge portions have begun to move under the retainer **38**, one releases the pressure exerted against plunger by the palm of the hand. The spring **32**, expanding, will now retract the plunger and will disengage the same from the keeper. The jaws are now pushed fully under the retainer, to the Figure 3 position with the plunger now retracted completely beyond the recess **35**.

As a next step, a stem **14** is threaded downwardly, and is rotated with the foot **20** in engagement with the valve head **34**. The result will be that the lifting frame **10** will be raised bodily, as for example to the dotted line position of Figure 2. This will of course cause the retainer **38** to be raised, the retainer **38** sliding upwardly along the stem **36** of the valve with valve spring **40** compressing as necessary.

With the retainer elevated, one is now free to insert or remove a keeper, and the keeper is installed, whether it be of the pin type or C-type. If a pin type keeper is being used, a pair of needle nose pliers, or their equivalent, may be used for inserting the pin type keeper. To remove a pin type valve keeper, one would utilize a suitable tool to push the same out of the stem.

A C-type keeper may be inserted by the use of a flat inserter tool, on which a keeper may be loosely supported and temporarily held in place by grease, the tool having a notch matching that of the C-type keeper, so that the keeper can be inserted about the valve stem and subsequently engaged by the retainer.

On threading of the screw **14** upwardly, the frame will be lowered once again, until ultimately the retainer is engaged with the keeper, after which the device is removed completely.

It has been found that a tool formed as illustrated and described facilitates the insertion or removal of keepers to such an extent as to permit a valve to be removed or replaced in as short a time as approximately 30 seconds. Thus, a problem which has presented considerable difficulties, in respect to maintenance and repair operations on valves of the type shown in Figure 2, is solved by the use of the tool.

It is believed clear that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles of operation and the means presently devised to carry out said principles, it being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. A tool for elevating a retainer on the stem of a valve of an internal combustion engine, comprising: a frame having a pair of opposed ends, a valve-engaging screw threaded in one end of said frame; said frame at its other end including jaws engageable under said retainer; and means reciprocable on said other end of said frame over and between said jaws and transversely of said frame and screw, said last-named means having a cam surface thereon for engagement under said retainer to lift said retainer towards said valve, said frame being shiftable towards said stem to permit said jaws to be inserted under said retainer after said retainer has been raised by said last named means, said last-named means comprising a spring-restrained plunger having a flattened tip providing the retainer-engaging cam surface, said jaws being spaced apart and said tip being disposed to enter the space between said jaws, said jaws being disposed in a common plane, and said tip being movable into said plane to engage under said retainer.

2. A tool for shifting a retainer axially of the stem of a valve of an internal combustion engine, said valve having a head at one end, said tool comprising a substantially C-shaped frame including a bight and legs extending horizontally from said bight, a screw threadedly engaged in one of said legs for movement in a path parallel to the length of said bight, said screw including a swiveled foot at one end for engagement with said valve head, said bight adjacent the other leg of said frame having an opening extending transversely therethrough, a partition fixedly secured to and extending transversely of said other leg of said frame, said partition having an opening therein aligned with said opening formed in said bight, a spring-restrained plunger extending through said openings and being reciprocable therein, said plunger including a cam surface at one end thereof oblique to the path of movement of said plunger, said other leg being formed with spaced jaws adjacent the free end thereof, said cam end of said plunger being movable into the space between said jaws against the restraint of its spring for original engagement under said retainer to lift the same above said jaws whereby to permit said jaws to be inserted beneath said retainer and upon withdrawal of said plunger to transfer said retainer to said jaws, said retainer being moved axially of said stem by said jaws on the threading of said screw in one direction in said one leg of said frame.

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