Dec. 3, 1929. L. E. FIX 1,738,178

AUTOMOBILE VALVE TOOL

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Fig. 2.

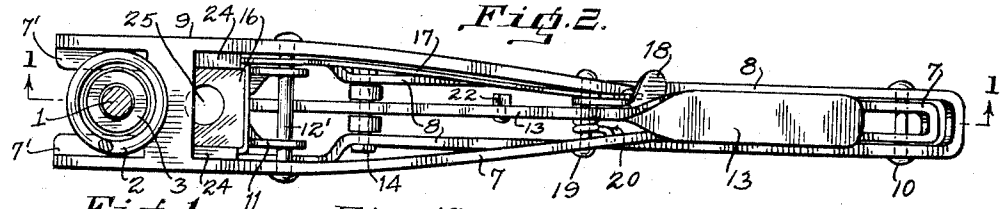


Fig. 1. Fig. 1a

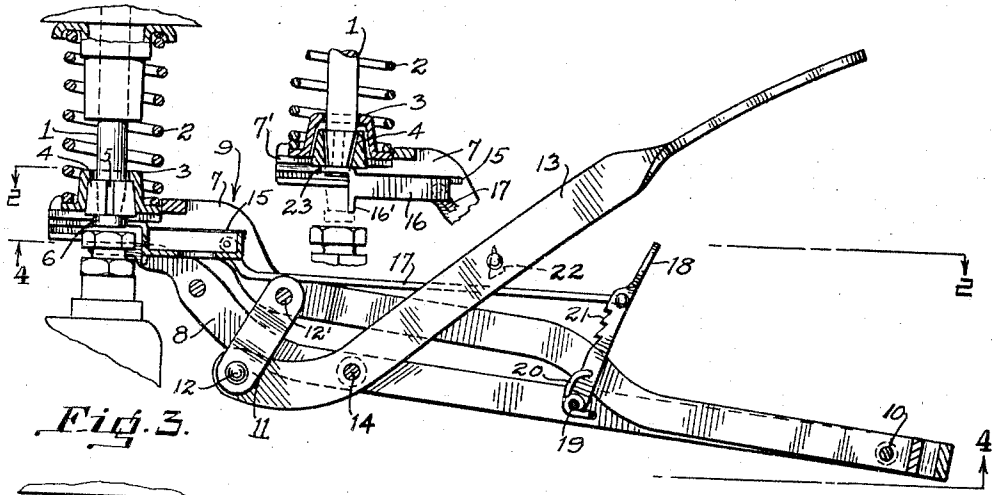


Fig. 3.

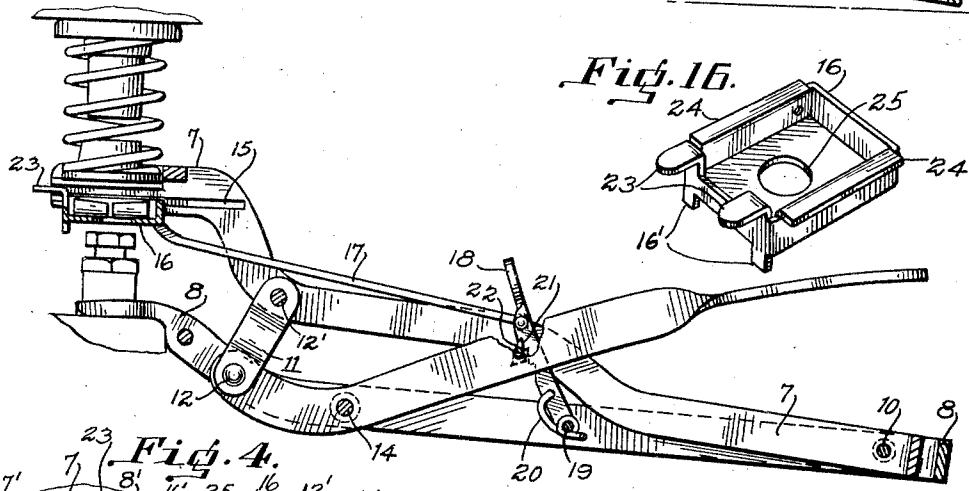


Fig. 4.

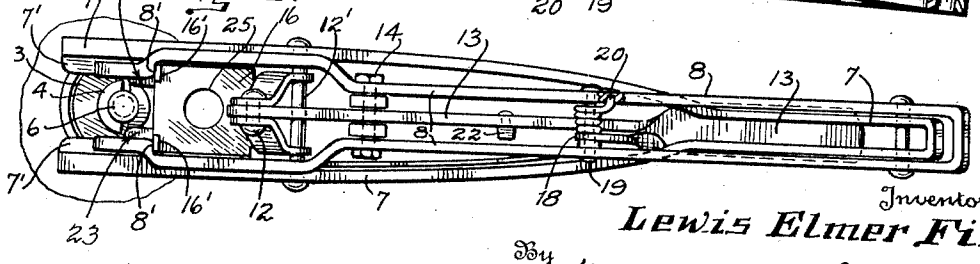


Fig. 16.

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Fig. 5.

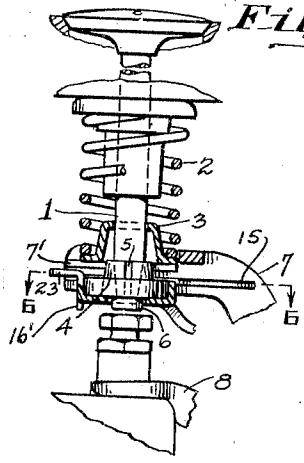


Fig. 6.

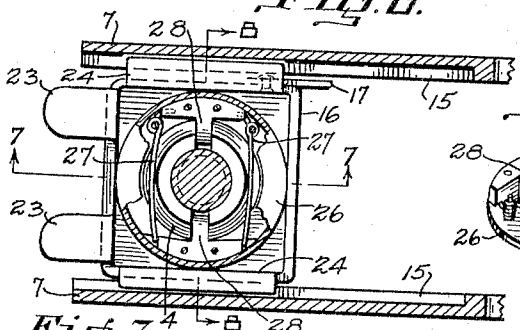


Fig. 9.

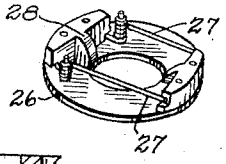


Fig. 7.

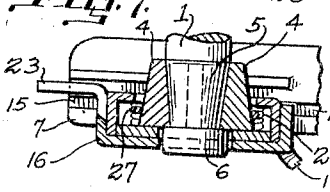


Fig. 8.

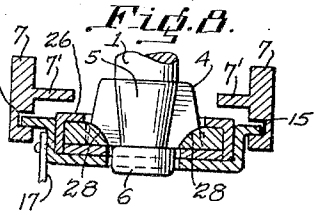


Fig. 10.

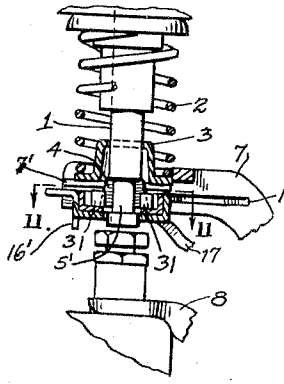


Fig. 11.

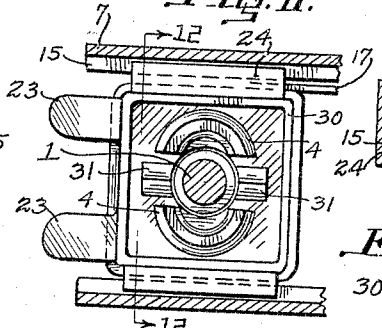


Fig. 12.

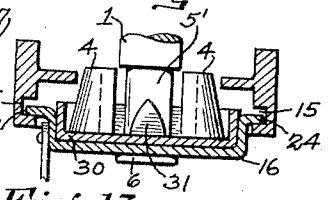


Fig. 13.

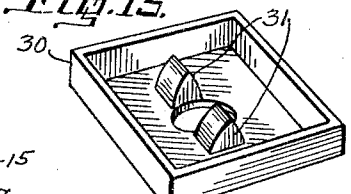


Fig. 14.

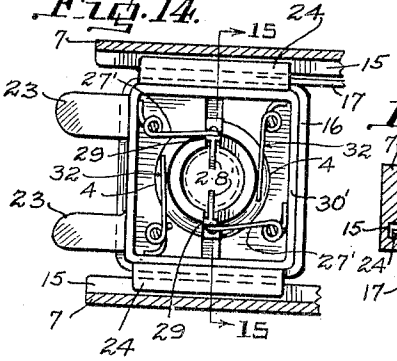
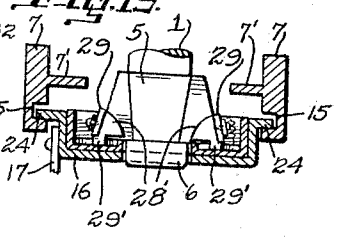


Fig. 15.



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UNITED STATES PATENT OFFICE

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AUTOMOBILE VALVE TOOL

Application filed May 5, 1928. Serial No. 275,496.

This invention relates to a tool to be used in connection with valve grinding and more specifically for compressing the spring surrounding the valve stem, receiving the locking members when they fall from their seat, assembling the locking members after the grinding operation has been performed and securing the valve stem in place.

The principal object is to provide a tool which will greatly facilitate the compressing of the stiffest spring surrounding the valve stem with very little effort to the operator.

Another object is to provide means for receiving the locking members when they fall from their seat after the spring has been compressed and for replacing the locking members after the grinding operation is concluded.

Other objects will be disclosed in the specification and drawings.

The operation of grinding valves in an automobile engine has always presented a serious problem. In order to release the valve stem and to permit the grinding of the valve seat, the spring surrounding the valve stem must be compressed in order to permit the removal of the securing means. In many of the later models, this spring is of a very heavy type and unless the mechanic has a special tool for compressing this spring, it is almost impossible to grind the valves.

Another problem which presents itself in the grinding of valves, especially where the conical split locking type is used, is that of losing these parts when the spring is compressed sufficiently to permit their release. I have provided a tray which automatically slides beneath the valve stem upon the spring being compressed sufficiently to admit the same.

Another problem which confronts the mechanic where securing means of this type are used, is the reassembling of same and replacing them in their seat on the valve stem. I solve this problem by assembling the parts in the tray carried by the upper jaws of my tool in a lock holder and upon the spring being compressed the parts carried by the tray will seat themselves very readily on the valve stem.

The recess in the valve stem to receive the locking means may be of two types. Where the recess has a gradual tapered face, the taper of the stem itself will force the locking members free of the stem upon the valve stem being forced downward; but a much more difficult problem presents itself for removing the locking means from the valve stem, where, instead of a taper, the recess or seat takes the form of a rectangular recess with shoulders at top and bottom. In this case, the downward thrust of the valve stem will not free the locking means, but it is necessary to provide some means for forcing the locking means away from the valve stem by outward pressure, instead of downward. This problem I have solved by the use of certain apparatus to be used in connection with the tray which will be hereinafter described.

In the drawings:

Figure 1 is a longitudinal section taken on line 1—1 of Figure 2 through the valve and tool, showing the tool when first attached;

Figure 1[a] is a section showing the springs slightly compressed;

Figure 2 is a top plan of the tool on line 2—2 of Figure 1;

Figure 3 is a longitudinal section showing the spring compressed and the tray beneath the valve stem with the locking means in the tray;

Figure 4 is a bottom plan on line 4—4 of Figure 1;

Figure 5 is a view similar to Figure 3 and partly in section showing the tool in position for the assembling operation;

Figure 6 is a plan of a horizontal section on line 6—6 of Figure 5, showing the assembling means in the tray of the tool;

Figure 7 is a section taken along the line 7—7 of Figure 6;

Figure 8 is a section taken along the line 8—8 of Figure 6;

Figure 9 is a perspective of the assembling means with the top portion removed;

Figure 10 is a vertical section showing the spring compressed and the valve stem protruding through the tray with the locking means snapped into position;

Figure 11 is a horizontal section on line 11—11 of Figure 10, showing a separator in

the tray to be used in removing the locking means;

Figure 12 is a section on line 12—12 of Figure 11, showing the split locking means;

Figure 13 is a perspective showing the means for separating the split locking means removed from the tray;

Figure 14 shows a modified form of assembling the locking means from that shown in Figure 6; and

Figure 15 is a longitudinal section taken along the line 15—15 of Figure 14 showing the valve stem in place.

Figure 16 is a perspective of the tray removed from the tool.

In the drawings similar numerals of reference indicate corresponding parts in the different views:

Numeral 1 designates a valve stem surrounded by a compression spring 2 and having a housing 3 for receiving the locking members 4. Numeral 5 designates a conical seat forming a head or shoulder 6 against which the locking members 4 rest. 7 and 8 are the upper and lower jaw levers, respectively, of a tool 9, pivotally connected at 10, upon which they turn when in operation. A toggle joint 11 permits the bringing together or separating of the jaws 7 and 8, the said toggle 11 being connected to the upper jaw 7 at 12′ and at 12 to handle member 13 which in turn is pivotally connected to the lower jaw 8 at 14.

Slidably mounted in grooves 15 in the upper jaw 7 is a tray 16 connected to an arm 17 which in turn is pivotally connected to a hand lever 18, the hand lever 18 being pivotally secured to the lower jaw 8, by a pin 19. Mounted on the pin 19 is a tension spring 20 normally forcing the hand lever 18 forward. On the face of the hand lever 18 are serrations or notches 21 which engage a lug 22 carried by the handle member 13. The tray 16 has projecting lips 23 and side flanges 24, the side flanges sliding in grooves 15. In the bottom of the tray is shown an opening 25 to receive the valve stem 1. As shown in Figure 6, a lock holder 26 to be used for assembling the lock members 4 may be placed in the tray 16, the lock members 4 being forced down into the lock holder 26 forcing the spring members 27 outwardly, the inner faces of the locking members resting against projections 28 in the lock holder 26.

A modification 30′ of the lock holder, similar to that shown in Figure 6 is shown in Figures 14 and 15 wherein spring members 27′ carry cams 28′ with shoulders 29, the shoulders 29 acting as spacer elements for the locking members. Other spring members 32, not carrying cams, press against the outer sides of the locking members 4.

Where locking members are secured in rectangular seats 5′, it may be desirable to use a separator, such as is shown in Figures 10, 11, 12 and 13, wherein a separator 30 is placed in the tray 16, the separator having wedge-shaped members 31 secured to the bottom of said separator 30 so that when the valve stem 1 carrying the locking members 4 is forced downwardly the said wedge-shaped members 31 will enter between the inner faces of split members 4 so that the same may be forced apart and away from the valve stem 1, the head of said stem as in the other faces passing through aperture 25′ in bottom of separator 30.

As actually operated, the jaws 7 and 8 of the tool 9 are placed beneath the valve so that flanges 7′ of the upper jaw 7 will contact with the housing 3 and the lower jaw 8 will eventually rest upon some rigid portion of the engine block. The handle member 13 will then be forced downwardly and the upper jaw 7, because of the toggle 11 and fulcrum 14 will cause the compression spring 2 to be compressed with very slight change in the angularity of the jaws themselves; the jaw movement approaching parallel jaw action and reducing the tendency of the jaws to slip when the tool is in use. The tray 16 being under constant spring tension, slides forward in the grooves 15 after the jaws draw apart sufficiently to allow lugs 16′ to disengage from locking shoulders 8′ of lower jaw at which time the projecting lips 23 of the tray slip under the raised housing 3 and support the split collar 4 which has been released by the housing 3 and must be supported until the tray is beneath said split collar.

As the separation of the jaws continues, the valve spring is further compressed and the valve stem as well as the housing is raised because of the tray lips 23 being directly beneath the valve stem. When the jaws have sufficiently separated, the tray, because of the spring tension, will shoot forward so that it will come to rest directly beneath the valve stem. By this time, the locking means 4 will have become completely disengaged from the housing 3, and being deprived of the support of the tray lips, 23, will fall into the tray 16 as the housing 3 has raised sufficiently to release them. In case members 4 should stick, the valve stem 1 may be forced downwardly and because of its tapered construction, will force the locking members outwardly to free them. When the tray 16 has been released by reason of lugs 16′ disengaging from locking shoulders 8′ the same becomes locked in its extended position by reason of the lug 22 and teeth 21 carried by the hand lever 18, and handle member 13, respectively, coming into locking engagement as shown in Figure 3. When the tool is first placed in position, only the flanges 7′ of the upper jaw come in contact with the housing and the tray lips 23 by reason of the closed position of the jaws are positioned beneath the locking members 4 but out of contact with the same; but, after

the upper jaw is raised, carrying tray member with it, the tray lips gradually come into contact with the locking members, and raise the same along with the valve stem until the jaws have separated sufficiently to permit the tray to shoot forward directly beneath the locking members and valve stem.

The hand lever 18 is then pulled back, pulling the tray with it and at the same time, releasing the jaws 7 and 8, which will come together and permit the removal of the tool. The operation of grinding the valves may then be proceeded with in the usual manner. After the valve grinding operation is completed, a lock holder, of the type shown in Figure 6, is placed in the tray, the locking members 4 being first inserted therein, and being held securely in place by the spring members 27 and suitably spaced apart by projections 28. The compression spring is then compressed by means of jaws 7 and 8, as shown in Figure 5, the tray shooting forward as in the first operation, when sufficient clearance between the jaws has been reached. The valve stem is held in fixed position during this operation, and after the locking members are forced upwardly around the valve stem, the head of same will force the locking members outwardly, compressing the spring 27 until the tapered seat 5 is reached when the locking members will spring into their locked position, carrying the lock retainer with them. The operator will then raise the stem until the lock holder is wiped off the split collar by engagement with flanges 7′ of upper jaw 7. The split collar is now seated in the housing 3 in its normal position and the lock holder has fallen back into the tray so that the tool may now be removed.

When the modification, as shown in Figures 14 and 15 is desired to be used, the shoulders 29 on the cam 28 are of such width that they force the locking members sufficiently apart to give clearance to the valve stem head in passing through. However as the head of the stem descends it engages cam surfaces 28′ so that the cams 28 will be forced outwardly until the shoulders 29 are beyond the outer edge of the locking members whereupon the spring members 32 on the opposite sides will force the locking members inwardly around the valve stem, since the cams themselves are of less width than the shoulders thus permitting the locking members to snap into the recess 5′ around the valve stem. Cams 28 are limited in their inward movement by reason of downwardly projecting lugs 29′ sliding in grooves in the floor portion of lock holder 30′.

Where the valve stem has a rectangular recess 5′ instead of a tapered recess 5, it is often necessary to provide some means for removing the locking members from the recesses after the spring has been compressed. Where this is necessary, I place in the tray preliminary to compressing the spring, a member such as shown in Figures 10, 11, 12 and 13, The wedges 31 secure to the bottom of the separator 30 will project up between the locking members separating the same and forcing them free from the valve stem when the housing has been lifted far enough to leave the locking members free. This procedure is only necessary when the recess in the valve stem is other than of the tapered type.

Having thus described my invention, what I claim is:

1. A valve tool comprising jaws pivotally connected to each other, means pivotally connected to each of said jaws for moving them toward and from each other, a tray carried by said jaws adapted to slide forward upon the separating of the jaws.

2. A valve tool comprising jaws pivotally connected to each other, means pivotally connected to each of said jaws for moving them toward and from each other, a tray carried by one of said jaws and means for advancing said tray upon the separating of the jaws.

3. A valve tool comprising upper and lower jaws pivotally connected to each other, means pivotally connected to each of said jaws for moving them toward and from each other, a tray slidably mounted in grooves in said upper jaw, and means for advancing said tray upon the separation of the jaws.

4. A valve tool comprising upper and lower jaws pivotally connected to each other, means pivotally connected to each of said jaws for moving them toward and from each other, a tray slidably mounted in grooves in said upper jaw, and advancing means for advancing said tray upon the separation of the jaws.

5. A valve tool comprising upper and lower jaws pivotally connected to each other, means pivotally connected to each of said jaws for moving them toward and from each other, a tray slidably mounted in grooves in said upper jaw, and automatic means for advancing said tray upon the separation of the jaws.

6. A valve tool comprising upper and lower jaws pivotally connected to each other, means pivotally connected to each of said jaws for moving them toward and from each other, a tray slidably mounted in grooves in said upper jaw, means for locking said tray against advancement while the jaws are in closed position, and means for advancing said tray upon the separation of the jaws.

7. A valve tool comprising upper and lower jaws pivotally connected to each other, means pivotally connected to each of said jaws for moving them toward and from each other, a tray slidably mounted in grooves in said upper jaw, means for advancing said tray upon the separation of the jaws and means for locking said jaws in open position.

8. A valve tool comprising upper and lower

jaws pivotally connected to each other, means pivotally connected to each of said jaws for moving them toward and from each other, a tray slidably mounted in grooves in said upper jaw, means for advancing said tray upon the separation of the jaws and means for locking the tray in a predetermined position after the jaws have separated sufficiently to permit the passage of the tray.

9. A valve tool comprising upper and lower jaws pivotally connected to each other, means pivotally connected to each of said jaws for moving them toward and from each other, a tray slidably mounted in grooves in said upper jaw, means for advancing said tray upon the separation of the jaws and means for locking the jaws in open position and the tray against further advancement after the jaws have separated sufficiently to permit the passage of the tray.

10. A valve tool comprising upper and lower jaws pivotally connected to each other, means pivotally connected to each of said jaws for moving them toward and from each other, a tray slidably mounted in grooves in said upper jaw, means for locking said tray against advancement while the jaws are in closed position, means for advancing said tray upon the separation of the jaws, and means for locking the jaws in open position and the tray against further advancement after the jaws have separated sufficiently to permit the passage of the tray.

11. A valve tool adapted to remove and replace a valve in an internal combustion engine in which a valve spring surrounds a valve stem, and in which a housing supports the valve spring and covers locking members seated on the valve stem; said tool including means for compressing said valve spring and releasing the locking members seated on said valve stem, and means carried by said tool for removing said locking members from said valve stem when said spring is compressed by said tool.

12. A valve tool adapted to remove and replace a valve in an internal combustion engine in which a valve spring surrounds a valve stem, and in which a housing supports the valve spring and covers locking members seated on the valve stem; the said tool including means for compressing said valve spring and releasing the locking members seated on said valve stem, and means carried by said tool for removing the locking members from said valve stem when said spring is compressed by said tool, and means for receiving said locking members from the last named means and adapted to replace said locking members in locking position on said stem by recompression of said valve spring by said tool.

13. A valve tool adapted to remove and replace a valve in an internal combustion engine in which a valve spring surrounds a valve stem and in which a housing supports the said valve spring and covers locking members seated on said valve stem; said tool having means for compressing said valve spring, a tray carred by said valve tool, and means in said tray for removing the locking members from said valve stem.

In testimony whereof I affix my signature.

LEWIS ELMER FIX.