

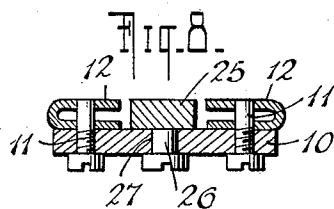
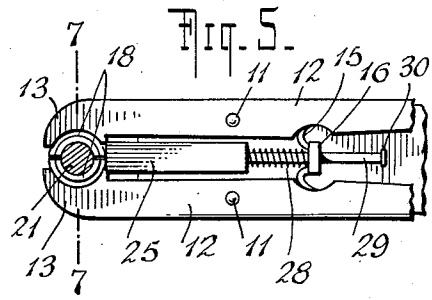
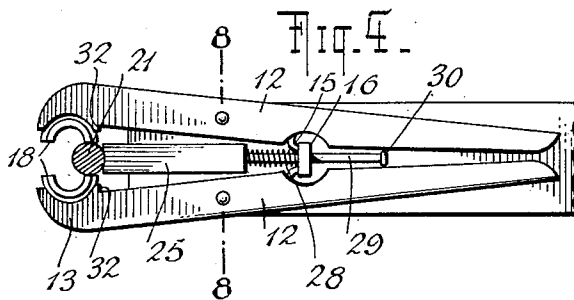
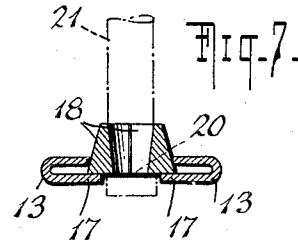
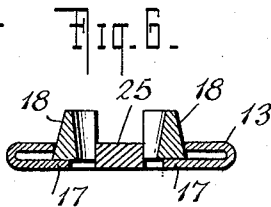
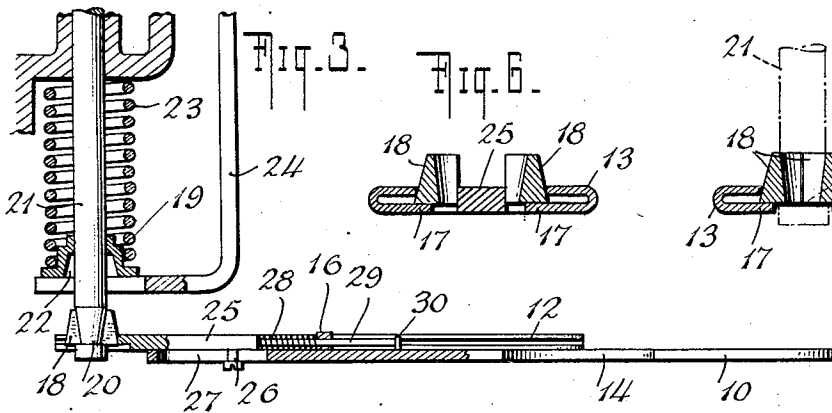
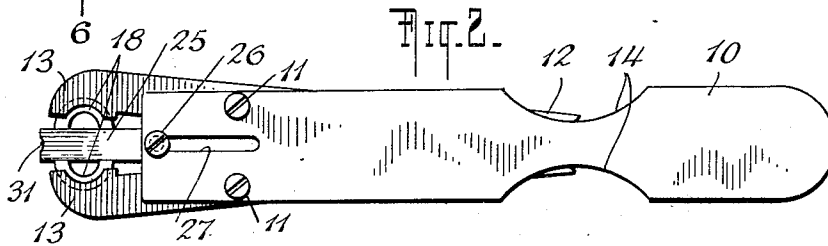
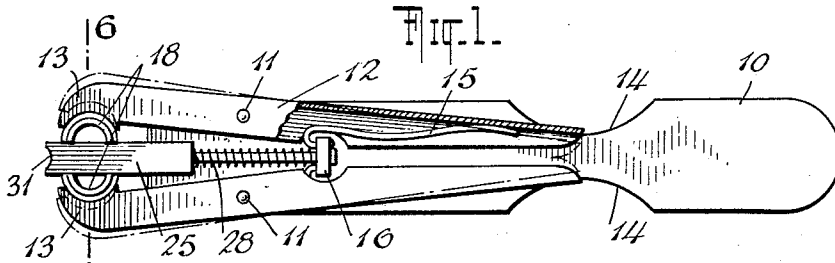
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J. H. MINDERMAN ET AL

1,861,973

VALVE TOOL

Filed April 8, 1931



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VALVE TOOL

Application filed April 8, 1931. Serial No. 528,570.

This invention relates to improvements in tools, and has particular reference to an implement to be employed in seating or mounting the valve springs of internal combustion engines.

The mounting most commonly employed for valve springs involves the use of a retainer which is engaged by one end of the spring and which is keyed to the stem of the valve in such manner that the spring and retainer are adapted to be lifted by a suitable instrument for purposes of repair, such as the grinding of the valve. The lifting of said retainer disengages the same from the split key usually employed to secure the retainer in position and, during the repair work, the sections of this key which embrace the valve stem are removed therefrom to be later replaced when remounting the spring in its operative position. This replacement of the key upon the valve stem and subsequent engagement of the spring retainer therewith consumes considerable time in its accomplishment for the experienced mechanic. The usual method is to coat each section of the key with a layer of grease which will cause it to adhere to the valve stem. This adherence is, at best, insecure and care must be taken, when lowering the spring and its retainer toward their operative position, that the key sections are not dislodged from the valve stem.

An object of the present invention is to overcome the difficulties experienced in securing the spring and its retainer in place and thereby facilitate the operation of mounting said elements. To this end, use is made of an improved tool which will securely hold the key sections upon the valve stem while the spring and retainer associated therewith are being adjusted to their operative positions wherein said key engages and supports the retainer.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for purposes of illustration, is shown in the accompanying drawing, wherein:

Figure 1 is a top plan view, partly broken

away and shown in section, of a tool constructed in accordance with the invention;

Figure 2 is a bottom plan view thereof;

Figure 3 is a longitudinal section of the tool showing its application to a valve stem and indicating the position of the parts in the final stage of the operation of applying the sectional key to the stem just prior to lowering the spring retainer on to said key;

Figure 4 is a fragmentary plan view showing the position of the parts at an intermediate stage of the operation of the tool;

Figure 5 is a view similar to Figure 4 showing the final stage of operation, also indicated in Figure 3;

Figure 6 is a section on the line 6—6 of Figure 1;

Figure 7 is a section on the line 7—7 of Figure 5; and

Figure 8 is a section on the line 8—8 of Figure 4.

In the embodiment illustrated, the tool is shown as comprising a handle 10 in the form of a flat bar. Adjacent one end of said handle, the same has pivoted thereon at 11 a pair of cooperating clamping members 12, the outer ends of which extend beyond the adjacent end of the handle and terminate in opposed jaws 13, while the inner ends of said members are disposed adjacent recesses 14 in the handle 10 whereby the operator may grip said members and exert pressure thereon to spread the jaws 13 against the tension of leaf springs 15, each of which has one end fixed in an abutment 16 formed on said handle. Each clamping member 12 is preferably made from a strip of metal bent upon itself, as shown in Figures 6 to 8, and the underside of each jaw 13 is of greater width than the upper side thereof to provide an inwardly projecting portion 17 which acts as a support for one of the complemental sections 18 of a split key customarily employed in securing the spring retainer 19 (Figure 3) in position. This split key is illustrative of one type employed in internal combustion engines and, when the same is in its operative position, is adapted to embrace the lower tapered and shouldered end 20 of the valve stem 21 and to project into a recess

22 in the retainer 19 corresponding in shape to that of the key. As is customary when a valve is to be ground, the retainer 19 and the spring 23 are raised by a suitable lifter 5 24 and during the repair work the sections 18 of the key are removed from the stem 21, to be subsequently replaced by the tool of the present invention. The first step in the operation of replacing the key to its operative position is to spread the jaws 13 to the dotted line positions indicated in Figure 1, whereupon the sections 18 of the key are mounted upon the supports 17 in opposed relation to each other. When in position, the clamping 15 members 12 are released by the operator and under the influence of the springs 15 the jaws move inwardly toward each other to the full line position of Figure 1, whereupon the edges of the sections 18, which abut when the key is in its embracing position upon the stem 21, will engage a plunger member 25 20 slidably mounted upon the handle 10 and guided for longitudinal movement thereon by a pin 26 carried by said plunger and engaged in a longitudinal slot 27 formed in said handle. When the jaws are spread apart, 25 the plunger 25 is forced to a projected position between the jaws 13 by a spring 28 coiled about the stem 29 of said plunger and engaging the abutment 16. The free end of said stem 29 is provided with a head 30 which contacts said abutment to limit the outward movement of the plunger to the position shown in Figures 1 and 2 wherein the outer 30 extremity of the plunger extends beyond said jaws. Thus, the sections 18 of the key are securely gripped between the plunger and jaws and are now ready to be adjusted in operative position upon the valve stem. 35 To accomplish this the concaved projecting extremity 31 of the plunger 25 is engaged with the tapered lower end 20 of the valve stem and pressure exerted upon the tool in the direction of said stem to force the plunger 40 25 inwardly against the tension of the spring 28. This pressure is continued until the parts are in the position shown in Figure 4, wherein the outer end of the plunger is forced inwardly between the clamping members 12 45 and slightly beyond the shoulders 32 on the jaws 13. In this position the sections 18 are disposed on opposite sides of the stem 21 with edges thereof in engagement with said stem. A slight quick pull is now exerted upon the 50 handle 10 in order to bring the sections 18 in centered relation with respect to the stem. As this pull is exerted the edges of the sections contacting said stem will ride over the circular surface thereof and at the same time 60 the springs 15 will exert pressure upon the clamping members 12 to force the jaws 13 toward each other. After a slight inward movement of these jaws, the shoulders 32 will engage the outer end of the plunger 25, as 65 shown in Figure 5, and prevent said plunger,

under the influence of the spring 28, from moving outwardly relative to said jaws. Finally the sections 18, under the influence of the inward movement of the jaws 13 toward each other, will be brought into embracing relation (Figure 5) with respect to the stem 21 and the key will now be in position to receive the retainer 19 thereon. The implement 24 is now actuated in the usual manner to lower the retainer 19 and, after the key 70 has at least partially entered the recess 22 in said retainer, the lower end of the implement will now engage upon the upper surface of the handle 10 and force the tool downwardly to disengage the jaws 13 from the key. 75 The retainer 19 will then be securely seated upon said key under the influence of the spring 23 and the implement 24 is now withdrawn, leaving the valve stem and its associated parts in their operative positions. 80 85

What is claimed is:

1. A tool of the character described, comprising cooperating jaws upon which sections of a split key are capable of being supported in opposed relation, means to maintain said jaws and sections separated while adjusting the latter to positions on opposite sides of a valve stem, said means being movable out of engagement with said sections to allow the same to embrace said stem, and means to prevent engagement of the last-named means with said sections when the latter are in stem-embracing position. 90 95
2. A tool of the character described, comprising cooperating jaws upon which sections of a split key are capable of being supported in opposed relation and adjusted to embracing position relative to a valve stem, means between said jaws engageable with and movable relative to said sections to maintain the latter separated while being adjusted to positions on opposite sides of a valve stem, and means to maintain the last named means out of engagement with said sections after the latter are in stem-embracing position. 100 105 110
3. A tool of the character described, comprising cooperating jaws upon which sections of a split key are capable of being supported in opposed relation, a plunger member engageable with said sections to keep them and said jaws separated while the sections are being adjusted to positions on opposite sides of a valve stem, said plunger member being actuated by pressure thereof against said valve stem to disengage from said sections and thereby allow the same to embrace said stem, and means to hold said plunger out of engagement with said sections after the latter are in stem-embracing position. 115 120 125
4. A tool of the character described, comprising a handle, cooperating jaws pivoted on said handle and having means to support sections of a split key in opposed relation, a plunger slidable on said handle and engageable with said sections to maintain the same 130 135 140

separated while they are being adjusted to positions on opposite sides of a valve stem, said plunger being movable out of contact with said sections to allow the latter to embrace said stem, and means on said jaws to prevent engagement of said plunger with said sections while the latter are in stem-embracing position.

5. A tool of the character described, comprising a handle having a guide slot therein, clamping members including cooperating jaws pivoted on said handle and having means to support sections of a split key in opposed relation, a plunger slidable on said handle between said clamping members and having means engaging in said slot to guide said plunger, a spring engaging said plunger to urge the same to a position between said jaws and in contact with key sections supported thereon, said plunger being movable to a retracted position out of engagement with said sections by pressure of the plunger against a valve stem, means engaging said clamping members for moving said sections into embracing relation to said stem when said plunger is retracted, and means on said jaws to prevent engagement of said plunger with said sections while the latter are in stem-embracing position.

In testimony whereof, we have affixed our signatures.

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FRANK HOBLER.