

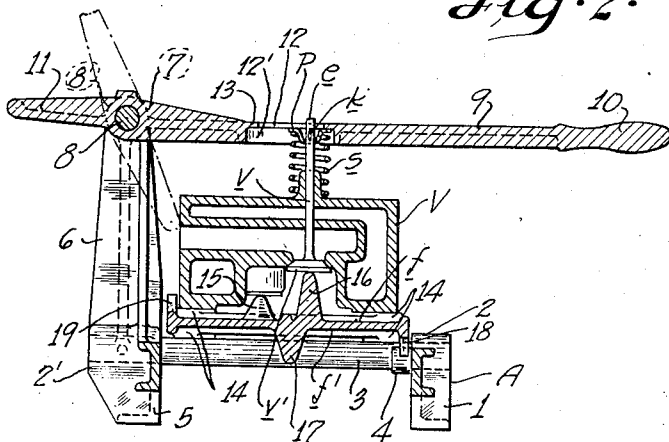
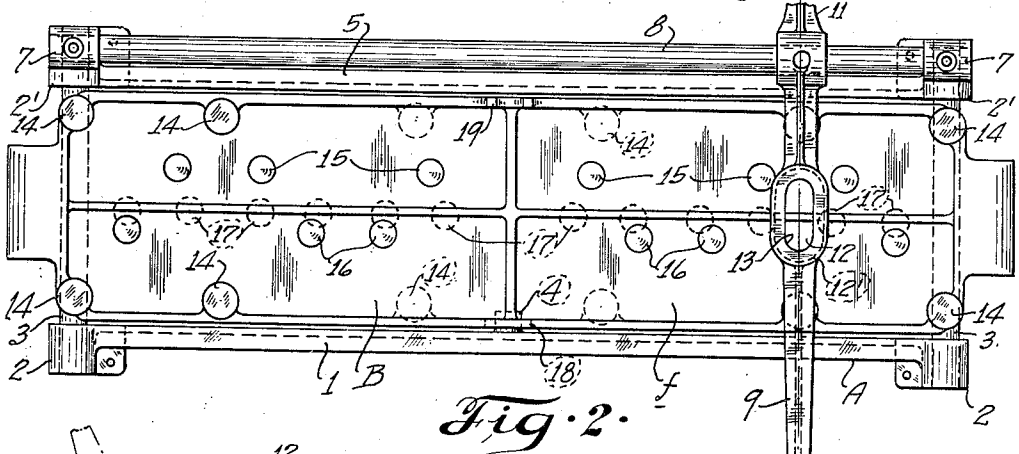
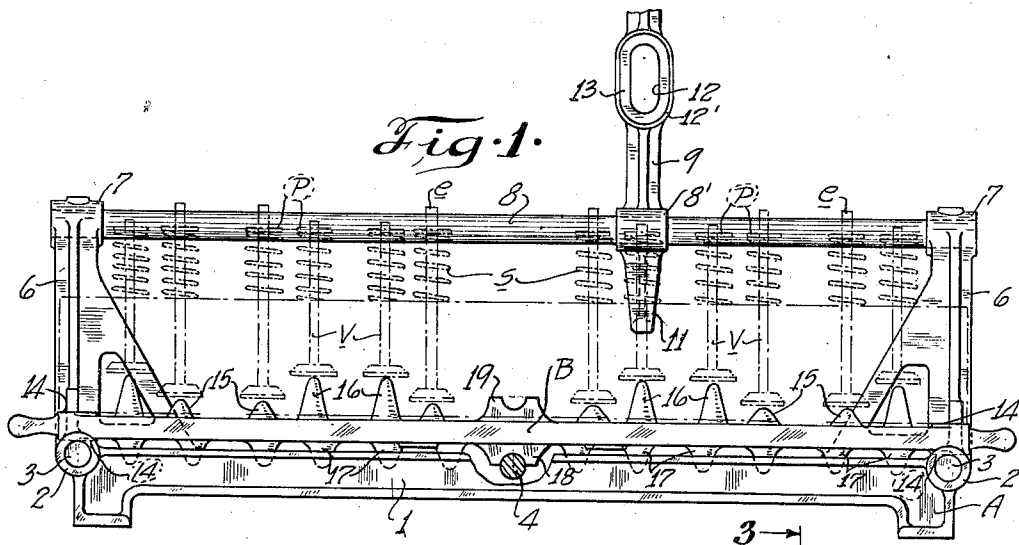
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MACHINE-SHOP FIXTURE

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MACHINE-SHOP FIXTURE

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1 Claim. (Cl. 29—86.3)

This invention relates generally to machine-shop fixtures and, more particularly, to a certain new and useful improvement in fixtures especially adapted for use in the assembling and disassembling of internal combustion engines.

In certain types of internal combustion engines, the intake and exhaust valves are operatively mounted, as is well known, in a removable casting or valve-head, as it is called, which, in turn, is bodily mounted upon the cylinder-block. The valve-stems in such engines extend outwardly from the head and are each normally urged or biased into closed or sealed position by a respective valve-spring, which bears at one end upon the head and at its other end upon a suitable washer-like dish or plate removably fixed to the valve-stem by means of a pin or key. In removing such valve-stems from the assembly, the stem must be rigidly held during compression of the spring, so as to enable removal of the retaining pin, upon the removal of which the particular spring may be released and also removed, thereby freeing the valve-stem, which may then, in turn, be removed.

At the present time, so far as we are aware, such result may only be effected or accomplished by the use of various tools known as valve-spring compressors designed for operation upon a single valve at a time. Such tools, further, frequently require auxiliary tools for holding the valve-stem during the spring-compression operation. Thus, an appreciable amount of time is lost in manipulation and the valve-stems and associated engine-parts are sometimes damaged. Finally, such available tools are not truly universal in application, since they are ordinarily designed for use with a particular form of internal combustion engine.

Our invention, hence, has for its primary object the provision of a unitary fixture or device for assembling or disassembling an entire series of valve-stems in a single continuous and integrated operation and in a simple, convenient, and time-saving manner.

Our invention has for a further object the provision of a fixture or device of the type stated which is simple and economical in construction, which is convenient in use, which obviates any danger of damaging the valve-stems or associated parts, and which is highly efficient in the performance of its intended functions.

And with the above and other objects in view, our invention resides in the novel features of form, construction, arrangement, and combination of parts presently described and pointed out in the claim.

In the accompanying drawing—

Figure 1 is a front elevational view of a valve-stem assembling fixture constructed in accordance with and embodying our present invention;

Figure 2 is a top plan view of the fixture; and

Figure 3 is a vertical sectional view of the fixture taken approximately on line 3—3 of Figure 2, operatively shown in connection with a valve-head, also illustrated in section.

Referring now in more detail and by reference characters to the drawing, which illustrates a preferred embodiment of our present invention, A designates a preferably rectangular frame-structure which comprises a front member or bar 1 provided preferably integrally at its respective extremities with parallel sleeves 2 for embracingly engaging the respective forward ends of parallel end or cross-rods 3 extending rearwardly and at right angles to the front member 1.

Centrally of its length, the bar 1 is formed with a rearwardly extending circular boss or shoulder 4, as best seen in Figures 1 and 2, for purposes presently appearing; and likewise provided at its opposite ends with sleeves 2' and mounted at the sleeves 2' upon the rearward ends of the rods 3 and extending transversely therebetween parallel with the front bar 1, is a rear-member or bar 5, which is also formed at its extremities with preferably integral upstanding parallel arms or brackets 6 equipped at their respective upper ends with aligned transversely extending horizontal sleeves 7 for supporting a cylindrical slide-rod 8, as best seen in Figures 1 and 2.

Mounted intermediate its ends, as at 8', on the rod 8 for swingable movement therearound and for also transverse slidable movement therealong, is a valve-spring compressing arm 9 provided at its forward end with a suitably shaped handle-grip 10 and at its other end with a rearwardly extending stop-arm 11 for abuttingly engaging the work, as shown in dotted lines in Figure 3, thereby preventing retrograde movement of the compressing arm 9 beyond a predetermined desired point.

Formed transversely through the arm 9 intermediate the bearing 8' and the hand-grip 10, is an elongated aperture 12 for loosely embracing the extended end *e* of the respective valve-stems *v*, the wall 12' of the aperture 12 having an inwardly extending annular flange 13 for abuttingly engaging the respective spring-plate or washer *p*, as best seen in Figure 3.

B designates an adapter-plate which is formed integrally upon each of its opposite faces *f*, *f'*, with respective flat-faced accurately machined

bosses or shoulders 14 for horizontally seating smoothly and evenly upon the end-rods 3 of the frame A. The plate B, it may be stated, is both removable and reversible relatively to the frame A, as will presently more fully appear, so that, when the plate B is in one desired position, the bosses or shoulders 14 which are on the then underside of the plate B will rest upon the frame A, while the shoulders 14 which are on the then upper side of the plate B will provide a seat upon which the valve-head V may rest, as best seen in Figure 3.

The plate B upon one face, as face *f*, is, further, provided with a row of relatively short outwardly presented or upstanding aligned projections 15 and a row of relatively long outwardly presented or upstanding aligned projections 16, each of the projections 15, 16, of the respective series being positioned for subjacent supporting engagement with the top or outer face of the valve proper *v'* of a particular valve-stem *v* in a predetermined type of valve-head. The plate B upon its other face, as *f'*, is provided with a single row of similar outwardly presented or upstanding aligned projections 17 for similarly supporting the valves of a differently designed valve-head.

Thus, it will be seen that the plate B, as here shown or illustrated, serves reversibly to accommodate two different types or makes of valve-head. For accommodating still other or different types of valve-heads, any number of such plates B may be supplied having projections similar to the projections 15, 16, 17, and arranged in accordance with the various particular designs of valve-heads.

The plate B is also provided with downwardly and upwardly presented bifurcated projections 18, 19, respectively, disposed centrally of the front and rear margins thereof for selectively embracingly engaging the shoulder 4 of the front bar 1 of the frame A. Thus, when the plate B is placed on the frame A with its face *f* presented upwardly, the bifurcated projection 18 will engage the shoulder 4 for positioning the plate B transversely with respect to the frame A. Likewise, when the other face *f'* of the plate B is presented upwardly, the bifurcated projection 19 will similarly engage the shoulder 4 for the same purpose and effect.

Presuming, for purposes of illustration, that a valve-head utilizing long and short valve-stems, such as the valve-head V shown in Figure 3, is to be disassembled, the plate B is positioned upon the end-rods 3 of the frame A with the face *f* presented upwardly and the bifurcated projection 18 in engagement with the shoulder 4. The valve-head V is then placed flatwise upon the face *f* of the plate B, with the extended ends *e* of the several valve-stems *v* and the associated valve-springs *s* in upwardly disposed position, and in such a manner that the respective projections 15, 16, of the plate B will be in subjacent supporting contact with the respective outer or top-faces of the respective valves *v'* of valve-stems *v*. The spring-compressing handle 9 is then shifted transversely along the slide-rod 8 until it is in alignment with a selected valve-stem *v*, whereupon the handle 9 is swung downwardly, so that the extended end of the particular valve-stem *v* is disposed in and through the aperture 12 and the flange 13 at its under face is in abutting engagement with the valve-spring plate or washer *p*, as best seen in Figure 3.

The handle 9 is then pressed downwardly, thereby compressing the particular valve-spring

s and shifting the valve-spring plate *p* downwardly out of engagement with the retention pin *k*, which latter may then be readily removed from the valve-stem *v*. The handle 9 may then be slowly released to relieve the compressive force exerted upon the particular spring *s* and finally swung entirely out of operative position with the stop-arm 11 resting against the valve-head V, as shown in dotted lines in Figure 3. The particular valve-spring *s* and its plate *p* may then be freely removed for cleaning and storage until re-assembly.

The handle 9 is then shifted along the slide-rod 8 into successive alignment with the remaining valve-stems *v* of the particular head, and the above series of operations repeated until all the valve-springs *s* of the set have been removed.

With the valve-springs *s* removed, the valve-stems *v* are freely removable from the valve-head V and would ordinarily drop out of the valve-head V if it were merely lifted off of the plate B. Therefore, it is preferable, though not necessary, to lift the plate B and the valve-head V bodily out of the frame A as a unit and, holding the two together, turn the valve-head V over on its side upon a work-bench or table. The plate B may then be withdrawn and the valve-stems *v* manually removed.

After the valve-head V and valve-stems *v* have been re-conditioned or repaired or otherwise treated, the head V may again be placed on its side upon the bench, the valve-stems *v* inserted, the plate B positioned thereupon, and the whole unit placed in the frame A in the same position as previously described. The valve-springs *s* may then be replaced for compression by the handle 9 and the several retention pins *k* re-inserted in the valve-stem *v* to complete the re-assembly operation.

If the work comprises a particular valve-head having merely one series of equal length valve-stems, then, while not here specifically shown, but as will be clearly understood, the plate B is positioned upon the frame A with its opposite face *f'* presented upwardly.

It will thus be evident that, by our present invention, we provide a simple and economically constructed unitary tool or fixture for enabling speedy and convenient removal of the valve-stems from the valve-heads of internal combustion engines of the "valve-in-head" type, which fixture may be readily adapted to accommodate practically any type or design of valve-head. Furthermore, it will be apparent that all the valve-stems may be assembled or disassembled in a progressively connected and integrated series of operations without repositioning the entire tool with respect to the valve-head for the various successive operations. In addition, the fixture is highly efficient in its operation and obviates any danger of warping or otherwise damaging the valve-stems in assembling and disassembling operations.

It should be understood that changes and modifications in the form, construction, arrangement, and combination of the several parts of the fixture may be made and substituted for those herein shown and described without departing from the nature and principle of our invention.

Having thus described our invention, what we claim and desire to secure by Letters Patent is—

A fixture for assembling and disassembling valve structures in an engine head comprising a front frame member having a pair of integrally formed hollow sleeve members respectively posi-

tioned adjacent the transverse end margins of the member, rod-like side rails rigidly mounted in and extending rearwardly from said sleeves at right angles to the longitudinal axis of the frame member, a pair of upwardly presented bracket members rigidly mounted at the rearward extremities respectively of the side rails, said inner members being respectively provided at their upper end with aligned sleeve members axially parallel to the longitudinal axis of the front frame member, a cross-rod rigidly mounted at its ends in said bracket sleeves for rigidly connecting the bracket members and thereby holding

the entire structure in rigid rectilinear formation, a valve depressing lever swingably and shiftably mounted on the cross-rod, a projection member mounted on and extending outwardly from the rearwardly presented face of the front frame member, and a cylinder head supporting plate removably mounted on and supported by the side rails, said plate having along its longitudinal margin a projection bifurcated member for position-finding engagement with said projection member.

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