Jan. 21, 1936. A. E. CARLISS 2,028,437

DIE

Filed May 18, 1934

Fig. 1.

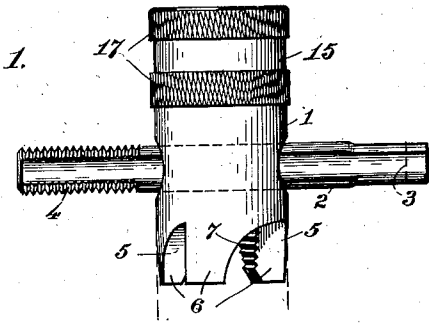


Fig. 2.

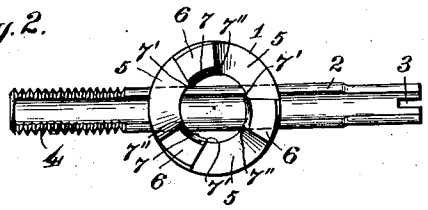


Fig. 4.

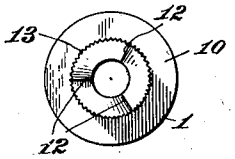


Fig. 3.

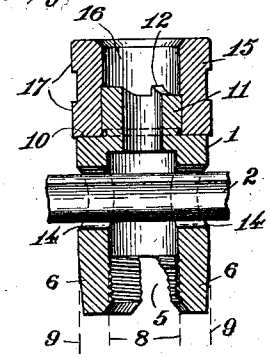
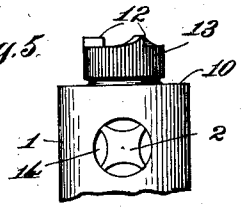


Fig. 5.



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UNITED STATES PATENT OFFICE

2,028,437

DIE

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Application May 18, 1934, Serial No. 726,416

5 Claims. (Cl. 10—118)

An object of the present invention is the improvement of the die portion of a valve stem repair tool; and a further object is the improvement of that portion of such tool designed for straightening the extremity or free end of a valve stem of the type commonly employed for check valves for pneumatic containers, such as automobile tires.

In the previously known tools of this type a cross pin has been inserted through a tube portion or hollow cylinder, the cross pin being formed at one end portion into a tap designed for use in straightening up mutilated portions of the internal thread of such a valve stem while the opposite end portion of the cross pin is notched and adapted to serve as a socket screwdriver to engage the upstanding ridge of the sleeve nut of a valve insides. The tube or hollow cylinder of such tool has heretofore been provided with cutaway portions and thread segments providing a die adapted for straightening up injured portions of the external thread of such a valve stem. Opposite the die portion, the hollow cylinder, as heretofore proposed, has been provided with a roughened end portion sometimes arranged at the shoulder of a counterbore and adapted to be rotated against the end of a valve stem to smooth up and flatten such end portion.

Such proposed die, however, has presented the difficulty of having less and less clearance inward of the die instead of greater clearance. This has been due largely to the fact that the die is formed by tapping out the end portion of the hollow cylinder and thus providing a constricting of the inner portions of the threaded parts.

The present invention includes among its objects the overcoming of such constricted portion and the provision of ample clearance as the work progresses inward along the die.

The present invention also includes the further object of providing clearance toward the trailing edges of the die sections in the direction opposite the direction of rotation.

A further object of the invention is to provide an effective cutter for dressing the end of a valve stem with precision and ease to provide a seat on the end of the stem to receive a gasket of a cap of the harder materials, such as fiber, where the cap is firmly screwed down onto the valve stem to be permanently connected therewith and where the cap contains in itself a complete valve insides.

With these and other objects in view as will in part hereinafter become apparent and in part be stated, the invention comprises a valve stem treating tool including all of the advantages of the heretofore proposed tools of this character and with the added advantages of ease and effectiveness of accomplishment of the work intended.

The invention also comprises in such a tool a die having die segments disposed at such angular relation to each other as to afford increasing clearance inward of the die threads; and the invention also comprises such die segments tilted angularly to provide trailing edges each having a greater radius than the radius of its forward edge.

The invention still further includes a tool for treatment of a valve stem in which a projection terminating in cutting edges is finished to provide a cutter and afterward assembled with a guiding sleeve affording the effect of a counterbore approach to the cutting edges.

The invention also comprises certain other novel constructions, combinations, and arrangements of parts as subsequently specified and claimed.

In the accompanying drawing,—

Figure 1 is a view in side elevation of a tool embodying the features of the present invention.

Figure 2 is an end view thereof looking from beneath.

Figure 3 is a vertical section taken therethrough on the plane indicated by line 3—3 of Figure 2.

Figure 4 is an end view, and Figure 5 is a fragmentary side elevation of the cutter tool and the upper portion of the hollow cylinder before the sleeve is applied.

Referring to the drawing by numerals, 1 indicates a hollow cylinder or tubular section transversely through which is extended the pin 2 that is anchored in the cylinder 1 in any appropriate manner, as by being wedged therein. The pin 2 has at one end the screwdriver slot 3 for receiving the projection or cross-piece of the sleeve nut of a valve insides for screwing the same into or out of place. The opposite end portion of the pin 2 is formed into a tap 4 proportioned to correspond with the threads on the inside of a valve stem, so that the tap 4 may be used for straightening up such threads if they become battered or otherwise injured.

The pin 2 serves as a handle for turning the cylinder 1, and the cylinder 1 serves as a handle for turning the pin 2.

The cylinder 1 has at one end portion notches 5, 5, opening at the end and leaving segments or die sections or prongs 6, 6, each formed with the

die teeth or cutting threads 7 at its inner face. The walls of cylinder 1 and its sections or prongs 6 are of substantially uniform thickness throughout those portions where the prongs appear. Each section 6, as a matter of convenience, is first formed as an axially extending projection from the main body of the cylinder 1 in that alinement therewith originally possessed, but after the sections have been formed by the production of the notches 5 and have been appropriately tapped to produce the cutting teeth 7, and before hardening, each of the sections or segments 6 is subjected to a centering stress sufficient to bend the several sections inward at their lower ends for at least a few thousandths of an inch, so that the lower portions of the said section will be nearer together than the upper portions, speaking of the tool as located in the position seen in Figures 1 and 3. The prongs or sections 6 are thus permanently set in a position inclined toward each other. To facilitate disclosure of the inclination thus given the several sections, the lines of the walls at the inner and outer surfaces of the cylinder 1 are shown extended in Figure 3 at 8, 8 and 9, 9. These lines 8 and 9, of course, are not part of the structure, but are employed to facilitate disclosure of measurements that are in actual practice so small as to be difficult of ready disclosure in an ordinary drawing. The amount of inclination given to the several sections or segments 6 is only sufficient to afford the requisite clearance at the upper portion of the die threads or teeth, so that, if the original diameter be say .318", the reduction at the lower extremity would be to about .302", though, of course, such variation in these proportions may be made as found desirable to afford best results under any particular set of circumstances. Not only are the several sections or segments 6 tilted or bent inward to cause their lower extremities to approach nearer than other parts of the sections but each is twisted angularly as shown in Figure 2, and given a permanent angular set, so that the advance edge 7' in each instance is at a shorter distance from the axis of rotation than is its trailing edge 7''. Thus, as the cutting teeth 7 act on material engaged there is constant clearance both in the general direction of the length of the die which widens out upward and in the direction opposite the direction of rotation as it advances about the work which widens in radius, so that clogging and tendency toward resulting injury to the work is obviated.

The upper end of the tubular portion or cylinder 1 is reduced in diameter providing an annular shoulder 10 and an upstanding projection 11, the upper end of which projection terminates in cutting teeth 12, 12. The periphery of the projection 11 is preferably serrated or provided with a milled edge 13. The shouldered portion 10, projection 11, cutters 12, and milling 13 are all completed, of course, while the cylinder 1 and its various parts are in their soft condition. They are preferably formed of steel, and after being shaped as described the cylinder is hardened by any appropriate and well known hardening process to a condition of substantially the hardness of an average tap or die. Of course, the pin 2 is similarly hardened, and may be driven into a driven fit condition in the opening 14 in the cylinder 1 after the cylinder is hardened or the connection may be made in any other manner preferred. However, the die segments 6 must, of course, be carefully tempered to be able to withstand the work of a die and the tap 4 likewise tempered. It is also essential that the projection 11 with its milling 13 be hardened similarly. When the parts have been thus prepared, a sleeve 15 is forced axially onto the projection 11 and is proportioned with respect to the said projection such that the ribs or ridges of the milling 13 enter and groove their way into the material of the sleeve 15 which is thus locked against independent rotation, and is also effectively anchored against longitudinal withdrawal under all ordinary circumstances from engagement with the projection 11. The sleeve 13 is preferably of mild steel, but may be made of other materials, such as brass, when and as desired. The sleeve 15 has its bore 16 proportioned with respect to a valve stem such as to snugly receive and yet allow free movement of the valve stem in and out of the bore 16. Thus, the bore 16 serves with respect to the cutters 12 as a counterbore and as a guide to retain the tool in the proper relation to the valve stem when the cutters 12 are being rotated against the end of the valve stem to finish it off to provide an effective seat for a cap to be mounted thereon. This dressing of the end of the valve stem may be done under any circumstances where a snug fit is to be assured, but is particularly desirable where the cap to be applied to the valve stem itself contains an air valve and the joint between the cap and the valve stem is, therefore, not only to be sealed as by engagement of a rubber or other soft gasket but to be sealed against air leakage with a more or less permanent connection and a gasket interposed of harder materials, such as hard paper fiber, or other hard gasket material. The sleeve 15 is preferably provided with knurling 17, 17 to facilitate handling and the lighter rotating operations of the cylinder 1.

To facilitate disclosure of details not otherwise readily seen by the naked eye, the parts are shown in the drawing on a scale several times enlarged over the size of the parts of the now conventional and popular size of such a tool.

The sleeve 15 and cutter structure 12 are made the subject matter of my co-pending divisional application Serial No. 753,401, filed November 16, 1934, and the art of forming or constructing a die for a valve stem finishing tool is made the subject matter of my co-pending divisional application Serial No. 753,402, filed November 16, 1934, and, therefore, neither of these subject matters is herein claimed.

What I claim is:—

1. A die comprising a cylindrical tube having notches opening at one end and leaving die sections, the walls of the tube and sections being of substantially uniform thickness throughout those portions where the sections appear, the sections being formed with die teeth converging toward the entering end of the die and the sections having a permanent set and being inclined toward each other so that the die teeth are more closely spaced at the entering end than at the opposite end.

2. A die as claimed in claim 1 wherein the sections are provided with a permanent set inclined from their normal or original relation to the body of the tube toward each other so that their free ends are nearer together than their bases where they join the tube.

3. A die comprising a cylindrical tube having notches opening at one end and leaving die sections, the sections being formed with die teeth and being permanently set with their faces at an angle to the planes of the faces of the balance

of the tube to cause the advanced edge of each section to lie nearer the axis of rotation of the die than the trailing edge in a manner similar to the relation they would assume if the sections were twisted.

4. A die as claimed in claim 1 wherein the sections are also provided with a permanent set at an angle, that is in a position causing the advanced edge in each instance to be nearer the axis of rotation of the die than the trailing edge.

5. A die for a valve stem finishing tool comprising a tube having a restricted terminus at one end and the other end portion having notches opening at the end of the tube and leaving die sections, the sections being formed with die teeth, and each section being permanently inclined toward the other sections to form converging sections and thereby to provide clearance inward of the die toward the restricted terminus of the tube.

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