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MEANS FOR SEPARATING DIE SETS

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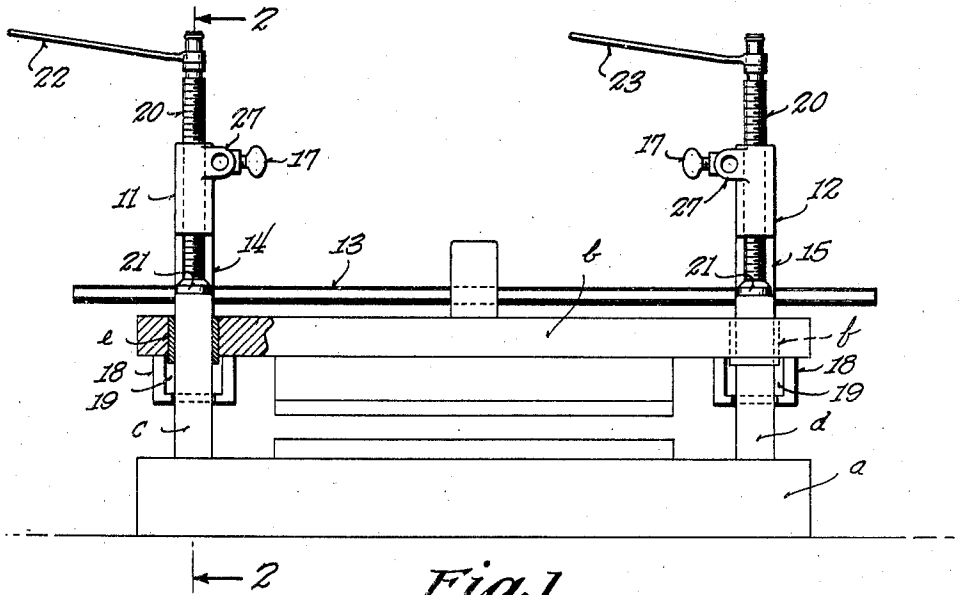


Fig. 1

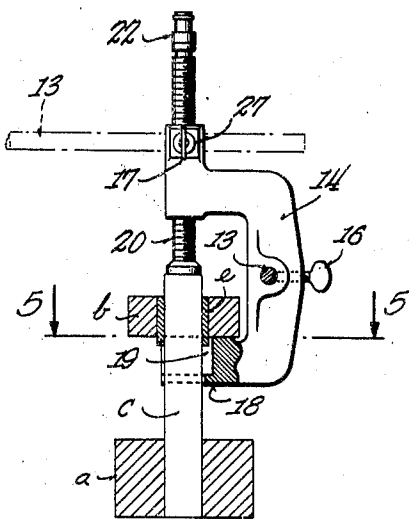


Fig. 2

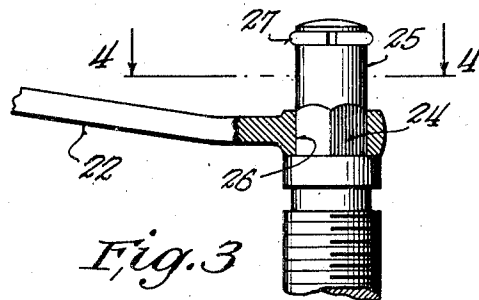


Fig. 3

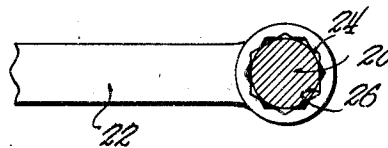


Fig. 4

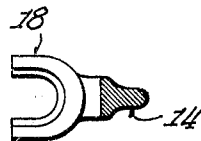


Fig. 5

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MEANS FOR SEPARATING DIE SETS

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1 Claim. (Cl. 29—84)

This invention relates to method and means for separating die sets.

Dies for metal stamping and the like are ordinarily built in sets, each set consisting of upper and lower plates commonly known as the punch holder and die shoe respectively. The die set is mounted in a press, and as the dies come together proper register of the dies is insured by leader pins normally projecting upward from the die shoe, and passing through bushings in the punch holder. Absolute accuracy is insured by perfect machining of the leader pins and bushing, which commonly have a clearance of only a few ten-thousandths of an inch.

When not mounted on a press, it is common to keep the two halves of the set together, with the punch holder held in place upon the die shoe by the leader pins passing therethrough. This induces greater ease in handling the set and facilitates mounting the set upon the press.

When it is desired to separate the two halves of the unmounted die set, however, great difficulty is commonly experienced. Unless the upper punch holder is kept absolutely parallel to the lower die shoe, the very close fit between the leader pins and the bushings will result in binding therebetween, so that separation of the die set is practically impossible. It is quite difficult to keep the two plates absolutely parallel, especially in the larger sizes where the punch holder is of considerable weight, and this difficulty is aggravated in many die sets by the fact that the center of gravity of the punch holder is in many instances horizontally offset from a vertical plane passing through the two leader pins. Due to the binding action between leader pins and bushings in separating methods heretofore practiced, it has been necessary to pry and hammer the plates apart, a tedious process, endangering the die set.

One object of the present invention is to provide a method by which a die set may be easily and quickly separated without binding.

This I have accomplished by concentrating the separating forces at points selected to avoid objectionable warping of the die members, by applying those forces axially of or parallel to the leader pins, and by accurately controlling the rate of withdrawal movements of the leader pins with respect to their bushings so that those movements may be made relatively uniform and substantially simultaneous.

Another object is to provide an apparatus for carrying out the above method in a simple expeditious manner.

Other objects and advantages will appear, expressed or implied, from the following description of an illustrative embodiment of the present invention.

The accompanying drawing illustrates one form of die set puller constructed in accordance with the present invention.

In the drawing:

Figure 1 shows a die set puller applied to a die set having two leader pins.

Fig. 2 is a vertical sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary view of the top of one of the jacks employed, showing the method of mounting the handle.

Fig. 4 is a view along the line 4—4 of Fig. 3.

Fig. 5 is a view along the line 5—5 of Fig. 2, showing the fork at the lower end of the jack.

For purposes of illustration, the die set puller is shown in Figs. 1 and 2 applied to a die set of common type. This die set consists of upper and lower parallel plates, a die shoe *a* and a punch holder *b*. This die set is of the type having two leader pins *c* and *d* projecting upwardly from the die shoe *a* through bushings *e* and *f* respectively, mounted in the punch holder *b*.

The gear set puller illustrated comprises two jacks 11 and 12 adjustably connected and braced by rod 13. Each of the jacks 11 and 12 has a C-shaped frame 14 or 15, and the connecting rod 13 passes through holes in these frames. Set screws 16 hold the rod 13 securely in the frames 14 or 15, and also permit adjustment of the die set puller to accommodate die sets of varying widths.

Since the jacks 11 and 12 are otherwise identical in construction and operation, they will be described together. In each of these jacks, the projecting lower portion of the C-frame 14 terminates in a jaw 18 which may be inserted between the die shoe *a* and punch holder *b*, and which is preferably forked to embrace the leader pin *c* and to bear against the under side of the punch holder *b*. In order to prevent binding as the die set is separated, it is desirable that the separating pressure be applied axially of the leader pin. For this reason the fork 18 extends beyond the leader pin *c*, and has its upper bearing surface accurately machined at right angles to the axis of the jack. It also has a recess 19 around its inner periphery to accommodate the lower end of the bushing *e*.

The projecting upper arm of the C-frame 14 is screw-threaded to receive a jack screw 20, the lower end of which is provided with an appro-

priate head 21 adapted to bear against the top of the leader pin c.

In order to insure against binding when the gear set is being separated, this screw is accurately centered with the axis thereof passing through the center of the fork 18 at right angles to its machined upper surface. This is accomplished by accurately machining the parts, and by making the jaw 18 embrace the leader pin to center the screw.

The screws of the jacks 11 and 12 are operated by handles 22 and 23 respectively. These handles are preferably angularly adjustable about their respective screws, and operably connected with them through axially separable interlocking formations on each screw and handle. In this instance the shank of each screw is provided with an hexagonal formation 24, and above the latter a reduced cylindrical portion 25, and the handle 22 has an opening 26 therein, preferably of double hexagonal form, as shown in Fig. 4, adapted to engage and interlock with the hexagonal formation 24 in a manner to effect rotation of the screw by manipulation of the handle. The arrangement shown is such that the handle may be lifted off the hexagonal portion onto the cylindrical portion 25 of the shank where it may be swung about the screw and re-applied to the hexagonal portion in any of twelve angular positions about the axis of the screw 20. Appropriate means, such as a split ring 27, is preferably provided to prevent withdrawal of the handle 22 from the shank of the screw 20.

In use, the die set puller is applied to the die set with the jaws 18 of the two jacks 11 and 12 between the die shoe a and punch holder b, and with the jacks 11 and 12 adjusted along the connecting rod 13 until the jaws 18 embrace the leader pins c and d. The screws 21 are then individually adjusted into light pressure contact with the tops of the leader pins c and d. Either of handles 22 or 23 is then loosened from engagement with its screw, and angularly adjusted into position parallel to the other handle and then

re-engaged with its screw. Then by turning both handles and their screws synchronously, keeping the handles parallel, the punch holder b will be elevated with respect to both of the leader pins c and d at the same rate. The punch holder b will thus be kept at all times absolutely parallel to the die shoe a, and may thus be quickly and easily drawn off the leader pins c and d.

The die set illustrated is rather narrow, permitting the jacks 11 and 12 to be arranged side-by-side along the rear edge of the punch holder b in which position the bracing rod 13 extends through the frames of the jacks and is adjustably clamped to both by the set screws 16 in the manner above described. In wider die sets, the jacks 11 and 12 are ordinarily arranged at opposite ends of the punch holder, embracing the end edges thereof and facing each other, in which position the bracing rod 13 is arranged, as indicated in dotted lines in Fig. 2, so as to extend through appropriate perforated lugs 27 which project from the sides of the jack frames and in which the rod is adjustably fixed by set screws 17. In this position of the jacks, their handles are adjusted and synchronously operated in the manner above described.

Various changes may be made in the embodiment of the invention hereinabove specifically described without departing from or sacrificing the advantages of the invention as defined in the appended claim.

I claim:

A separator for die sets of a type having parallel leader pins on one member withdrawable from another member of the set, said separator comprising jacks for applying a separating thrust to each of said pins and said last named member to effect relative withdrawal movements therebetween, and operating handles on said jacks angularly adjustable into parallelism relative to each other and simultaneously operable to effect simultaneous withdrawal movements between said pins and last named member at equal rates.

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