Aug. 22, 1944. F. C. DANNEMAN 2,356,387

PIN AND BUSHING LOCK FOR DIE SETS

Filed Dec. 23, 1942

Fig. 1.

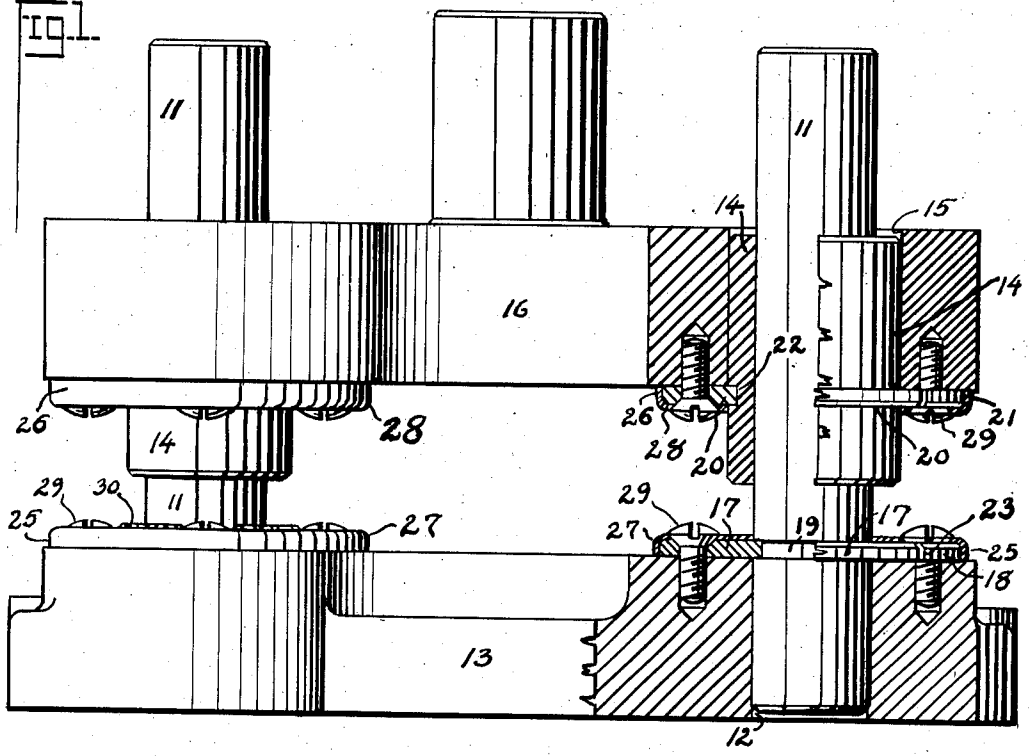


Fig. 2.

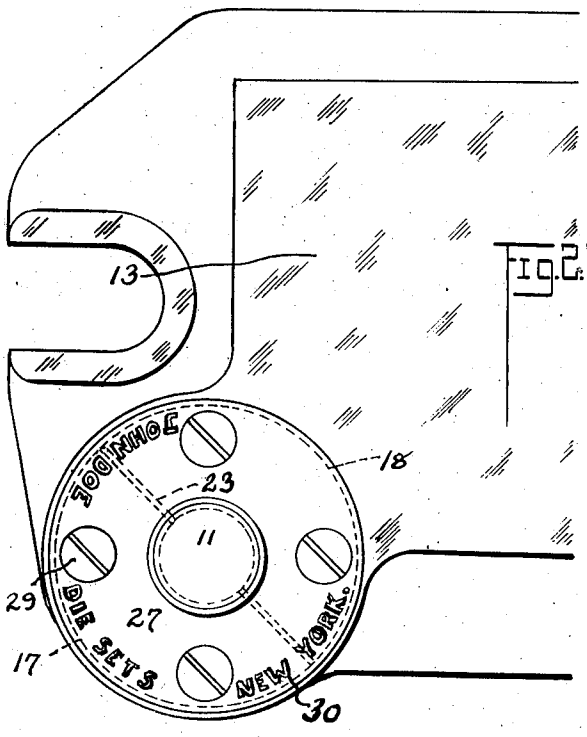
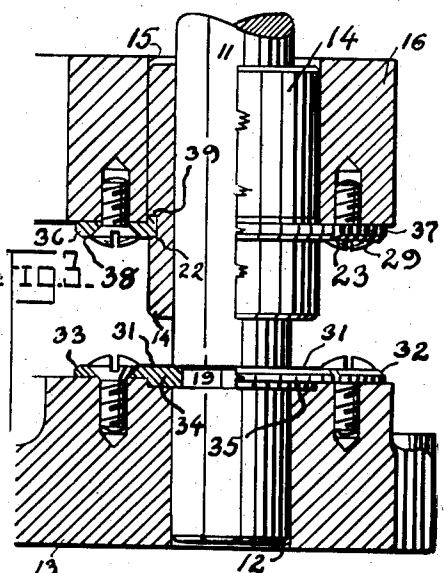


Fig. 3.



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PIN AND BUSHING LOCK FOR DIE SETS

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16 Claims. (Cl. 164—118)

This invention concerns die sets of similar machine elements. More particularly the invention refers to locks and means for securing in position cylindrical guide parts of those elements, such as the leader pins or bushings.

Machine elements of that type require accurate alignment of the coacting parts, more particularly when they are arranged to reciprocate in relation to each other. In a die set that refers to the punch holder and the die shoe, for instance to bushings and pins mounted upon these parts and slidably engaged upon each other.

The cylinders accurately fit bores in the coacting parts, such as the die shoe and the punch holder, and are commonly forced in under pressure. In addition locking or setting means are desirable, which fixedly retain the cylindrical parts at a preferred position or level in the respective bores.

Such locks represent a source of trouble because they do not evenly engage and react in retaining the cylinders in the respective bores, and they are apt to throw the parts out of alignment, either originally or during operation. For that reason the locks have been frequently made permanent which is not desirable, because the parts must occasionally be taken apart and the locks should thus be readily disengageable.

The search for a suitable lock has frequently led to complicated arrangements in the prior art which are undesirable from a point of view of handling, using and in an economical respect.

It is the object of this invention to overcome those disadvantages of the prior art, to provide a lock which locks and preserves perfect alignment, which is rugged, which permits the parts to be readily released from each other if so desired, and which is of the utmost simplicity.

This invention has also specific objects. For practical considerations it is to provide for means assembling the lock with the cylinder, so that it may be handled as one with the cylinder before mounting.

According to another object of this invention the mounting is to be simplified.

More details of these and other objects of this invention will be learned from the following description thereof which is to be interpreted as an illustration, but not in limitation of the invention.

This application is a continuation in part of my copending application, Serial No. 430,315; for Demountable pin or shank assemblies, filed on February 10, 1942, which has general reference to a device of this invention. However the said parent application is primarily directed to resilient lock means whereas resiliency is not necessary in a device of this invention.

In the drawing:

Fig. 1 is a rear elevation of a punch holder and die shoe assembled into a die set by locks of this invention. The die set is cross-sectioned at the right in a plane through the axis of the leader pins and bushings.

Fig. 2 is a corresponding pictorial top view of the die shoe only.

Fig. 3 presents another embodiment of this invention by way of a sectorial, vertical cross-section similar to that shown to the right of Fig. 1.

Similar numerals refer to similar parts throughout the various views.

The views of the drawing show a general, conventional arrangement of the following parts: A pair of cylindrical leader pins 11 arise in parallelism from corresponding bores of the die shoe 13. Pins 11 extend with a close, sliding fit through the bushings 14, which are seated in corresponding bores 15 of the punch holder 16.

According to the invention the cylinders, e. g. the pins, or bushings, or both of them, have circular grooves. Into each groove extend in a radial direction a plurality of sectors which substantially complement each other to form a circular element like a washer or flange. Those sectors are directly affixed to the part upon which the respective grooved cylinder is to be locked.

In a preferred embodiment my invention also provides a means e. g. a cage holding the complementary sectors radially together, thus retaining them in the groove of the respective cylinder, although they may not yet be affixed to the part having a bore accommodating that cylinder.

That embodiment is illustrated in Figs. 1 and 2. Sets of complementary sectors 17 and 18 each engage in a groove 19 of one of the leader pins 11. Corresponding sets of sectors 20 and 21 engage in grooves 22 upon the bushings 14. Since in the exemplary showing of the drawing the sets of sectors are pairs, they are substantially semi-circular or half annuli. The sectors are suited for direct mounting by being flat upon one side, so that they are thus shown to affix directly to the top side of the die shoe 13 and bottom side of the punch holder 16, respectively. If the sectors of a set are made by cutting a washer or flange into two more parts, they will not necessarily touch each other, but may be spaced apart to the width of the cut 23.

The grooves 19 and 22 may have any desired shape. But preferably they have surfaces upon

their sides which extend normally to the axis of the respective cylinder, and the sectors have parallel marginal surfaces which fit exactly between said sides. That arrangement avoids any radial components of the thrust between the cylinders and the sectors.

A means encircling the outer periphery of the sectors of each set will retain the sectors in the grooves in which they are centripetally engaged.

In the embodiment of Figs. 1 and 2 of the drawing, such means is indicated by cylindrical skirt portions 25 and 26 of caps or cages 27 and 28, which respectively centripetally retain the sectors 17 and 18 in engagement upon the leader pins, and the sectors 20 and 21 in engagement upon the bushings 14. The caps or cages 27 and 28 may be attached to the die shoe 13 and the punch holder 16 together with the sectors retained thereby, the drawing showing screws 29 for such purpose, which extend into the caps or cages, through clearance holes in the sectors, and are threadedly engaged upon the die shoe and the punch holder, respectively.

Each cap or cage has a clearance hole for the respective leader pin or bushing and serves also as a protective covering for the sectors. These caps or cages may be very thin because they are under no particular stress under operating conditions when arranged as shown. Thus they may be sheet metal stamping, and legends may be struck up in their surfaces in the stamping, as indicated at 30.

Such caps or cages are preferred means for holding together the sectors, because they retain the sectors upon the pins or bushings even before these are assembled with the die shoe and punch holder. On the other hand each set of sectors may also be held together by being countersunk, in whole or in part, into a corresponding recess of the die shoe, or of the punch holder, or into the respective bores. When the sectors are retained in part only in a recess, this may refer to their thickness or to any fraction of their diameter or to both. That is illustrated in Fig. 3.

In the arrangement of Fig. 3 each one of the sectors 31 and 32 has a thinner marginal portion 33, surrounding a thicker central portion 34 engaging in groove 19 of the leader pin 11. Those thicker central portions 34, like the sectors, substantially complement each other to make an annulus and they fit into a recess 35 in the top side of the shoe 13, so that the sectors 31 and 32 are retained in groove 19, when strapped by screws 29 onto die shoe 13, or by groove pins or other substitutes for or equivalents of screws.

The pair of sectors 36 and 37 engaged in the groove 22 of the bushing 14 of the modification of Fig. 3 similarly provide a thinner marginal portion 38 surrounding a heavier central portion 39. But in that case the outer diameter of the projecting part of the central portion 39 is limited to the diameter of bore 15. In case of this particular arrangement no special recess has to be provided at all in the surface to which the sectors are affixed, and still they remain secured in the groove while resting on such surface.

The invention is put to use as follows:

In a device of Figs. 1 and 2 a set of sectors 17 and 18 is inserted in the groove 19 of a leader pin 11. Cap, cage or stamping 27 is then slipped onto the leader pin and over the sectors projecting therefrom, so that the sectors are retained in the grooves. The leader pin and the sectors may now be handled as one unit. The leader pin is inserted into the corresponding bore 12 of the die shoe 13 and is pushed down until the sectors come to rest upon the top surface of the shoe. Then the cap 27 and the sectors 17 and 18 contained therein are screwed down outside upon the die holder by screws 29. The bushings are arranged upon the punch holder 16 by a corresponding operation.

In the embodiment of Fig. 3 the sectors 31 and 32 may be inserted in groove 19 after the pin 11 has been inserted in the respective bore 12 but just before such pin is finally pushed down to the desired level. In this case as well as in the case of the embodiments of Figs. 1 and 2 the holes may be oriented relatively to the cap in the die shoe just before the leader pin reaches the final position or level, e. g. by then inserting the screws 29, and those screws are tightened when the leader pin 11 has been finally allocated. Bushings 14 are mounted in similar manner above the punch holder.

In connection with the modifications shown in Fig. 3 it is desirable to gather the inserted sectors centripetally until they or their projecting portions, such as the thickened parts 34 or 39, have dropped into the countersinks, recesses or bores of the respective die shoe or punch holder. It is expedient to use for such purpose a cap like the cages or stampings 27 or 28 of the embodiment of Figs. 1 and 2. That cap is then removed after the sectors have dropped into their seat in the respective supporting surface, whereupon they are screwed down.

Having thus described my invention in detail, yet I do not wish to be limited thereby, except as the state of the art and the appended claims may require, for it is obvious that various modifications and changes may be made in the form of embodiment of my invention, without departing from the spirit and scope thereof.

What I claim is:

1. In a machine element comprising coacting parts relatively guided by a cylinder mounted in a bore of one of said parts, a lock for allocating said cylinder in said bore on said one part in an axial direction and having a plurality of sectors directly screwed onto said part and each engaged between the sides of a groove encircling said cylinder.

2. In a machine element comprising coacting parts relatively guided by a substantially rectilinear cylinder mounted in a bore of one of said parts, a lock for allocating said cylinder in said bore on said one part in an axial direction and having a plurality of sectors directly screw fastened onto said part and extending from all sides into and engaged in a circular groove in said cylinder.

3. In a machine element comprising coacting parts relatively guided by a cylinder mounted in a bore of one of said parts, a lock for allocating said cylinder in said bore on said one part in an axial direction and having a plurality of complementary sectors directly screw fastened onto said part and each engaged between the sides of a groove encircling said cylinder.

4. A lock for endwise allocating in a bore of one of two coacting parts, a cylinder fitting a corresponding bore of one of said parts and guiding said other part, a circular groove in the outside of said cylinder, and sectors fitting said groove and each screw fastened onto said bored part.

5. A lock for endwise allocating in a bore of one of two coacting parts a cylinder relatively

registeringly guiding said parts, comprising a groove encircling said cylinder, sectors fitting said groove and each screw fastened onto said one part, and circular retaining means radially confining said sectors in said groove.

6. A lock for endwise allocating in a bore of one of two coacting parts a cylinder relatively registeringly guiding said parts, comprising a groove encircling said cylinder, sectors fitting said groove and screw fastened onto said one part, and a cage radially confining said sectors in said groove.

7. A lock for endwise allocating in a bore of one of two coacting parts a cylinder relatively registeringly guiding said parts, comprising a groove encircling said cylinder, sectors fitting said groove and screw fastened onto said one part, and circular retaining means radially confining said sectors in said groove but withdrawable from said sectors in the direction of the axis of said cylinder, said means being screwed onto said one part together with said sectors.

8. A lock for endwise allocating in a bore of one of two coacting parts a cylinder relatively registeringly guiding said parts, comprising a groove encircling said cylinder, sectors fitting said groove and screw fastened onto said one part, and a stamping having a substantially cylindrical skirt radially confining said sectors in said groove.

9. A lock for endwise allocating in a bore of one of two coacting parts a cylinder relatively registeringly guiding said parts, comprising a groove encircling said cylinder, sectors fitting said groove and screw fastened onto said one part, a stamping substantially covering one side of said sectors where they are outside of said groove, and a skirt on said stamping radially confining said sectors in said groove.

10. A lock for endwise allocating in a bore of one of two coacting parts a cylinder relatively registeringly guiding said parts, comprising a groove encircling said cylinder, and sectors fitting said groove and each screw fastened onto said one part, said one part having a circular recess in which said sectors are seated.

11. A lock for endwise allocating in a bore of one of two coacting parts a cylinder relatively registeringly guiding said parts, comprising a groove depressed into said cylinder, and sectors fitting said groove and each screw fastened onto said one part, said sectors having projections engaged in a recess of said one part.

12. A lock for endwise allocating a cylinder in a bore of a support, comprising a groove encircling said cylinder, and sectors fitting said groove and each screw fastened onto said support, said sectors having recesses at which they are centripetally engaged by said bore of said support.

13. In a die set, a die shoe, a leader pin engaged in a bore of said shoe and having a circular groove, and a subdivided flange engaged in and projecting from said groove and fastened upon the surface of said shoe.

14. In a die set, a punch holder, a bushing engaged in a bore of said punch holder and having a circular groove, and a subdivided flange engaged in and projecting from said groove and fastened upon the bottom side of said punch holder.

15. The method of mounting a cylinder in the bore of a part of a die set by sectors engaged in a groove of said cylinder and adapted to be strapped onto said part after being dropped into a recess holding them together, comprising retaining the sectors in the groove, engaging thereover a means holding said sectors centripetally together, sinking the cylinder into said part until the sectors have dropped thereinto, removing said means, and strapping each sector onto said part.

16. In a lock for endwise allocating upon a support a cylinder having a circular groove upon the outside, sectors substantially complementarily fitting and fitting around said groove and projecting therefrom, a cap comprising a washer portion clearing said cylinder and a skirt portion extending from said washer portion and adapted to engage peripherally around said sectors when they are fitted into and around said groove, part of said washer portion being struck up to form a legend thereon, and fastening means for engaging said sectors upon said support when said cap is engaged therearound.

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