Jan. 23, 1951 K. C. KERSEG 2,539,085

DIE SET

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Fig. 1

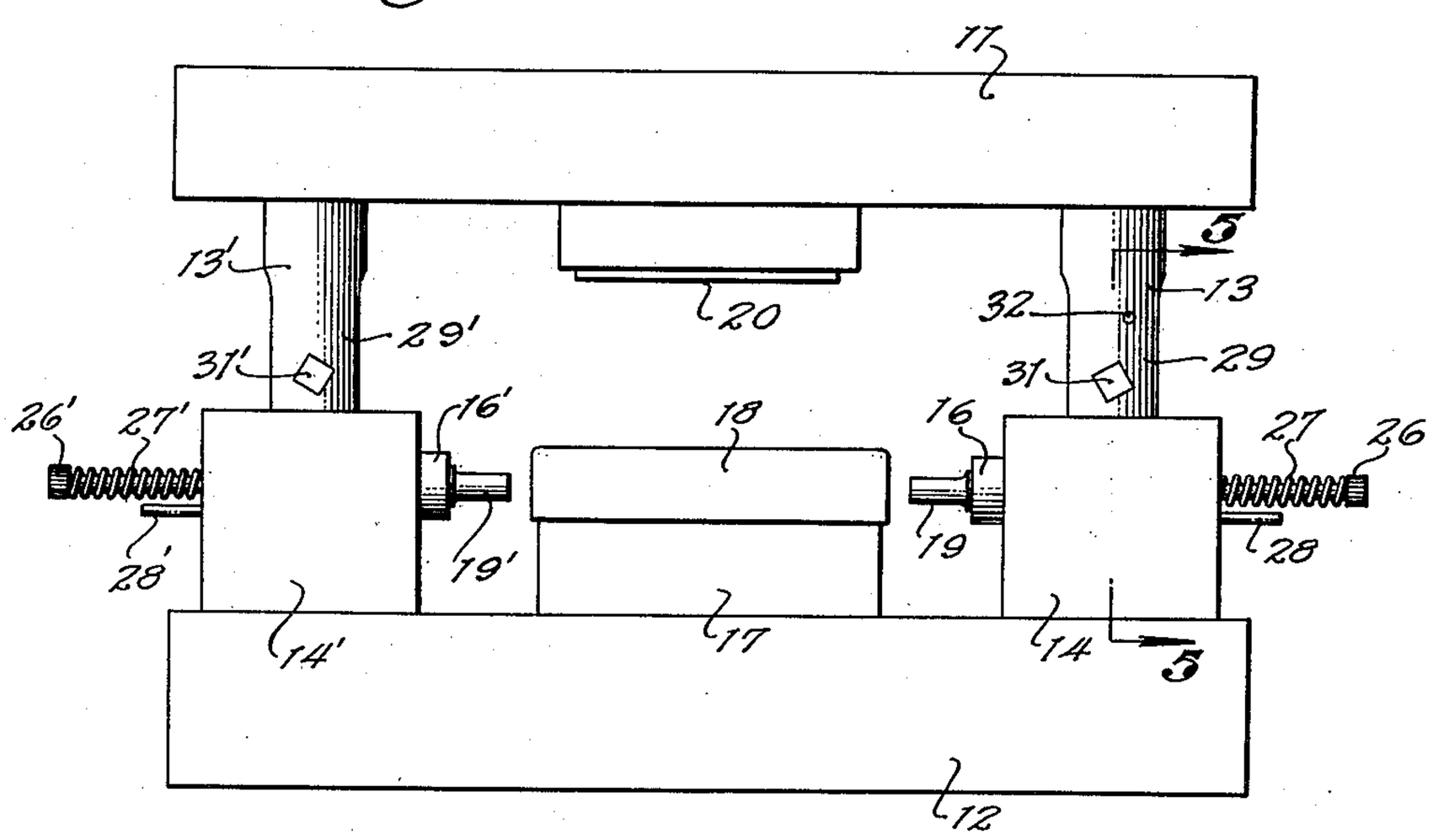

Fig. 2

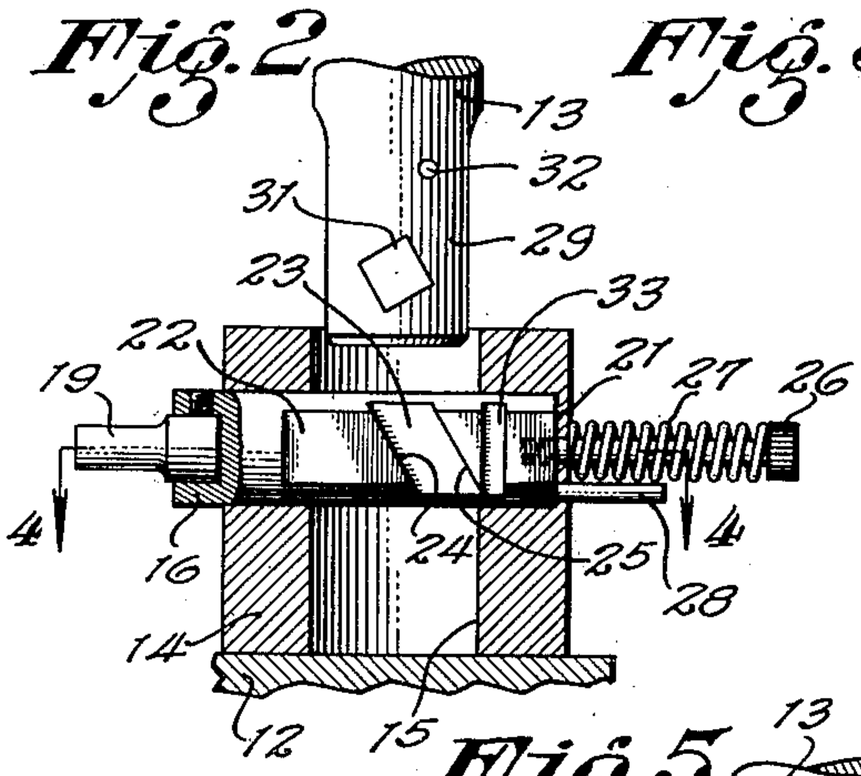

Fig. 3

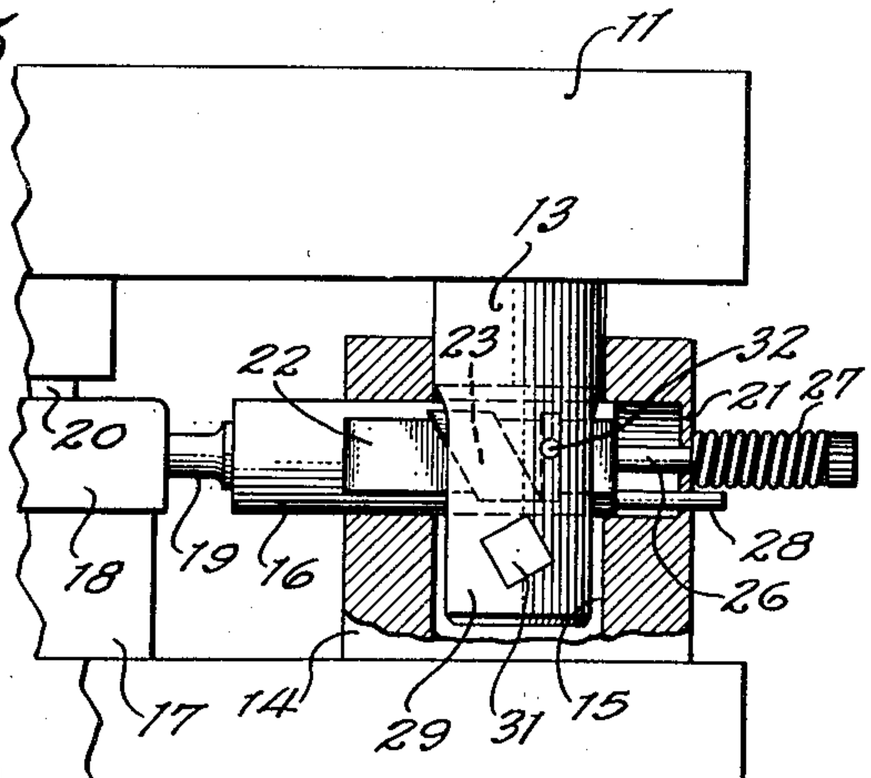

Fig. 4

Fig. 5

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DIE SET

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10 Claims. (Cl. 164—90)

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This invention relates to improvements in punch-actuating mechanism for punch presses or the like, and more particularly to a die set embodying said mechanism.

A conventional die set comprises a pair of die-supporting parallel plates which are maintained in relative alignment by a plurality of guide posts or leader pins secured to one of the plates and slidable in conforming openings or bushings in the other plate; the plates being attachable, respectively, to the ram and to the bed of a punch press. It is an object of this invention to provide a die set wherein the leader pins serve not only as means for maintaining alignment of the plates and thereby of the dies supported by them, but also as means for actuating dies or punches in directions at right-angles to the directions of relative movement of the die plates.

Another object of the invention is to provide punch-actuating mechanism, of the "cam-die" type referred to in the preceding object, whereby the punch is driven positively in alternate directions.

Another object is to provide means for holding the punch in a predetermined actuated position so as to permit additional operations to be performed during continued relative movement of the plates.

For full understanding of the invention, and further appreciation of its objects and advantages, reference is to be had to the following detailed description and accompanying drawing, and to the appended claims.

In the drawing:

Figure 1 is a front elevation of a die set embodying the invention;

Figure 2 is a fragmentary sectional view, to enlarged scale, of the right-hand portion of the die set shown in Fig. 1;

Figure 3 is a view similar to that of Fig. 2, but showing the parts in moved positions;

Figure 4 is a transverse section taken along the line 4—4 of Fig. 2; and

Figure 5 is a fragmentary longitudinal section, to enlarged scale, taken along the line 5—5 of Fig. 1.

As is seen in Fig. 1 of the drawing, the die set of the present invention comprises an upper plate 11 and a lower plate 12; these plates being adapted to be secured by any suitable means (not shown) to the ram and the bed, respectively, of a punch press and therefore conveniently designated as a ram plate and a bed plate. Serving to maintain alignment of the plates 11 and 12

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is a pair of guide posts or leader pins 13 and 13' which are secured to the ram plate 11, as by pressing in undersize openings in the plate, and are slidable in conforming openings (indicated at 15 in the other figures) in blocks 14 and 14' secured to the bed plate 12 by means such as screws and dowel-pins (not shown).

Reciprocable in horizontal openings in the blocks 14 and 14' are round punch-members 16 and 16' which are actuated by the leader pins 13 and 13' in a manner hereinafter to be described in connection with the other figures of the drawing. By way of illustrating a typical application of the die set, there is shown, secured to the bed plate 12 between the blocks 14 and 14', a support 17 for a work-piece 18 which may be an inverted shallow cup the side wall of which is to be pierced by punches 19 and 19' carried by the punch members; an additional die 20, mounted on the ram plate 11, being adapted to perform some additional operation (such as embossing) on the horizontal portion of the work-piece.

Referring now to Figs. 2 to 5 wherein the block 14 is shown in section, it will be observed that the circular opening for the punch member 16 is so bored that it intersects the axis of the leader-pin opening 15 and terminates adjacent the right-hand end of the block to leave a thin wall 21. The major inner portion of the punch member 16 is machined to provide opposite flat surfaces 22, and, in these surfaces, grooves 23 the parallel opposite sides 24 and 25 of which are in planes inclined from the axis of the opening 15. Threaded in the right-hand end of the punch member is a rod 26 which projects through an opening in the block-wall 21 and is encircled by a spring 27 compressed between its headed outer end and the block, whereby the punch member is normally retained in its retracted position as shown in Figs. 2 and 4; another rod 28, similarly arranged, serving to prevent rotation of the punch member.

As is best seen in Fig. 5, the lower portion of the leader pin 13 is bifurcated to provide a pair of legs 29 and 30 which straddle the flattened portion of the punch member when, in the operation of the punch press, the die plates are moved toward each other, as shown in Fig. 3. Rigidly secured to each of the legs 29 and 30 is a square key 31 which projects inwardly and is oriented to cooperate with the individual punch-member grooves 23. Similarly mounted on the leg 29 is a pin 32 which is adapted to cooperate with a vertical recess 33 in the punch member

in a manner and for a purpose to be described. The leader pin and punch arrangement shown at the left in Fig. 1 is identical in construction with the right-hand arrangement described, and the corresponding parts are therefore indicated by the same numerals with a prime mark added.

When, in operation, the leader pin descends, its keys 31 engage the left sides or cam-surfaces 24 of the inclined grooves in the punch member so that the same is driven outwardly, and when the leader pin subsequently rises, the keys engage the opposite sides or cam-surfaces 25 of the grooves so that the punch member is positively driven also in the reverse direction, thus avoiding the possibility of sticking which might occur if a spring were relied upon for retracting the punch member. The spring 27 serves merely as means for preventing movement of the punch member from its normal position (as might be caused by vibration of the press) when the keys are withdrawn from the grooves.

In simple operations, the stroke of the press may be so adjusted that the keys 31 do not leave the grooves on the down-stroke. However, when it is desired to perform additional or sequential operations (as, for example, by means of the die 20) while the punch member is maintained in projected position so that continued movement of the leader pin effects disengagement of the keys from the punch member as shown in Fig. 3, the pin 32, which is arranged to enter the recess 33 simultaneously with the departure of the keys from the grooves, holds the punch member in position to receive the keys when the leader pin rises; this arrangement having particular utility when the punch 19 is designed to perform a forming (as distinguished from a piercing) operation.

It will be observed that, since the bifurcated portion of the leader pin is closely guided in the block-opening 15, any tendency toward spreading of the legs of this portion is avoided. It will be understood that the tool carried by the punch member 16 may be designed to perform any die-operation such as piercing, forming, lancing, riveting or staking; or, when a plurality of punch members are employed, they may be arranged to hold or clamp a workpiece while some other operation is performed on it.

The specific embodiment of my invention herein shown and described is obviously susceptible of modification without departing from the spirit of the invention, and I intend therefore to be limited only by the scope of the appended claims.

I claim as my invention:

1. Punch-actuating mechanism for a punch press, comprising: a pin member adapted to be driven longitudinally in alternate directions by the ram of said press, a block adapted to be secured to the bed of the press and having a first opening for guidingly receiving said pin member in its movements, a punch member reciprocable in another opening in said block intersecting said first opening substantially at right-angles thereto, the portion of said pin member received within said first opening being bifurcated and arranged to straddle said punch member, the portion of said punch member within said first opening having in its surface a groove the sides of which are in parallel planes inclined from the axis of said pin member, and a key extending from an inner surface of said bifurcated portion of the pin member and so cooperating with said groove that in alternate movements of the pin member the punch member is actuated in alternate directions.

2. The combination defined in claim 1, and including: a pin carried by one of said members and cooperable with a recess in the other of the members when, by continued inward movement of said pin member, said key is disengaged from said groove.

3. Punch-actuating mechanism for a punch press, comprising: a pin member adapted to be driven longitudinally in alternate directions by the ram of said press, a block adapted to be secured to the bed of the press and having a first opening closely receiving said pin member in its movements, a round punch member reciprocable in another opening in said block intersecting said first opening substantially at right-angles thereto, the portion of said round punch member within said first opening being machined to provide opposite flat surfaces and in each of said surfaces a groove the sides of which are in parallel planes inclined from the axis of said pin member, the portion of said pin member received within said first opening being bifurcated and arranged to closely straddle said flat surfaces of the punch member, and a key extending from each of the inner surfaces of said bifurcated portion of the pin member and so cooperating with said grooves that in alternate movements of the pin member the punch member is actuated in alternate directions.

4. The combination defined in claim 3, and including: a pin carried by one of said members and cooperable with a recess in the other of the members when, by continued inward movement of said pin member, said keys are disengaged from said grooves.

5. A die set, comprising: a ram plate and a bed plate, a plurality of spaced-apart leader-pin members carried by said ram plate, a plurality of blocks secured to the working surface of said bed plate and having guide openings for the respective leader-pin members whereby alignment of said plates is maintained in their movements toward and away-from each other, at least one of said blocks having another opening intersecting its guide opening substantially at right-angles thereto, a punch member reciprocable in said other opening, the leader-pin member associated with said one of said blocks being bifurcated and arranged to straddle said punch member, the straddled portion of said punch member having in its surface a groove the sides of which are in parallel planes inclined from the axis of the associated leader-pin member, and a key extending from an inner surface of said bifurcated portion of the leader-pin member and so cooperating with said groove that in alternate movements of the leader-pin member the punch member is actuated in alternate directions.

6. The combination defined in claim 5, and including: a pin carried by one of said associated leader-pin and punch members and cooperable with a recess in the other of the associated members when, by continued inward movement of the associated leader-pin member, said key is disengaged from said groove.

7. A die set, comprising: a ram plate and a bed plate, a plurality of spaced-apart leader-pin members carried by said ram plate, a plurality of blocks secured to the working surface of said bed plate and having guide openings for the respective leader-pin members whereby alignment of said plates is maintained in their movements toward and away-from each other, at least one

of said blocks having another opening intersecting its guide opening substantially at right-angles thereto, a round punch-member reciprocable in said other opening, the leader-pin member associated with said one of said blocks being bifurcated and arranged to straddle said punch member, the straddled portion of said round punch-member being machined to provide cooperating opposite flat surfaces and in each of said surfaces a groove the sides of which are in parallel planes inclined from the axis of the associated leader-pin member, and a key extending from each of the inner surfaces of the bifurcated portion of the leader-pin member and so cooperating with said grooves that in alternate movements of the leader-pin member the punch member is actuated in alternate directions.

8. The combination defined in claim 7, and including: a pin carried by one of said associated leader-pin and punch members and cooperable with a recess in the other of the associated members when, by continued inward movement of the associated leader-pin member, said keys are disengaged from said grooves.

9. An actuating mechanism comprising: an elongated driving member adapted to be moved longitudinally in alternate directions, a block having a first opening for guidingly receiving said driving member in its movements, an elongated member to be driven by said driving member and reciprocable in another opening in said block intersecting said first opening substantially at right-angles thereto, the portion of said driving member received within said first opening being bifurcated and arranged to straddle said driven member, the portion of said driven member within said first opening having in its surface a groove the sides of which are in parallel planes inclined from the axis of said driving member, and a key extending from an inner surface of said bifurcated portion of the driving member and so cooperating with said groove that in alternate movements of the driving member the driven member is actuated in alternate directions.

10. An actuating mechanism comprising: an elongated driving member adapted to be moved longitudinally in alternate directions, a block having a first opening closely receiving said driving member in its movements, a round elongated member to be driven by said driving member and reciprocable in another opening in said block intersecting said first opening substantially at right-angles thereto, the portion of said round member within said first opening being machined to provide opposite flat surfaces and in each of said surfaces a groove the sides of which are in parallel planes inclined from the axis of said driving member, the portion of said driving member received within said first opening being bifurcated and arranged to closely straddle said flat surfaces of the round member, and a key extending from each of the inner surfaces of said bifurcated portion of the driving member and so cooperating with said grooves that in alternate movements of the driving member the round member is actuated in alternate directions.

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