(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 414 973 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **89308898.9**

(51) Int. Cl.5: **B21K 1/56**

(22) Date of filing: **01.09.89**

(43) Date of publication of application:
06.03.91 Bulletin 91/10

(84) Designated Contracting States:
AT BE CH DE ES FR GB IT LI LU NL SE

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(54) A die set for forging knife-edge of tapping screw.

(57) This invention relates to a die set (1,2) for forging the knife-edge of a tapping screw which utilizes a pair of reciprocating concentric positioners (15) to fix a tapping screw in place prior to punch pressing so as to forge a knife-edge of the tapping screw and cooperates with a horizontal punch press to provide mass production for forging the knife-edge of the tapping screw.

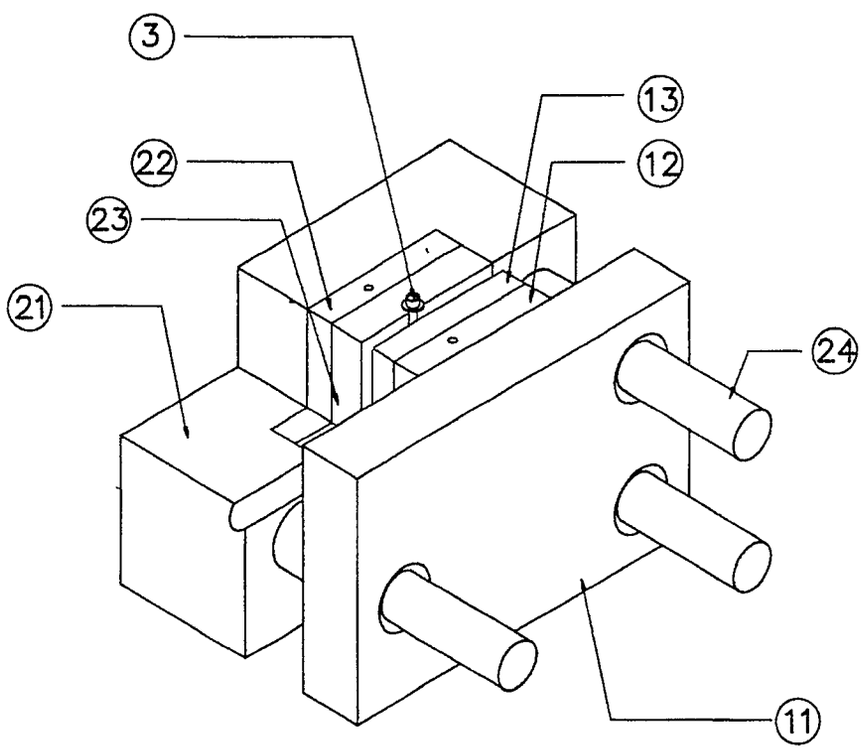

FIG1

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A DIE SET FOR FORGING KNIFE-EDGE OF TAPPING SCREW

This invention relates to a die set which utilizes a pair of reciprocating concentric positioners to fix a tapping screw in place prior to punch pressing so as to forge a knife-edge of the tapping screw.

It is found that tapping screws are widely used to force into the material by pressure for making permanent fastenings. However, according to the convectional method, the knife-edge of the tapping screw is formed by milling thereby making it impossible for mass production.

Recently, a punch press is used to forge the knife edge of a tapping screw, but it lacks the concentric positioneis thus producing a lot of unqualified products.

It is, therefore, the primary object of the present invention to provide a die set which utilizes a pair of reciprocating concentric positioners to fix a tapping screw in place prior to punch pressing so as to forge a knife-edge of the tapping screw.

It is another object of the present invention to provide a die set for forging the knife-edge of a tapping screw which is simple in construction.

It is still another object of the present invention to provide a die set for forging the knife-edge of a tapping screw which is of high efficacy.

It is still another object of the present invention to provide a die set for forging the knife-edge of a tapping screw which is easy to operate.

Other objects and merits and a further understanding of the present invention will be obtained by those having ordinary skill in the art when the following detailed description of the preferred embodiment is read in conjunction with the accompanying drawings.

Fig. 1 is a perspective view of a die set according to the present invention;

Fig. 2 shows the structure of the die A and die B of the present invention;

Fig. 3 shows the interior of the die A and Die B of the present invention;

Figs. 4~8 shows the working of the present invention;

Fig. 9 shows a primary product of a tapping screw formed by the present invention;

Fig. 10 shows a finished tapping screw formed by the present invention;

Fig. 11 shows the arrangement of the die set on a horizontal punch press;

Fig. 12 shows various applications of the tapping screw; and

Fig. 13 is an exploded view of the present invention.

The present invention will now be described in detail in conjunction with the accompanying drawings.

With reference to the drawings and in particular to Figs. 1 through 3, the tapping screw according to the present invention mainly comprises a A die 1 and a B die 2. The A die 1 is constituted by a die seat 11, a packing plate 12, a clamping plate 13, a sleeve 14, a concentric positioner 15, a knife-edge mold 16,, a guide rod 17 and a spring 18. The clamping plate 13 and the packing plate 12 are locked in sequence on the die seat 11, while the knife edge mold 16 is is engaged at the center to the clamping plate 13. A hole extends through the die seat 11, the packing plate 12 and the clamping plate 13 and is designed for receiving a spring 18. A screw 5 is engaged with the bottom of the through hole so as to keep the spring 18 therein. The positioner 15 is partially inserted into the through hole and is associated with the concentric positioner 25 of the B die 2 so as to clamp a tapping screw 3. The sleeve 14 is mounted on the die seat 11 for receiving a guide rod 24 of the B die. The guide rod 17 on the clamping plate 13 of A die is adapted to be received in the sleeve 27 of B die 2 thereby correctly guiding the relative motion between the A, B dies.

B die 2 is also constituted by a die seat 21, a packing plate 22, a clamping plate 23, a guide rod 24, a concentric positioner 25, a knife-edge mold 26, an auxiliary sleeve 27, a spring 28 and a withdrawing rod 9. The arrangement of the packing plate 22, the clamping plate 23, the concentric positioner 25 and the knife-edge mold 26 are the same as those of A die 1 and will not be described here in detail. The withdrawing rod 20 is disposed in a hole extending through the die seat 21, the packing plate 22 and the clamping plate 23. The lower end of the 3 withdrawing rod 20 is locaed on the spring 29. The bottom o9f the through hole is sealed by a screw 4.

The die set according to the present invention is composed of the A die 1 and the B die 2 and is mounted on a horizontal punch press 6 shown in Fig. 11. As illustrated, the B die 2 is rigidly fixed not he platform of the horizontal punch press 6, while the A die 1 is mounted on a sliding block 61 is controlled by a crank shaft 63 and a link 62 so that the sliding block 61 can be moved to and fro in a horizontal plane thereby pressing the A die 1 against the B die 2.

Figs. 4 through 8 show how the present invention works. As the punch press 6 is turned on, a vibratory feeder 64 will transfer the tapping screws into preparotory positions via a feeding device 64. Then, the A die 1 is moved by the sliding block 61 towards the B die 2. When the two dies 1 and 2 are disposed at the position shown in Fig. 5, the

two positioners 15 and 25 will clip a tapping screw 3 in a fixed position adapted to the knife-edge molds 16 and 26. As the A die 1 is continuously pushed against the B die 2, the two positioners 15 and 25 will automatically move backwards to compress the springs 18 and 28 further keeping the tapping screw 3 and the knife-edge mold 16 in fixed position. When knife edge molds 16 and 26 of the A and B dies clamp the lower part of the tapping screw 3 (see Fig. 6), the A die 1 will continuously move towards the lower dead point of the punch press 6, forging the lower end of the tapping screw 3 in accordance with the knife-edge molds 16 and 26. In the meantime, the feeding means 64 will withdraw to its original position. Thereafter, the punch press 6 will move the A die backwards and the springs 18 and 28 located at the lower parts of the positioners 15 and 25 will be restored to push the tapping screw 3 out of the knife-edge molds 16 and 26. Then, as shown in Fig. 7, the A die 1 will continuously move backwards to the upper dead point of the punch press 6, forcing the two positioners 15 and 25 away from the tapping screw 3. At the same time the leaving rod 20 of the B die 2 will push the tapping screw 3 to drop downwards (see Fig. 8). As such, the tapping screws 3 will be rapidly forged in order. Fig. 9 shows the tapping screw 3 having been forged by the punch pres 6. The unnecessary parts of the knife-edge will be cut off at the same time as screwing.

Although the present invention has been described with a certain degree of particularity, it is understood that the present disclosure is made by way of example only and that numerous changes in detail of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

Claims

1. A die set forging a knife-edge of a tapping screw comprising:
a first die constituted by a die seat, a packing plate, a clamping plate, a sleeve, a concentric positioner, a knife-edge mold, a guide rod and a spring, said A die being fixed on a sliding block of a punch press, said packing plate and said clamping plate being locked in sequence on said die seat while said knife-edge mold being engaged at a center of said clamping plate, a hole extending through said die seat, said packing plate and said clamping plate 13 for receiving a spring, a screw being engaged with a bottom of said hole so as to keep the spring therein, said positioner being partially inserted into said hole, said sleeve being mounted on said die seat; and
a second die constituted by a die seat, a packing plate, a clamping plate, a guide rod, a concentric positioner, a knife-edge mold, an auxiliary sleeve, a spring and a leaving rod, arrangement of said packing plate, said clamping plate, said concentric positioner and said knife-edge mold being the same as those of said first die, said leaving rod being disposed in a hole extending through said die seat, said packing plate and said clamping plate, the lower end of said withdrawing rod being located on the spring and the bottom of said hole being sealed by a screw.

2. A die set for forging the knife-edge of a tapping screw which utilizes a pair of reciprocating concentric positioners to fix a tapping screw in place prior to punch pressing so as to forge a knife-edge of the tapping screw and cooperates with a horizontal punch press to provide mass production for forging the knife-edge of the tapping screw.

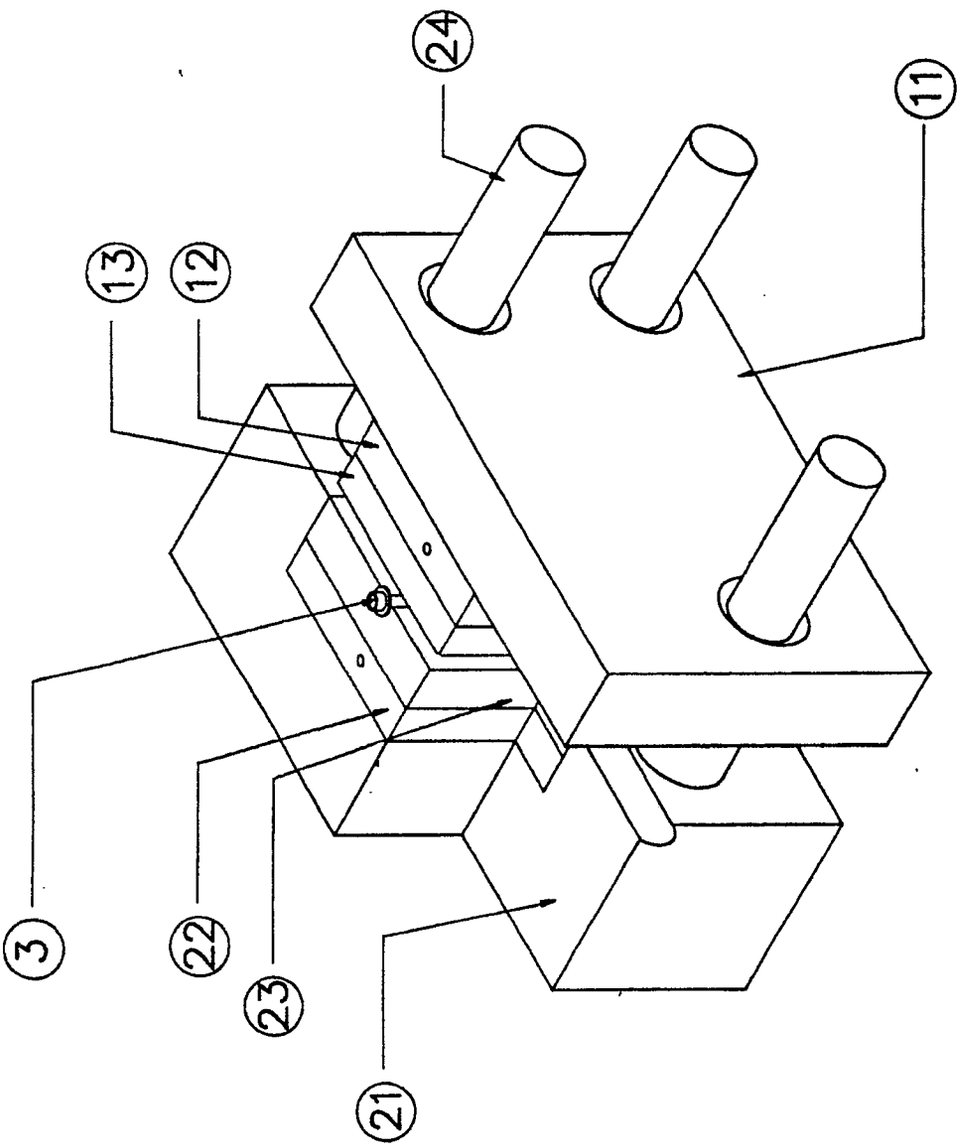


FIG1

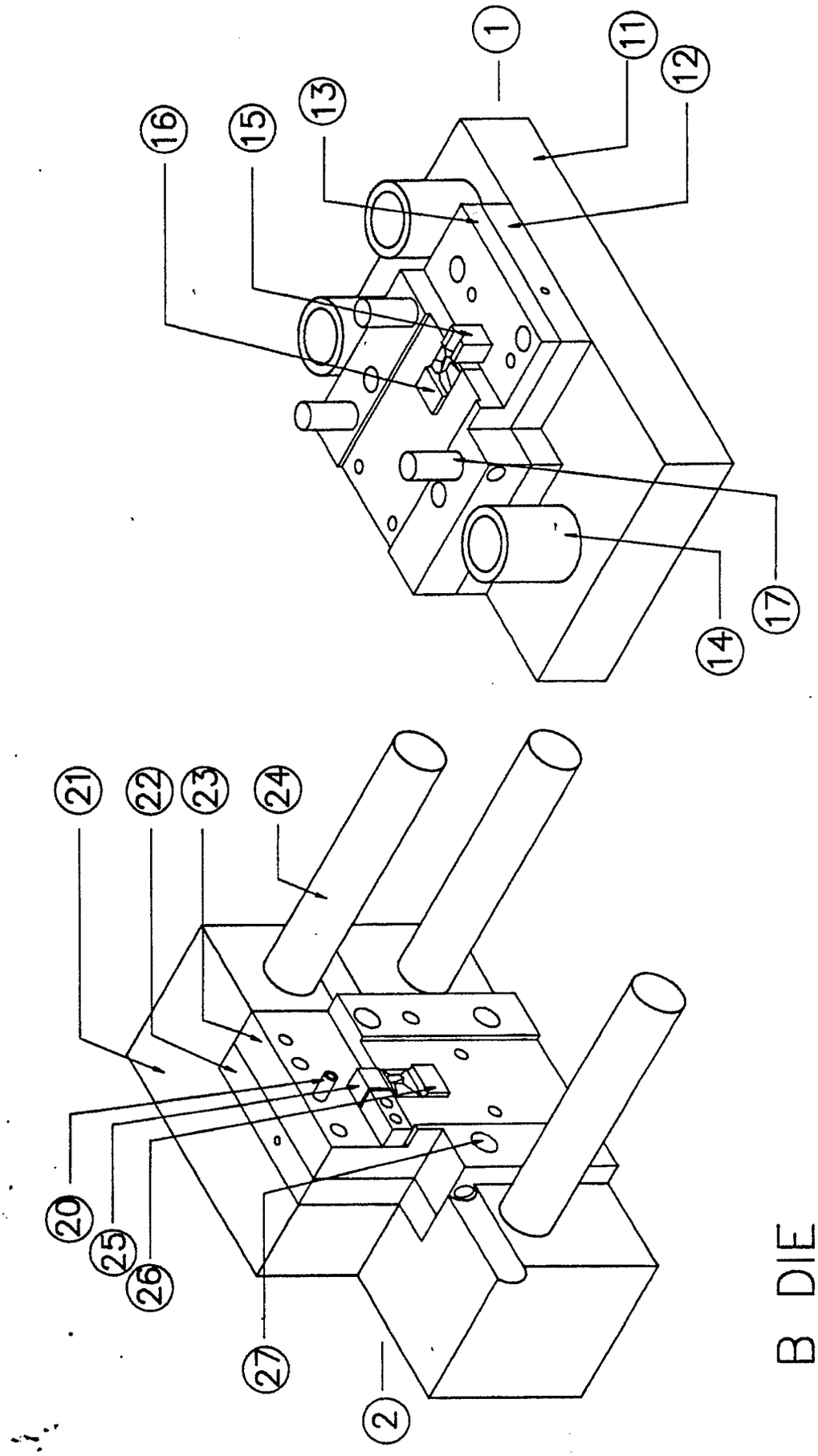
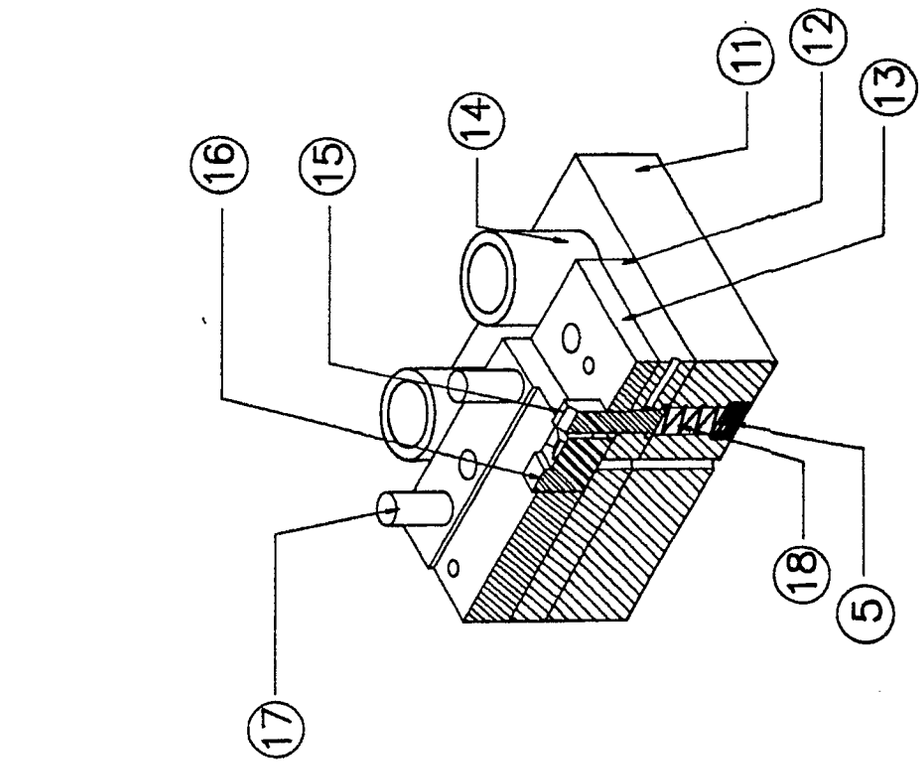
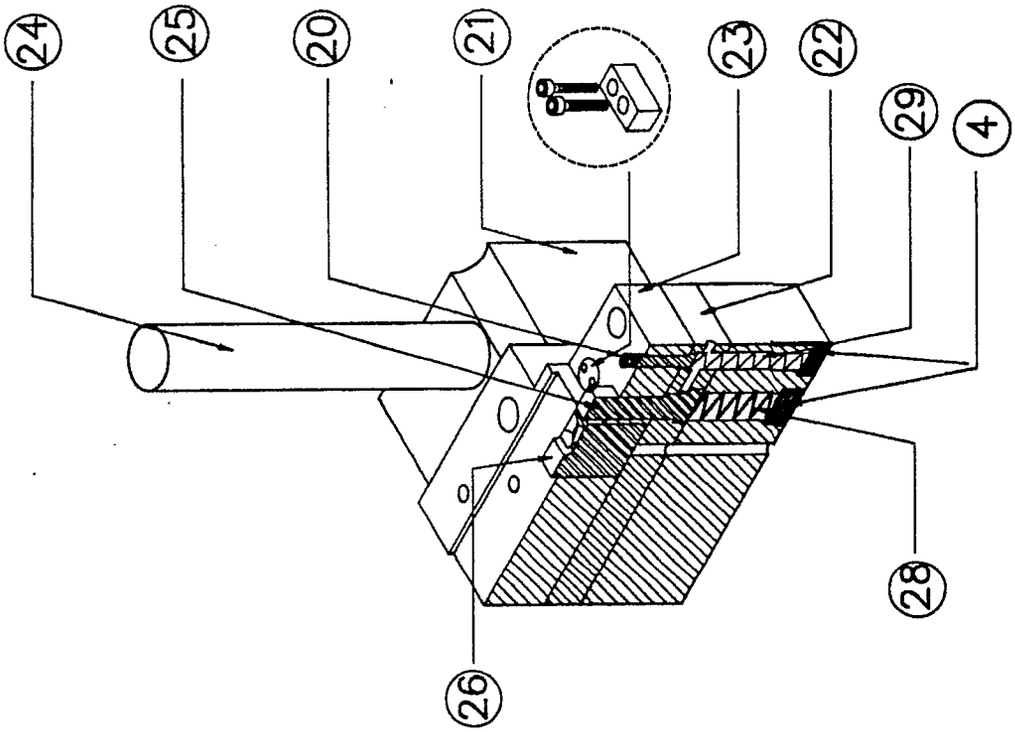


FIG2



A DIE

FIG3



B DIE

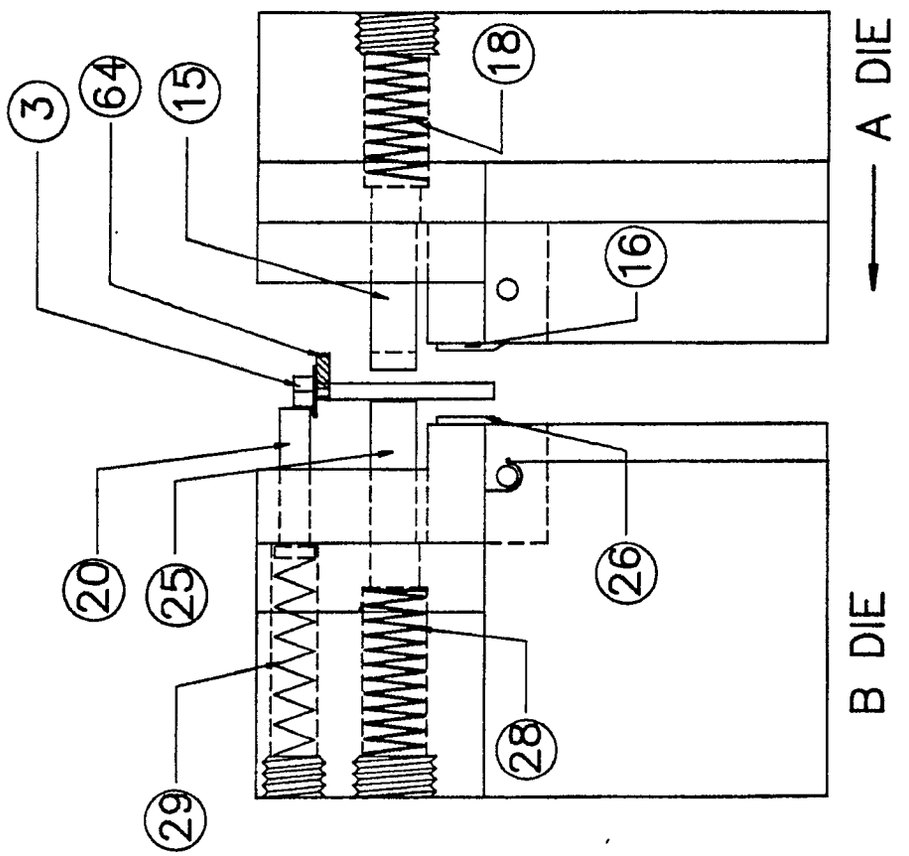


FIG4

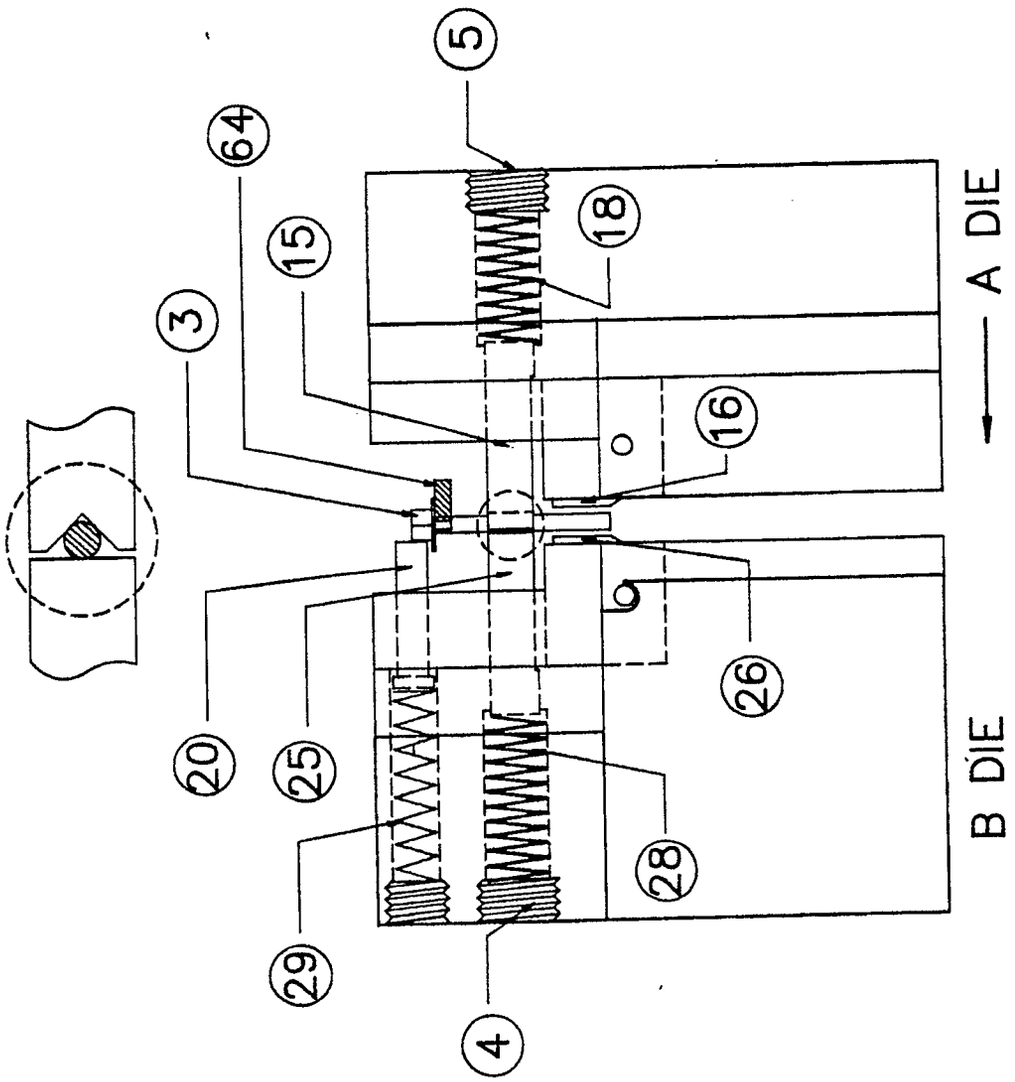


FIG5

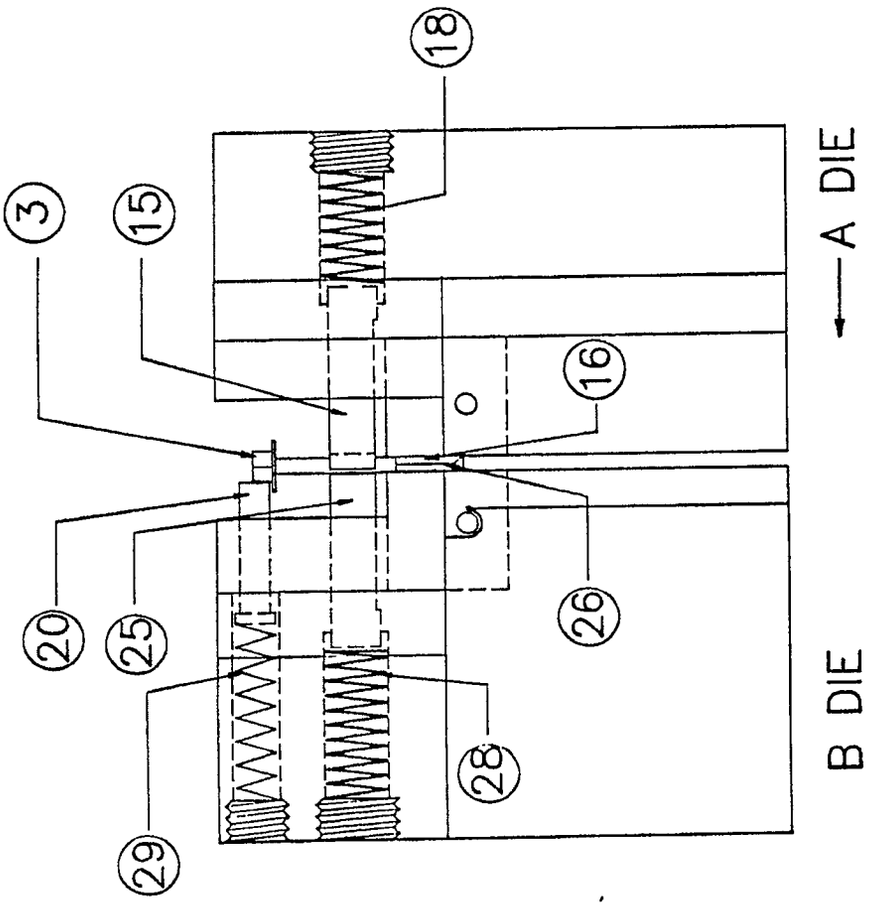


FIG6

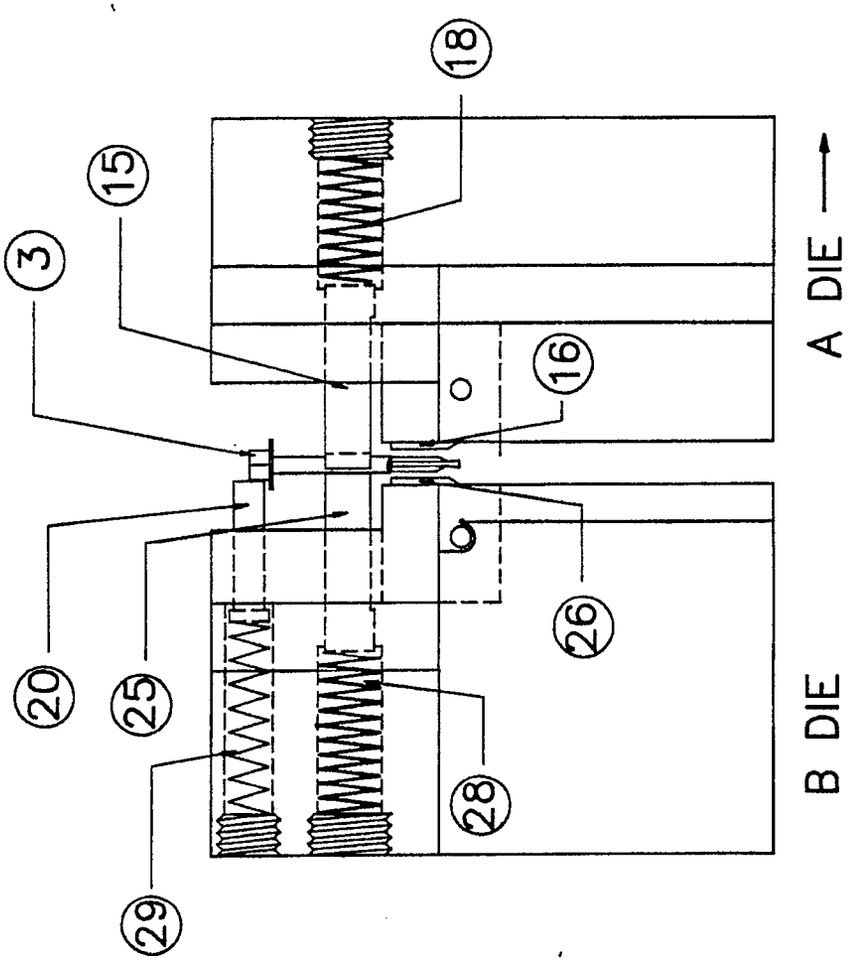


FIG7

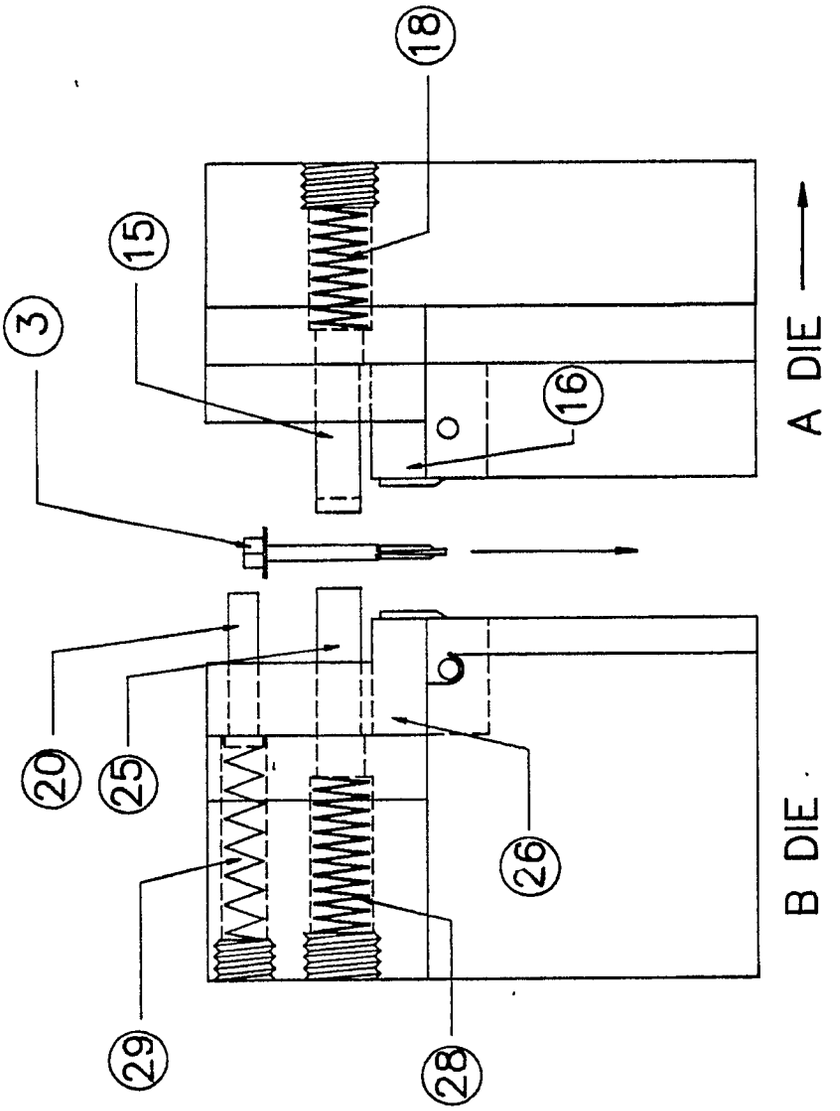


FIG8

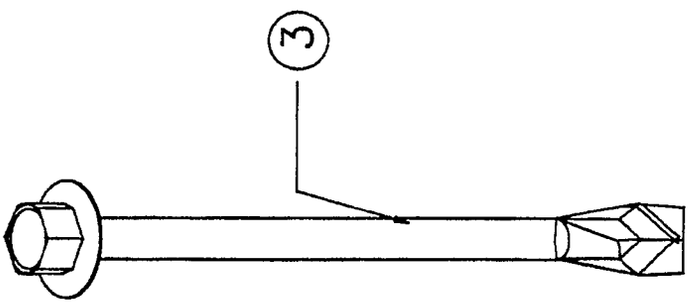


FIG9

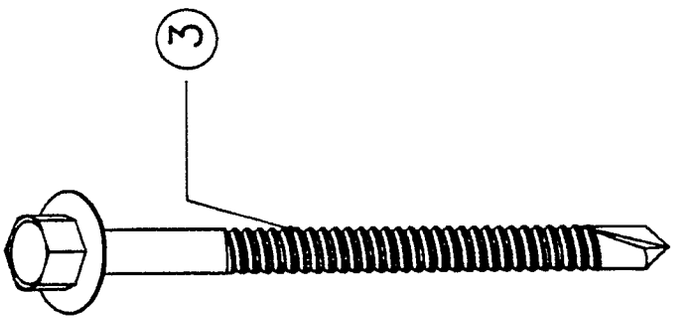


FIG10

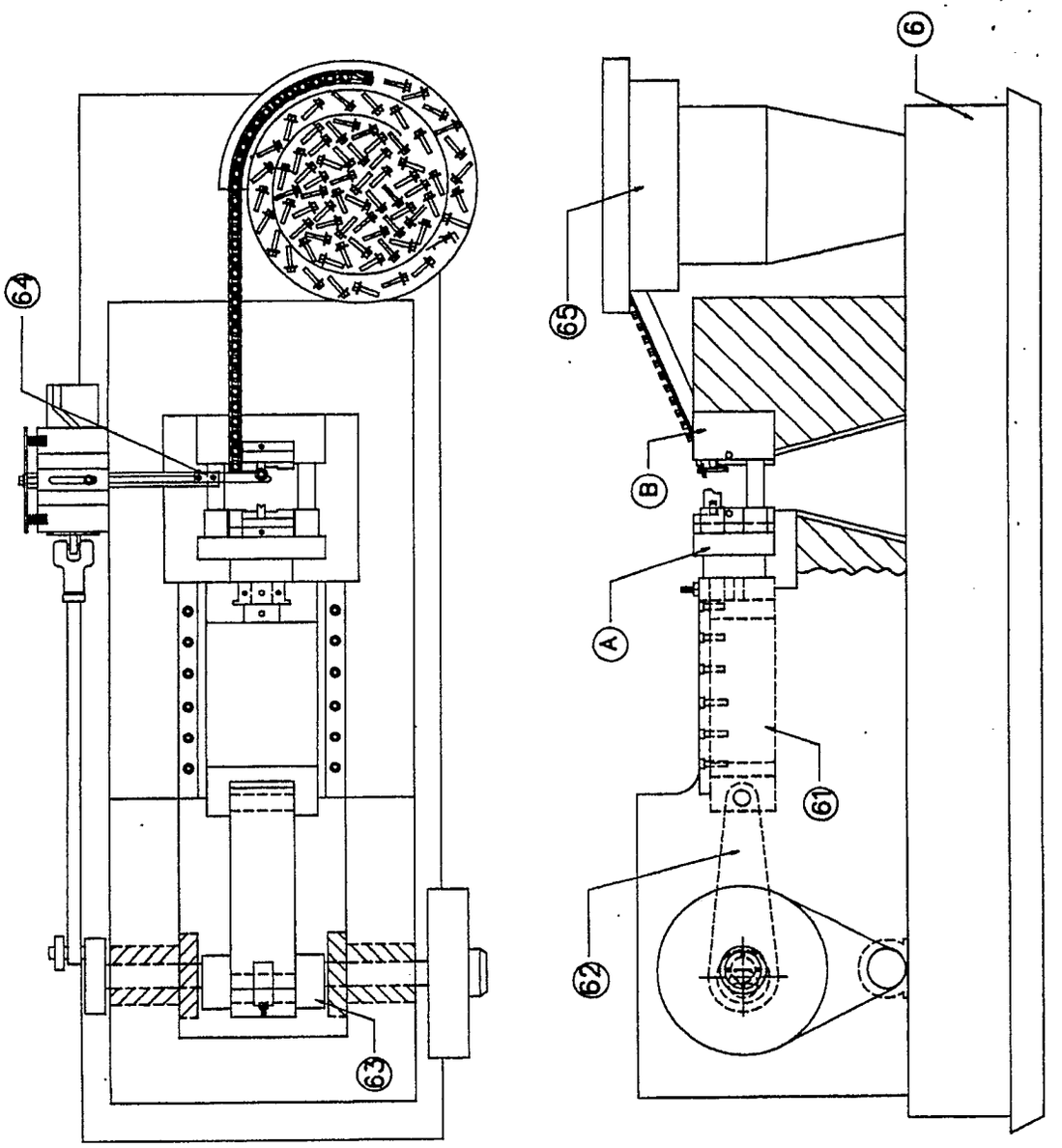


FIG11

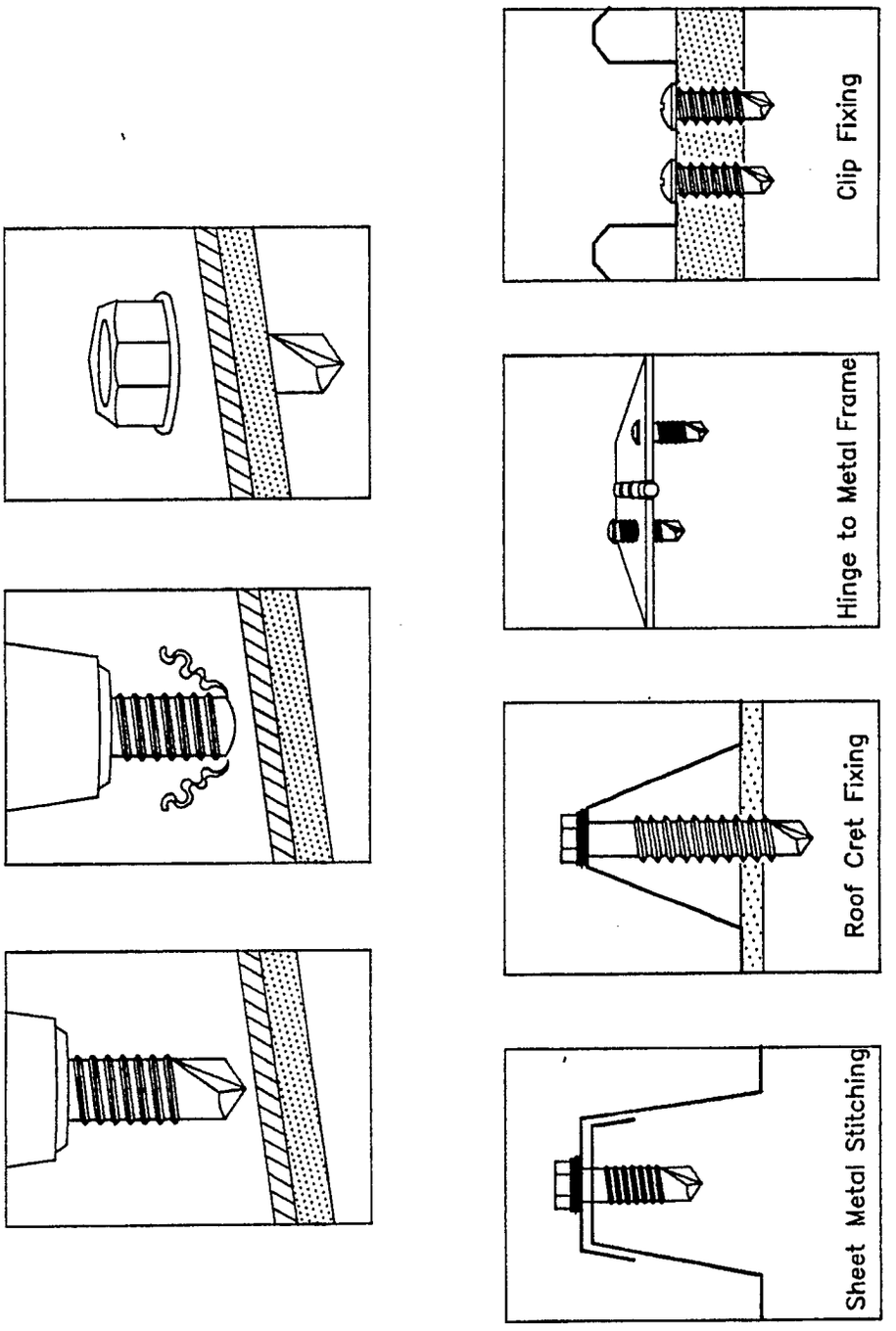

Clip Fixing
Hinge to Metal Frame
Roof Cret Fixing
Sheet Metal Stitching

FIG12

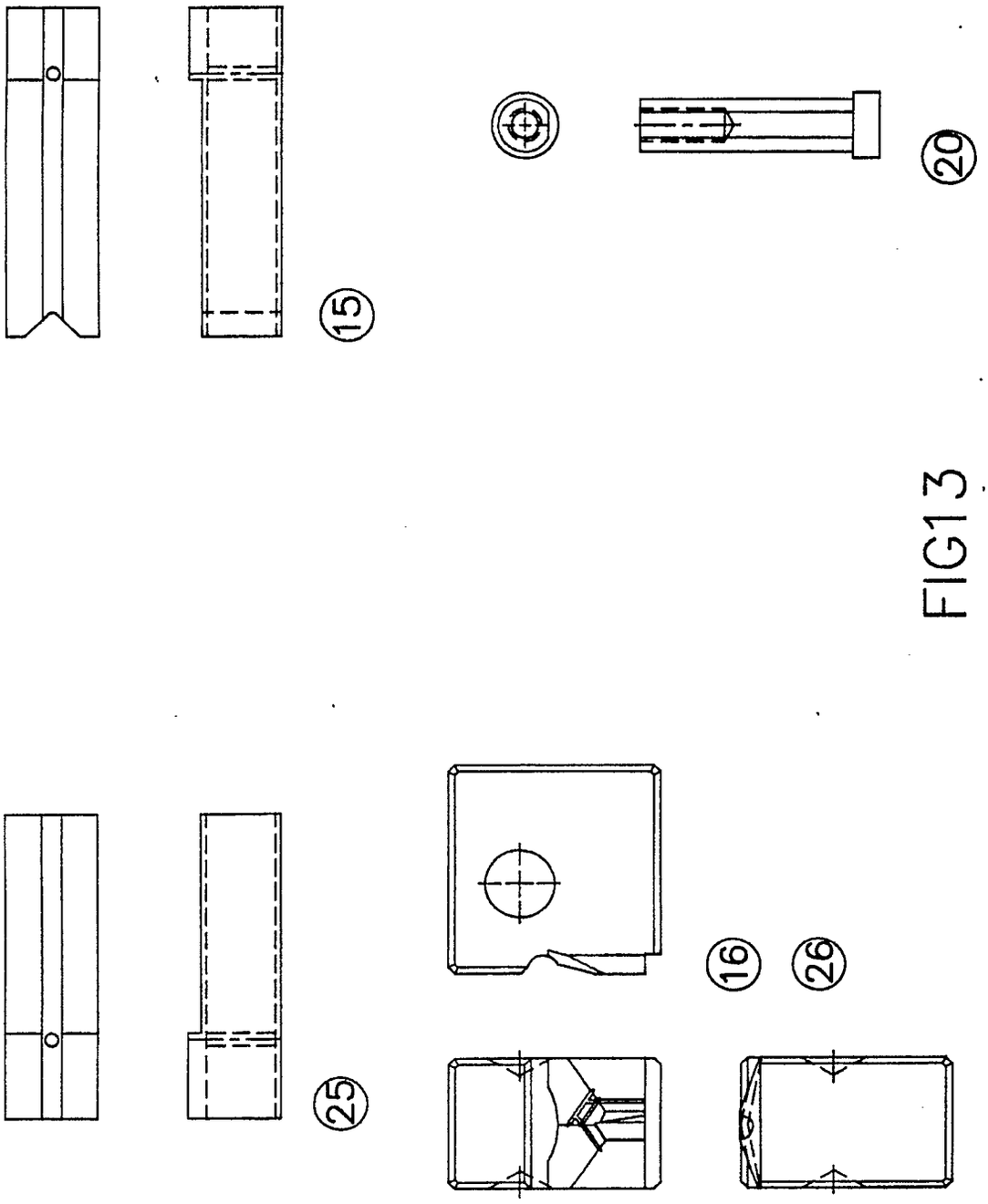


FIG13

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 30 8898

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-4 100 638 (DONALD A. FISCHER) * abstract *	1	B 21 K 1/56
A	DE-A-2 820 259 (DOHI) * claim 1 *	1	
A	EP-A-0 136 912 (W.A. DEUTSHER PTY. LTD)		
A	EP-A-0 209 305 (YUGEN KAISHA SHINJO SEISAKUSHO)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 21 K
B 21 H
F 16 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	09-05-1990	SCHAEFFLER C.A.A.

CATEGORY OF CITED DOCUMENTS

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