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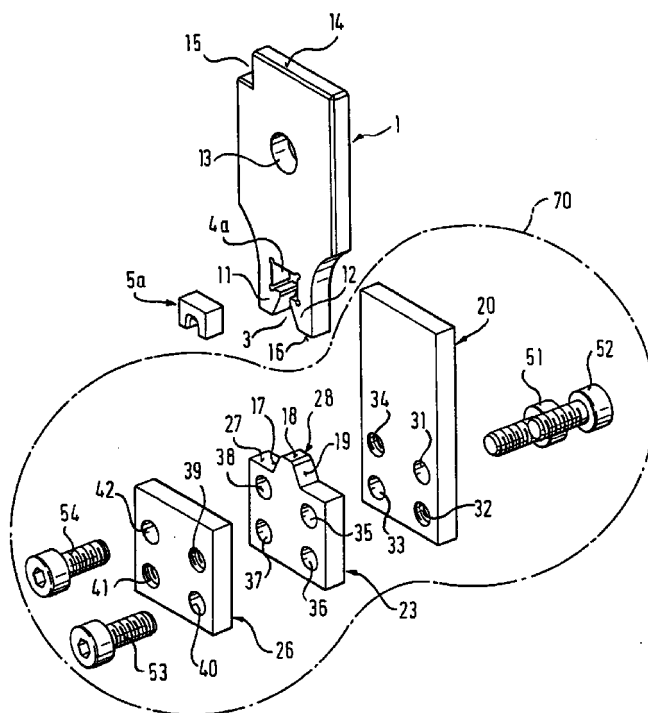
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(54) **Die for crimping tools and release tool for inserts located in dies**

(57) A die for crimping tools with a substantially flat rectangular metal plate (1) which has a funnel-shaped cut-out (3) in one of the edges (16) of the metal plate (1). This cut-out (3) passes into a recess (4a; 4b) for receiving an insert (5a; 5b) with a diecasting (6) which is

shaped to fit the recess (4a; 4b) and is composed of a friction-resistant material. In its assembled state, the cut-out (3) passes into the diecasting (6).

Fig. 1



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Description

[0001] The invention relates to a die for crimping tools, in particular for the pre-crimping of steel cable lugs and a release tool of inserts located in dies in accordance with the preamble statement of patent Claims 1 and 8.

[0002] Such dies are preferably used for the pre-crimping of cable lugs and wires. Known dies are normally composed of hardened steel. Such dies which are used in assembly line production are subject to a very high rate of wear so that a frequent exchange of dies is necessary. Here it is particularly disadvantageous that the number of crimped joints produced per unit time falls by reason of frequent tool changing. For example, such a die is described in US 3 696 322.

[0003] It is the purpose of the present invention to provide a die for crimping tools which calls for less frequent changing.

[0004] It is a further purpose of the invention to provide a release tool with which an insert located in the die can be fitted and removed simply and rapidly.

[0005] These purposes are accomplished by the characteristics of the independent Claims.

[0006] The die for crimping tools according to the invention consists of a substantially flat, rectangular metal plate which has a cut-out running into a funnel-shaped edge. The said cut-out can be converted by means of diesinking into a recess to receive an insert which is shaped to fit the recess and is composed of a friction-resistant material. Further, the assembled cut-out can pass into the diesinking.

[0007] The invention offers the advantage that the die can now be of ordinary steel and no longer of specially heat-treated, hardened steel. By the use of an insert in the die, it is no longer necessary to exchange the complete die. Using different diesinkings, a die can remain the same and only the insert is exchanged. In addition, the life of the insert becomes longer and since it is composed of a friction-resistant material, the frequency of exchange of the insert is lower so that the associated downtimes are shorter than is the case in the state-of-the-art.

[0008] An advantageous feature of the invention is the fact that the material is a highly resistant ceramic material or tungsten carbide. This makes it possible to use a very small, compact insert, which can be very hard (> 2000 Vickers Hardness). Since the insert is very compact and is produced by a sintering process, it can have polished surfaces which have optimum crimping properties.

[0009] The release tool for insert located in the die according to the invention comprises a rectangular retaining with at least two drilled holes, a substantially square centre plate with at least two drilled holes and a substantially square front plate, where the centre plate has on one of its edges a wedge located substantially in the centre, which has a shape such that when the said

wedge is introduced into the cut-out, the wings of the metal plate are pushed apart.

[0010] The invention offers the particular advantage that the insert located in the die can rapidly and easily be fitted and removed.

[0011] Preferred embodiments of the invention are given in dependant Claims.

[0012] Below are described by reference to the drawings and in detail, preferred embodiment examples of the die and release tool according to the invention:

Fig. 1 shows an exploded view of the die and of the release tool according to the invention;

Fig. 2 shows a diagonal view of the front of the assembled die and of the release tool according to the invention from Fig. 1;

Fig.. 3 a, b, c show respectively the front, side and diagonal views of a first embodiment of a rectangular insert;

Fig. 4 shows a partial enlargement of the front of the die from Fig. 1 for the insert from Fig. 3 ;

Fig. 5 shows a front view of a second embodiment of a die with an insert on the same.

[0013] Fig. 1 and Fig. 2 show respectively an exploded view and an assembled view of the die and the release tool according to the invention. In the upper half of Fig. 1 can be seen the die with a substantially rectangular metal plate 1 and the rectangular insert in front of the same. A fixing hole 13 is located in the upper half of the rectangular plate substantially in the centre of the longitudinal axis of the said plate which is fixed to a stamping tool (not shown), using, for example, a screw or a pin. The upper edge of the metal plate 1 has a graduation on one of its corners 15. A funnel-shaped cut-out 3 is located on the lower edge 16 opposite the upper edge 14 and substantially in the centre of the longitudinal axis which passes into a substantially rectangular recess 4a, forming wings 11 and 12 respectively on the right and on the left side. The recess 4a is formed to be complementary to the outer face of the insert 5a, so that the said insert 5a can be placed therein. The wings 11 and 12 can be pushed apart outwards by 0.1 to 0.5 mm. As can be seen in Fig. 4 which is an enlargement of the lower half of the metal plate 1, the edges 8 of the recess 4a have round openings 9 which project into the recess so as to facilitate the introduction of the insert 5a. For production reasons, it is scarcely possible or only possible with difficulty, to produce clean edges in the recess 4a.

[0014] Fig. 3 a to 3c show a first embodiment example of an insert 5a in different perspective views. The insert 5a has a substantially M-shaped diesinking 6, which is widened outwards. The insert 5a can be substantially composed of tungsten carbide and produced by means of a sintering process. It should be noted that the form of the diesinking 6 is not decisive and in principle depends on the intended use.

[0015] Fig. 5 shows a second embodiment of an insert 5b which is substantially shaped as a circle. Correspondingly, the recess 4b must have a complementary shape. It is not necessary to provide additional openings 9. This round form admittedly does not provide any orientation to the insert 5b, so that during the process of fitting, the fitter must take care of the orientation. It should be noted that the rectangular plate 1 is wider than the insert 5a or 5b in order to protect it from impact and consequent fracture, since it is composed of a very brittle material.

[0016] Fig. 1 and 2 below explain in greater detail the release tool for inserts located in the die.

[0017] Fig. 1 shows an exploded view of the lower part of the release tool 70 which has a substantially rectangular retaining plate 20 with four drilled holes 31 to 34, arranged substantially in a square where two of the diagonally oriented drilled holes 32, 34 have interior threads, as well as a substantially rectangular centre plate 23 also with four drilled holes 35 to 38 and a substantially square front plate 26 with four drilled holes 39 to 42, where drilled holes 32, 34, 39 and 41 have interior threads. The drilled holes 31, 35 and 39, the drilled holes 32, 36, 40, the drilled holes 33, 37, 41 and the drilled holes 34, 38 and 42 are aligned with one another. It should also be noted that the centre plate 23 has on its upper edge 27 a substantially central wedge 28 which can be introduced into the cut-out 3. The trapezoidal wedge 28 is framed in a first shoulder 17, a ridge 18 which runs parallel to edge 27 and a second shoulder 19, where both the shoulders 17 and 19 have a slope substantially equal to that of the edges of the cut-out 3.

[0018] The fitting and removal of an insert is briefly explained below by reference to Fig. 1 and 2.

[0019] The plates 20, 23, 26 are fitted together in such a way that on the one hand the corresponding drilled holes are aligned with one another and on the other hand, the reverse side of the metal plate 1 bears on the retaining plate 20 and the front of the wings 11 and 12 bears on the front plate 26. To fix this sandwich, two fixing screws 51 and 52 are inserted from the reverse side into the drilled holes 31 and 33 which are screwed into the threads 39 and 41. Correspondingly, the screws 53 and 54 are introduced into the drilled holes 40 and 42 and are then screwed into threads 32 and 34 of the retaining plate 20.

[0020] By means of clamping the metal plate 1 between the retaining plate 20 and the front plate 26, the wedge 28 reaches the cut-out 3 of the metal plate 1.

It should be noted that the centre plate 26 is at least as thick as the metal plate 1 (as can be seen in Fig. 2). The fitting and removal of the insert is independent of its outer form, that is to say, this procedure applies to both the inserts 5a and 5b.

[0021] It is now only necessary that pressure should be brought to bear on the die or on the metal plate 1 against the wedge 28 so that the wings 11 and 12 should be pushed apart by some 0.2 mm so that the insert can be removed from its corresponding recess. This can take place, for example, on the stamping installation itself, that is to say, it is only necessary to fit the release tool. After fitting, the stamping tool presses the die on the release tool, the release tool being located, for example, on a table. In this way, a pressure is generated which is adequate to push the wings apart. After the exchange of the insert, it is only necessary to release the pressure so that the wings 11 and 12 exercise an adequate pressure on the insert 5a or 5b so that it is pushed into its appropriate recess. This means that the recess 4a or 4b is somewhat smaller than the outer width of the inserts 5a or 5b, that is to say, without the release tool it is not possible to fit an insert into the die.

[0022] The preceding description is to be understood as being only an illustrative and not a limiting one.

Claims

1. Die for crimping tools comprising

a substantially flat rectangular metal plate (1) which has a funnel-shaped cut-out (3) cut in an edge (16) of the metal plate (1), characterised by the fact that the cut-out (3) passes into a recess (4a; 4b) to receive an insert (5a; 5b) with a diecasting which is shaped to fit the recess (4a; 4b) and is composed of a friction-resistant material and the fact that in its assembled state the cut-out (3) passes into the diecasting (6).

2. Die for crimping tools according to Claim 1, characterised by the fact that the material is a highly resistant ceramic material, in particular tungsten carbide.

3. Die for crimping tools according to at least one of the preceding Claims, characterised by the fact that in the transition area (7) between the cut-out (3) and diecasting (6), the metal plate (1) projecting beyond the insert (5a; 5b) to afford it protection.

4. Die for crimping tools according to at least one of the preceding Claims, characterised by the fact that the diecasting (6) is widened outwards.

5. Die for crimping tools according to Claims 1 to 4, characterised by the fact that the insert (5b) is a substantially round plate and that the recess (4b) is

formed thereto.

6. Die for crimping tools according to Claims 1 to 3, characterised by the fact that the insert (5a) is an essentially rectangular block and that the recess (4a) is shaped as a complement thereto. 5

7. Die for crimping tools according to Claim 6, characterised by the fact that round openings (9) are made in the metal plate (1) close to each corner (8) of the recess (4a) in such a way that they run into the said recess (4a) 10

8. Release tool (70) according to Claims 1 to 7 for inserts (5a; 5b) which are located in the die, characterised by a rectangular retention plate (20) with at least two drilled holes (31, 33), a substantially square centre plate (23) with at least two drilled holes (35, 37) and a substantially square front plate (26), where the centre plate (23) has on one of its upper edges (27) a substantially central wedge (28) which is so shaped that when the said wedge (28) is introduced into the cut-out (3), the wings (11, 12) of the metal plate (1) are able to be pushed apart. 15
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9. Release tool (70) according to Claim 8, characterised by the fact that the wedge (28) is trapezoidal in shape. 25

10. Release tool (70) according to Claims 8 to 9 characterised by the fact that each plate (20, 23, 26) has four aligned drilled holes which are substantially arranged in a square, where two diagonally arranged drilled holes (32, 34; 39, 41) of the retention plate (20) and the front plate (26) have threads, so that the plates (20, 23, 26) which are able to be stacked against one another can be fitted firmly together. 30
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Fig. 1

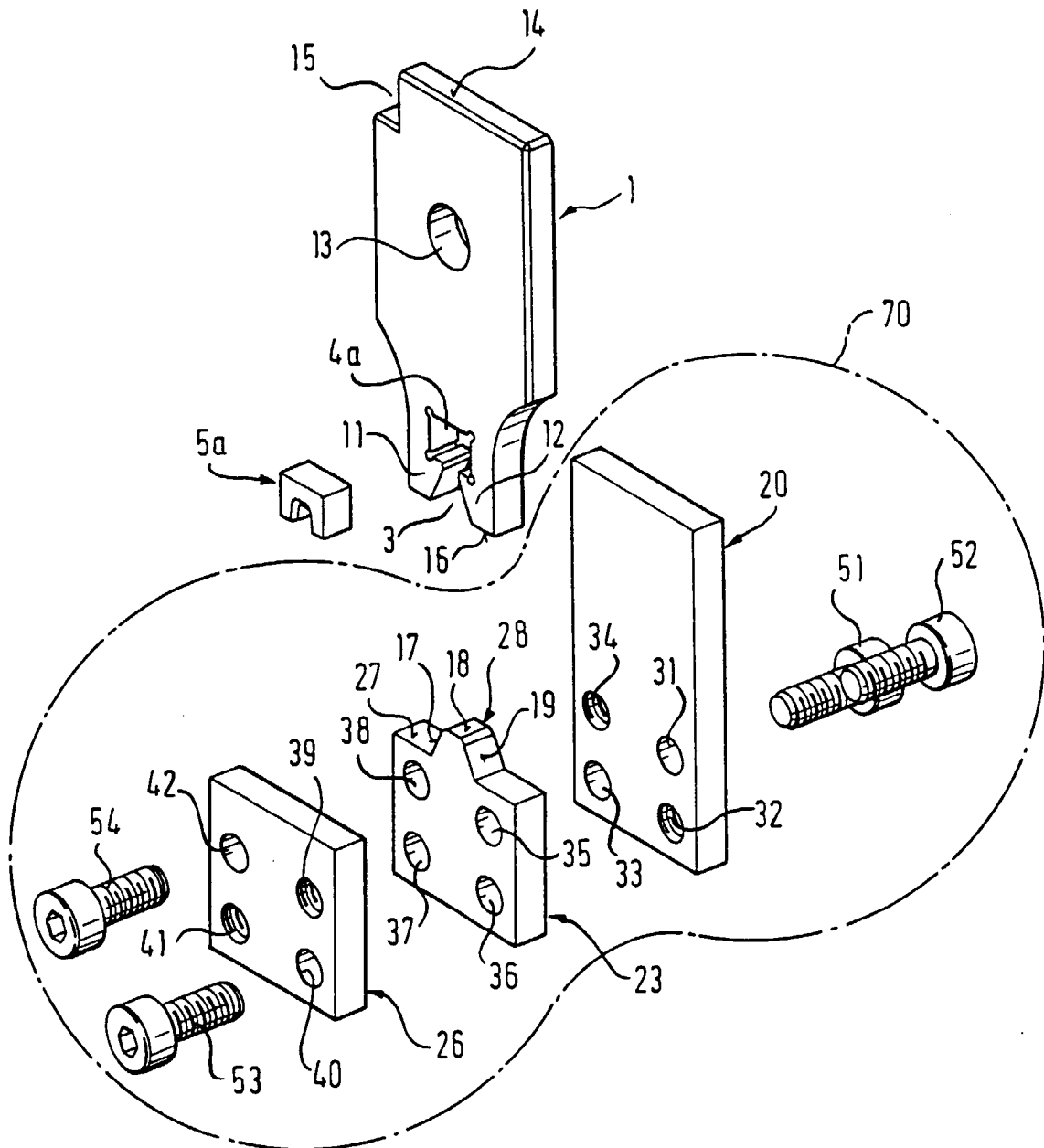


Fig. 2

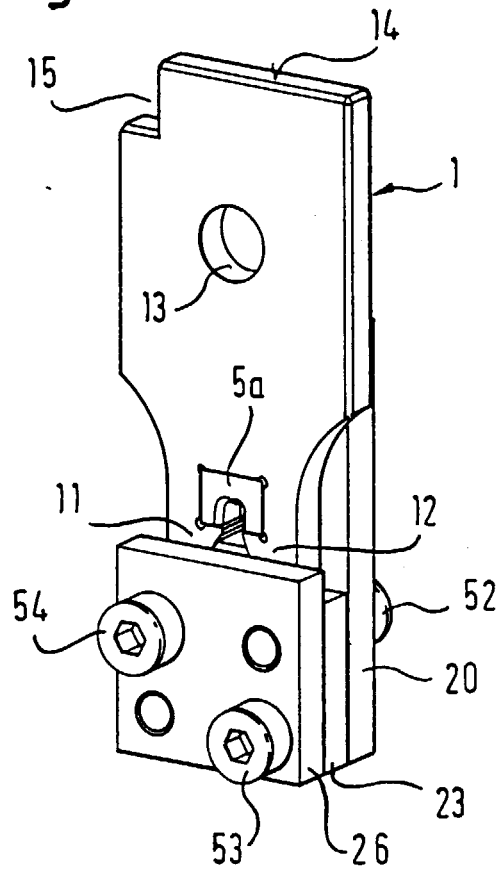


Fig. 3a

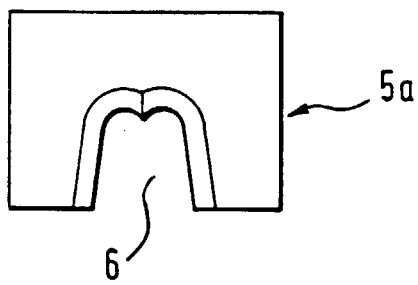


Fig. 3b

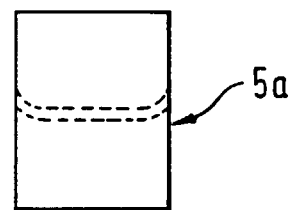


Fig. 3c

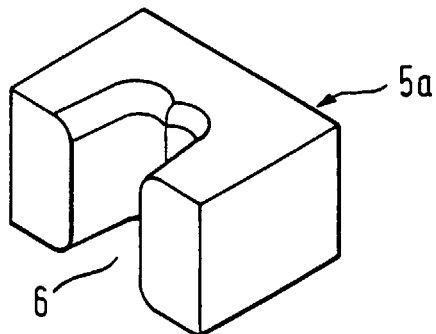


Fig. 4

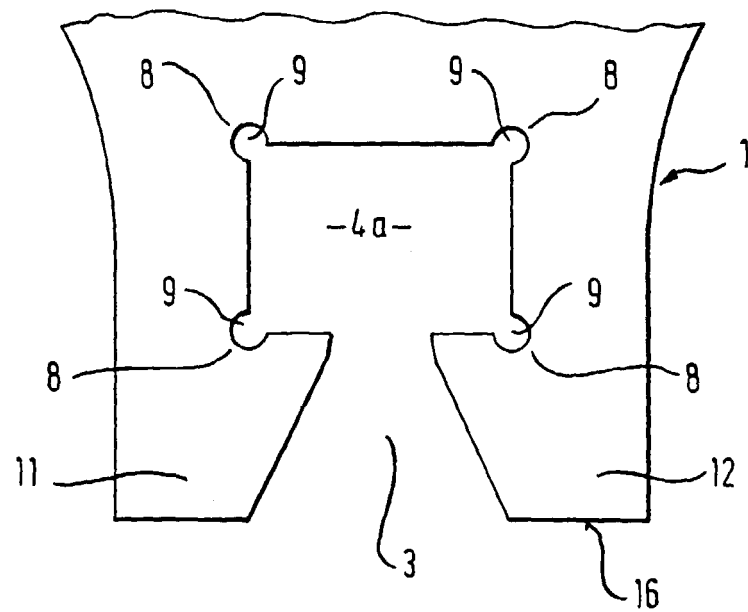
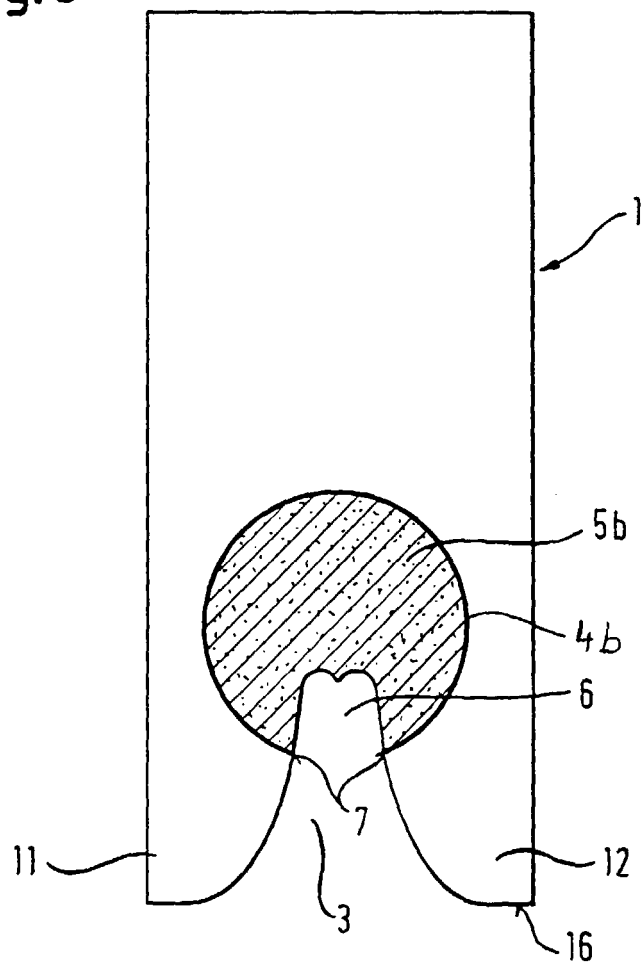


Fig. 5





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EUROPEAN SEARCH REPORT

Application Number
EP 00 11 7352

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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Place of search	Date of completion of the search	Examiner	
THE HAGUE	7 December 2000	Waern, G	
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