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(72) Inventor: **Donatiello, Gaetano**
20035 Lissone (Milan) (IT)

(74) Representative: **Martegani, Franco**
Patent Attorney,
Via Carlo Alberto, 41
20052 Monza (Milano) (IT)

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(71) Applicant: **DI.GI.EMME S.r.l.**
I-22060 Carugo (Como) (IT)

(54) **Procedure for punching a blank from a metallic band**

(57) A procedure for the punching of a blank (12, 13) from a metallic band (10), in a punching station (11), which is particularly but not exclusively intended for the production of a hinge box for furniture, comprises the following cyclically repeated steps:

- punching said blank (12, 13) from the metallic band (10);
- discharging said punched blank (12, 13) from the punching station (11) and transferring it to a subsequent processing station;
- at the same time as the transfer of said blank (12,

13), advancing the band (10) longitudinally for a distance X in a direction (F) and moving it laterally for a distance Y in a direction (F1) or (F2), said distance Y being determined according to the configuration of the blanks (12, 13), in such a way that the profiles of the punched blanks fit together at each operation. The procedure is characterised in that said punched blank (12, 13) is rotated in the same punching station by a suitable angle at least once every two punching operations to be in a suitable position for a subsequent processing.

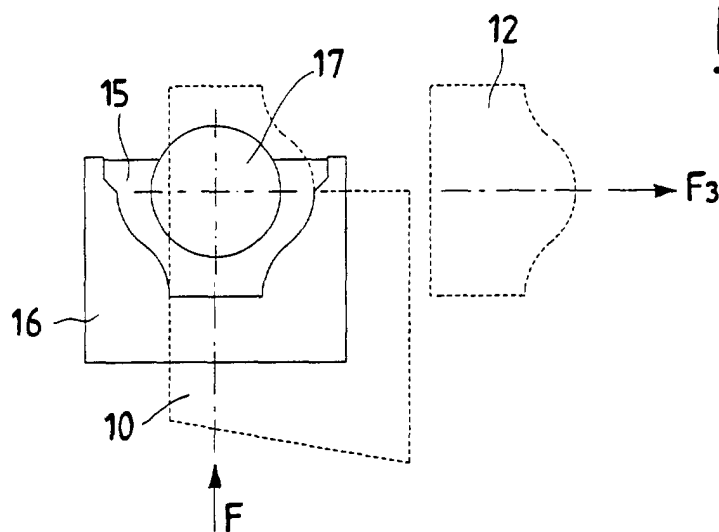


Fig.15

Description

[0001] The present invention refers to a procedure for rapidly punching a blank, which is intended, particularly but not exclusively, for the manufacture of a detail of a furniture hinge, from a metallic band.

[0002] The invention also refers to products obtained with said procedure.

[0003] The large scale production of pieces, using a punching operation from a metallic band, always requires the resolution of the technical problem of material swarf, which should be kept to a bare minimum, of increasing productivity and of the reduction in costs, in order not to have too much of a negative effect on the cost of the finished product.

[0004] Therefore, the possibility of realising a punched blank with the minimum possible swarf, particularly in the production of low-cost items, would be highly desirable.

[0005] In order to obtain this result, different solutions have already been proposed which are all based upon the maximum use of the metallic band by searching for an ideal punching line, which is, however, also compatible with the actual manufacturing requirements.

[0006] The systems which are generally adopted are those in which the punching of the blank is carried out according to a design such that on the metallic band the punched shapes fit together, and wherein the punching operation is carried out on the band which moves linearly or in zigzags.

[0007] In this way the swarf is reduced to the bare minimum: nevertheless, some material must be left between one blank and the one next to it to be able to carry out the punching operation. A solution to the problem of swarf has been proposed by the patent EP-661118.

[0008] In the most commonly used systems, the different steps of the punching operations are carried out in different punching stations. Such moulding machinery is of a substantial size and has transportation devices suitable for covering large distances. The high maintenance costs which result are directly dependant upon the number of punching stations, as well as the length and the complexity of the line of movement.

[0009] Amongst the punching steps it is necessary to have a centring operation of the punched piece which is moved towards the next punching station. This step slows down the operation, represents a possible source of imprecisions in operation and acts, therefore, as a significant cost factor.

[0010] The general purpose of the present invention is to overcome the drawbacks quoted above of the prior art in an extremely simple, cost-effective and particularly functional way.

[0011] Given the aforementioned purposes, according to the present invention, we have put our minds to realising a procedure for punching a blank from a metallic band, such as to have practically no swarf, and carried out on moulding machinery, characterised in that it

has a particularly compact arrangement of its elements, with the characteristics disclosed in the attached claims.

[0012] The characteristics and the advantages of a procedure according to the present invention will become even clearer from an examination of the following description, given as an example and not for limiting purposes, referring to the attached schematised drawings, wherein:

- 10 - figures 1-8 show the steps of a punching procedure of two blanks according to the invention;
- figure 9 schematically shows the punching lines of a first butting cut from the rectilinear band;
- 15 - figure 10 shows a plane view of a punching station which can be used in a first and in a second possible non-exclusive embodiment of the invention;
- figures 11 and 12 show the respective sections of the punching station which can be used in a first and in a second embodiment of the invention;
- 20 - figure 13 shows a plane view of a punching station which can be used in a third possible non-exclusive embodiment of the invention;
- figure 14 shows the section of the punching station of figure 13;
- 25 - figures 15 and 16 show a plane view of a punching station which can be used in a fourth possible non-exclusive embodiment of the invention.

[0013] In figures 1-8, a butted metallic band, wholly indicated with 10, is made to move forward step by step in the direction of the arrow F, through any apparatus suitable for the purpose, which is not illustrated here since it is known to men skilled in the art (figure 1).

[0014] According to the procedure of the invention a blank 12 is punched from the band 10 in a punching station, wholly indicated with 11 (figures 11, 12 and 13) without any swarf. Such a blank can have different forms from that shown in figure 2, but its outline must necessarily fit together with that of another blank 13 punched in the same machine in a subsequent punching operation (figure 6).

[0015] In the same punching station 11 said blank 12 is rotated by a suitable angle to be arranged in a suitable position for a subsequent processing. In this example we propose to arrange the blank with the more encumbrant outline turned facing out of the punching station to reduce the step between the different processing stations (figures 3 and 7). After having taken up the appropriate position the blank 12 is discharged through a suitable apparatus amongst those which are known, moving it forward towards an appropriate discharge direction. At the same time the new positioning of the band 10 on the punching station 11 takes place to start the punching operation of the second blank 13. To such an end the band 10 is made to move forward longitudinally by one step X according to the arrow F and laterally by one step Y according to the arrow F1 (figure 4) into the position of figure 5. The step X, in this example, corre-

sponds to half the length of the blank to be formed, the distance Y is also variable according to the configuration of the blank, as well as the final piece.

[0016] The operations of punching and rotating the second blank 13 (figures 5-8) follow each other in completely the same way as that which has already been described regarding figures 1-4. The second blank 13 is discharged by moving it forward in the appropriate direction, the band is then made to move forward longitudinally by one step X according to the arrow F and laterally by one step Y according to the arrow F2, opposite to the arrow F1 (figure 8) to return to position itself as in figure 1.

[0017] If the punching operation described concerns a first butting cut starting from a band with a rectilinear profile 10', that which has been described regarding the punching from a butted band 10 remains valid (figure 9). Moreover, the cutting outline will have the same length and, moreover, will produce a swarf 14, equal to half a blank, and one butted band 10. The swarf will then be moved and discharged from the punching station in completely the same way as that which has already been illustrated, however without the need for carrying out a rotation.

[0018] The operation of punching and rotating the blank on the same station, object of the present invention, can be carried out through different embodiments of the punching station 11, of which we will shortly illustrate a few non-exclusive examples.

[0019] With reference to figures 10-14, a punching station of the metallic band 10 which is the object here is wholly indicated with 11 and comprises a mobile part and a fixed part, which can be a punch 15 and a matrix 16 respectively, or vice-versa, as well as a device for picking up an individual blank 12 and 13. In the example described here the pick-up device consists of an extractor 17, for example with a cylinder form. The extractor is capable of rotating the blanks by a suitable angle in planes 19 parallel to a feeding plane 18, as well as of moving said blanks at a right angle to the same plane 19.

[0020] The matrices 16 and the rod 15 can make relative reciprocal displacements perpendicular to the feeding plane 18, which vary according to the different embodiments of this invention. In the example shown the feeding plane 18 is a horizontal plane and the displacements of the mobile parts are vertical.

[0021] A first embodiment of a punching station for carrying out the procedure according to the present invention is shown in plan in figure 10 and sectioned in figure 11. The punching station 11, described hereafter as an example, exhibits the fixed structure, the matrix 16, arranged on a lower plane than the feeding plane 18, the mobile structure, on the other hand, consisting of the punch 15. The punching operation starts with the zigzag feeding of the continuous butted metallic band 10 in the direction of the arrow and in one of the perpendicular directions F1 or F2, up to, for example, the position indicated in figure 10 with a dotted line.

[0022] The punch 15, which in this case is mobile, interacting with the fixed structure, i.e. the matrix 16, acts upon the metallic band 10 causing the punching of a first blank 12.

[0023] At the end of the punching operation the continuous band 10 repositions itself on the feeding plane 18 and the extractor 17 moves the blank 12 onto a different plane 19. The orientation takes place by alternatively rotating the blank 12 by 90° in a clockwise or anticlockwise direction to position it in a suitable position according to the criteria described previously. The blank, discharged through a movement forward in the direction F, is indeed positioned symmetrically with respect to the advancing direction F with the outline causing the greatest encumbrance turned facing out of the punching station.

[0024] The present invention can be realised through a second embodiment wherein the actuation of the mobile structure, the punch 15, punches a blank 13 from the band 10 by interacting with the matrix 16, which is situated on the feeding plane 18 of the band. In this second embodiment the rotation of the extractor 17 and the discharge of the blank take place on a lower plane 19 to the feeding plane of the band.

[0025] If the rotation takes place on a plane inside the matrix, such a matrix will have a form suitable not to interfere with the blank, as illustrated in figure 14.

[0026] The discharge of the blank in the direction of the arrow F and the zigzag feeding of the band 10, take place in the same way as that which has already been described for the first embodiment proposed.

[0027] A third possible embodiment to carry out the procedure for punching the blanks 12 or 13 from a metallic band 10, object of the present invention, has the fixed structure consisting of the punch 15 and the mobile structure consisting of the matrix 16. The punching always takes place through the intervention of the mobile part on the band 10 which interacts with the fixed part. The extractor element 17 keeps the functions of the perpendicular movement to the feeding plane 18, in this case through the lifting with, for example, magnetic elements and, above all, of rotating the punched blank (figure 12).

[0028] The discharge of the blank in the direction of the arrow F and the zigzag feeding of the band 10, take place in the same way with respect to that which has already been described for the first embodiment of this invention.

[0029] A fourth embodiment, schematised in figures 15 and 16, distinguishes itself from the previous ones in that the punched blank is discharged from the punching station along a direction F3, perpendicular to the feeding direction F. In this example the rotation is carried out in the same punching station through the operation of the extractor 17. The blank is alternatively rotated by an angle of 0° or of 180° to be arranged with the outline causing the greatest encumbrance turned towards the outside of the punching station.

[0030] The main advantage of the procedure which is the object of the present invention is that it has eliminated the need to devote a station exclusively to the orientation of the punched blanks. This is possible since the punching station is also capable of carrying out the aforementioned rotating operation.

Claims

1. Procedure for the punching of a blank (12, 13) from a metallic band (10), in a punching station (11), which is particularly but not exclusively intended for the production of a hinge box for furniture, comprising the following cyclically repeated steps:
 - punching said blank (12, 13) from the metallic band (10);
 - discharging said punched blank (12, 13) from the punching station (11) and transferring it to a subsequent processing station;
 - at the same time as the transfer of said blank (12, 13), advancing the band (10) longitudinally for a distance X in a direction (F) and moving it laterally for a distance Y in a direction (F1) or (F2), said distance Y being determined according to the configuration of the blanks (12, 13), in such a way that the profiles of the punched blanks fit together at each operation;

characterised in that said punched blank (12, 13) is rotated in the same punching station by a suitable angle at least once every two punching operations to be in a suitable position for a subsequent processing.
2. Procedure according to claim 1, **characterised in that** said punched blanks (12, 13) are discharged from the punching station and transferred to a station for subsequent processing with the most encumbrant outline turned to face the outside of the punching station.
3. Procedure according to claim 1, **characterised in that** said blanks (12, 13) are discharged from the punching station in a direction (F) for feeding the metallic band (10).
4. Procedure according to claim 3, **characterised in that** said blanks (12, 13) are rotated in said punching station (11) by 90° about an axis perpendicular to a feeding plane (18) clockwise and anticlockwise alternatively.
5. Procedure according to claim 1, **characterised in that** said blanks (12, 13) are discharged from the punching station in a direction (F3) perpendicular to the feeding direction of the band.

6. Procedure according to claim 5, **characterised in that** said blanks (12, 13) are rotated in said punching station (11) about an axis perpendicular to the feeding plane (18) by an angle of 180° once every two punching operations.
7. Procedure according to claim 1, **characterised in that** said blank is rotated in a plane (19) parallel to a feeding plane (18).

Fig.1

Fig.2

Fig.3

Fig.4

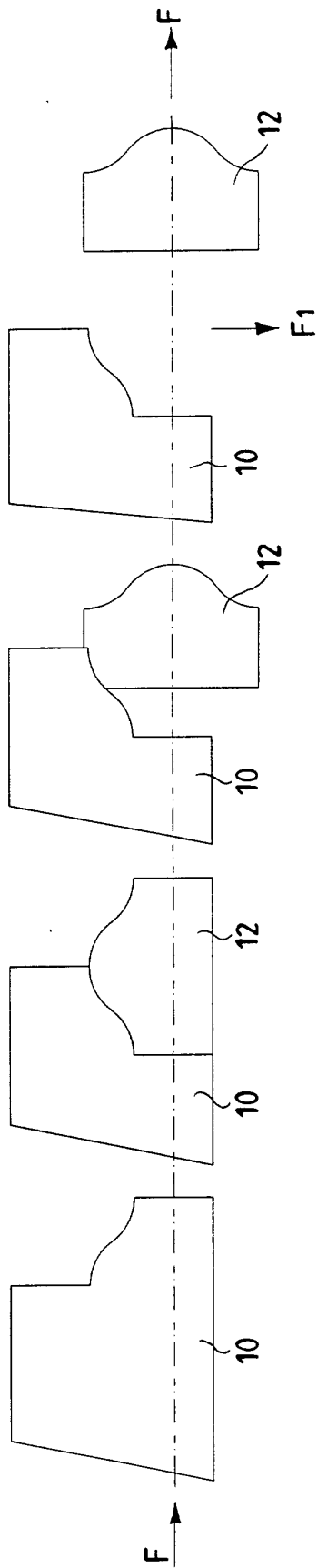
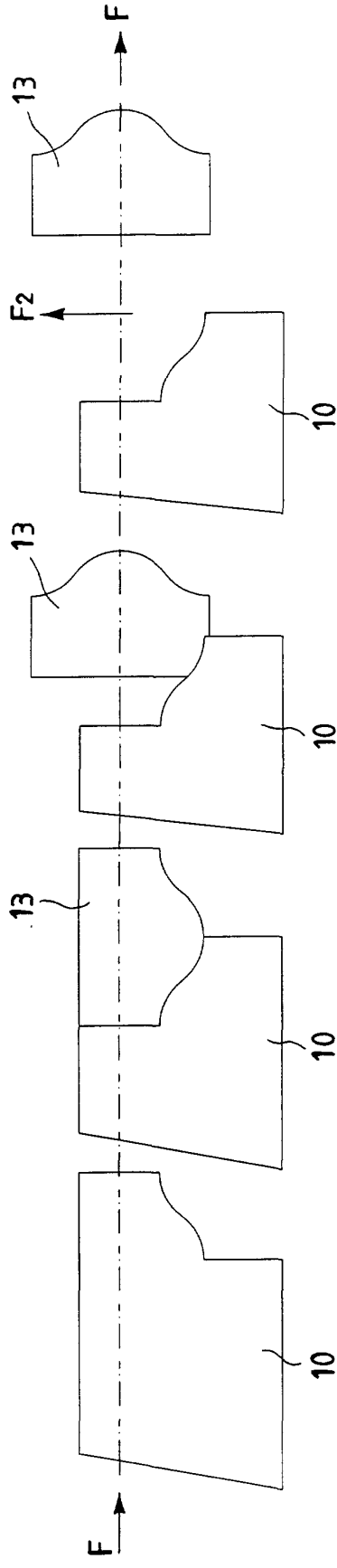


Fig.5

Fig.6

Fig.7

Fig.8



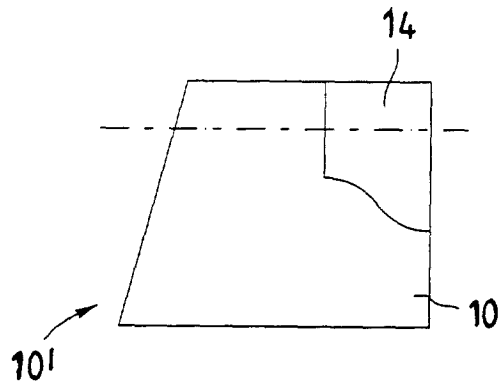


Fig.9

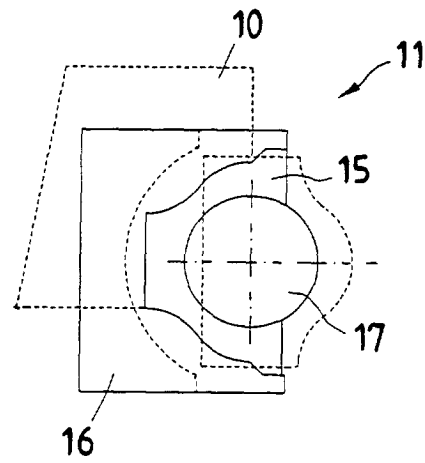


Fig.13

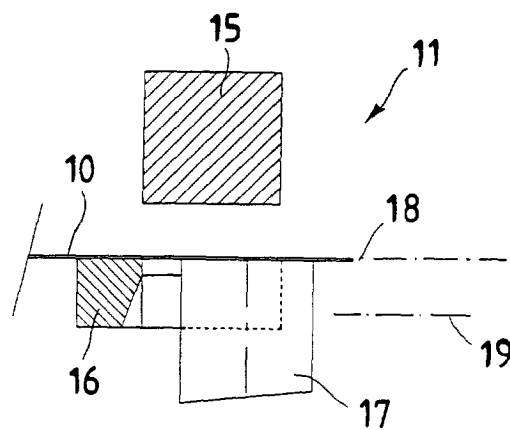


Fig.14

Fig.10

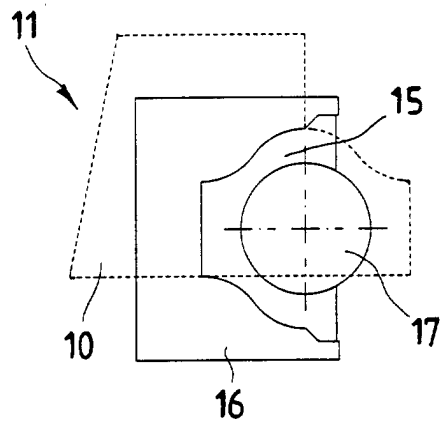


Fig.11

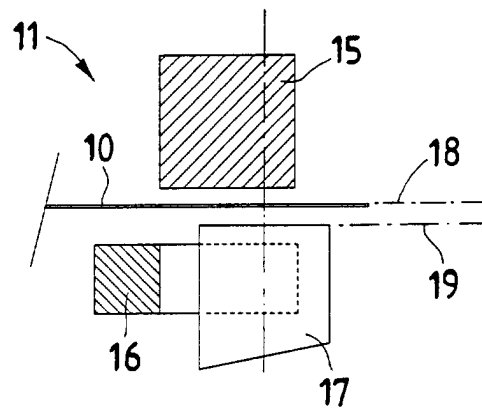
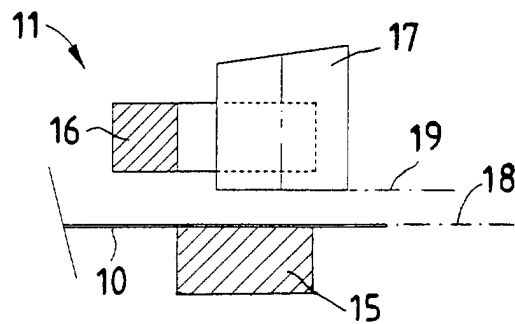
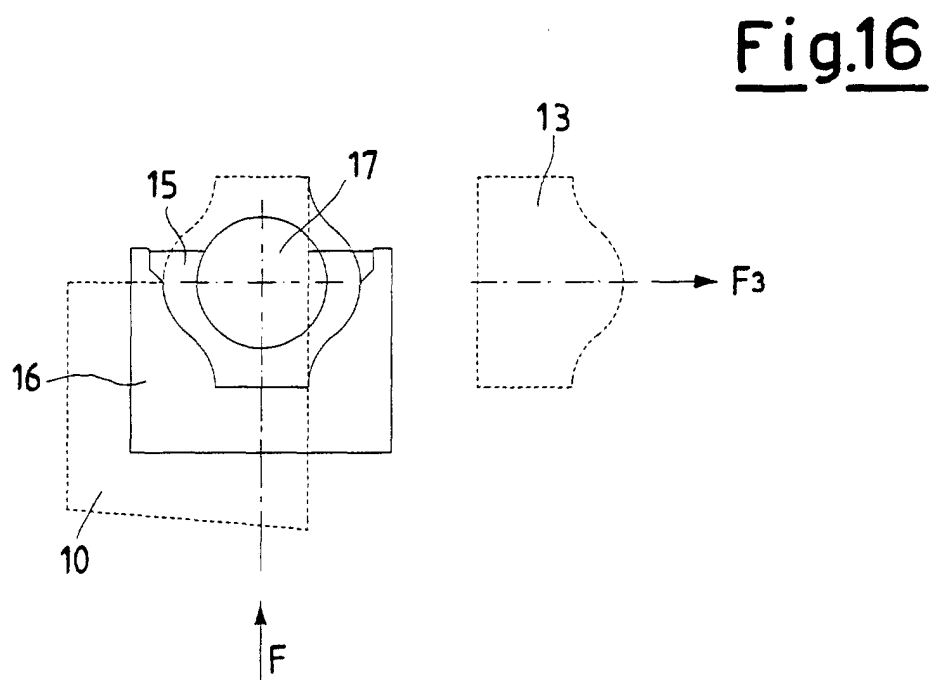
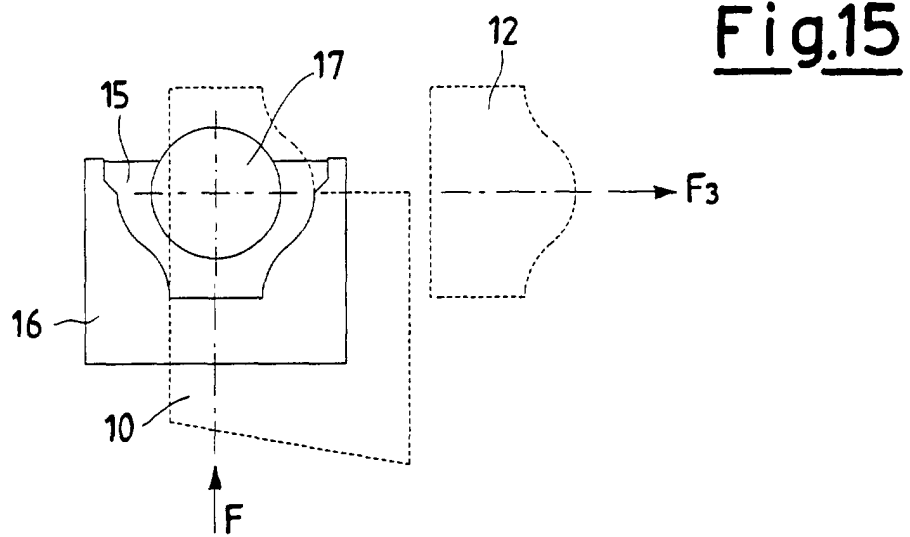


Fig.12







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Application Number
EP 01 20 3825

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The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 25 January 2002	Examiner Vinci, V
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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