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I-21100 Varese (IT)(54) **Tool carrier for a tile cutting device.**

(57) The system embodied by tool carrier (1), is comprised by a second class lever, which is rendered valuable, by a self-pointing device (6, 6', 4): the pair of rollers (6, 6'), which conventionally limited the dropping of the tool carrier (1), is rendered mobile and sliding, with its axle (4), along a groove (8), under the control of a spring (8'), whose power is sufficient to keep it up. This makes the wheel (5), comprising the fulcrum of the system, to come into contact with the bottom side (9), of the guide (9') observing the excursion limit provided by a rod (7). A head section (90) of the body, suitably provided with brake-block means ($R_1 < R$), absorb and dissipates the power remained. Such means (60) are arranged so that the self-collision between the indentation ($R_1 < R$) or brake-blocks (166, 166'), and the pair of wheels (6, 6') of radius R , being mobilized, provide a braking effect.

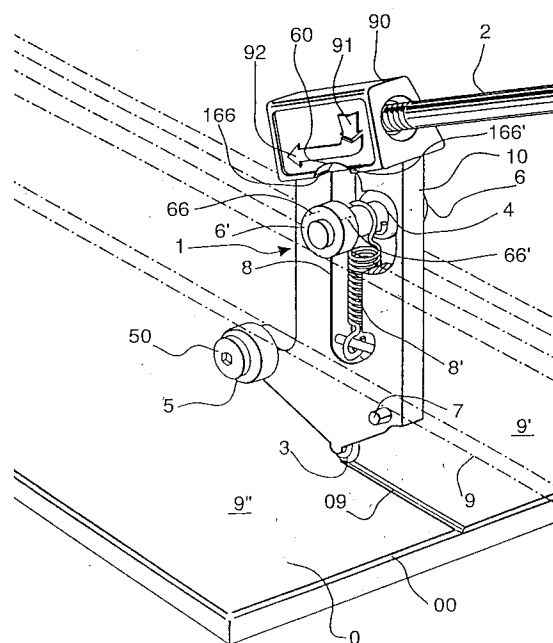


FIG. 2

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Pushoperable tool carrier, including a self-pointing device, particularly for application to tile cutting machines, to score very hard and thick ceramic tiles.

The present invention relates to a pushoperable tool carrier, particularly for scoring thick and very hard tiles, of the so-called "Enduro" kind and the like, particularly to be used with tile cutting machines. It is provided with self-pointing device, having a pantographic effect and as such highly organoleptic, in order to provide a tactile pointing of the "target", i.e. the initial and/or any scoring point, for thorough scoring, hence repeatedly operable. Once the scoring reaction ceases a brake block is automatically set into action, to absorb and dissipate the exceeding energy, in order to soften the tool carrier stopping.

At the present state of the art, either push- or pull-operable tool carriers are known, for scoring the glassy layer and particularly the body of the tiles. For cutting very hard tiles, of the so called "Enduro" kind and the like, only the push-operable tool carriers can be used, as they offer the best ergonomic efficiency. Such best efficiency, results in active and passive unbalancing in the operator body, since the conventional second class lever system substantially does not include any device providing a tactile pointing, to attain the target, which is comprised by the initial scoring point. This drawback depends from the organoleptic difficulty to obtain that the disk-like tool come into contact with the point where the scoring is to be started, generally it is the tile-edge closer to the operator. At the end of the scoring, then, there is a sudden liberation of the energy in use which is transformed in destructive kinetic energy, capable to cause accidents to persons and damages to things. In resting condition, the conventional, pushoperable tool-holder, due to gravitation tends to fall in an opposite position far from the expected operative position or possibly goes casually to rest away from it, therefore in an always different position, which can hardly be apprehended by its operator. Moreover, as shown in Fig. 5, from the tool, here comprising the sensor, to the lever end control, in spite of a mechanical advantage ratio there is a corresponding disadvantage ratio, in terms of sensitivity lack, due to the remote control thereof therefore in the organoleptic qualities of the device, as in a second class lever-system without fulcrum bearing. This important drawback occurs at every scoring. A considerable time-loss accumulates like this, by trying to find the ideal working position which is often completely missed, with "terrible slips" which compromise the scoring. This causes heavy damages. Considering that the value of a large tile (90 cm x 90 cm), is plainly higher than the value of the tool carrier and corresponds to

1/10 of the cost of the whole tile-cutting machine. In particular a conventional tool-carrier operationally comprises a second class lever, having in weight position, a disk-like scoring tool, and a sliding roller in fulcrum position, whereas to limit its drop, there is a pair of small idle rollers, which, nevertheless, have to permit it limitedly for functional reasons. Whereas, the upward excursion is also limited by a stopping rod. Of course, the system is out of control between the two extremes and pointing is substantially provided blindly and substantially does not allow any experience or learning.

The invention as claimed is intended to remedy these drawbacks and, moreover, to offer various advantages. The inventors with ingenious perception have conceived a tool-carrier with a self pointing device, with pantographic effect, thus highly organoleptic, directed to the tactile pointing of the "target", represented by the initial scoring point, therefore to the entire scoring, hence repeatedly operable. Once the scoring reaction ceases a brake block is automatically set into action, to absorb and dissipate the exceeding energy, in order to soften the tool carrier stopping. Practically, the self pointing features of the tool-carrier are such that, when quitted, always goes to a determined constant quote apprehensible by the operator, while the performance of the stroke, between such self-pointing quote and the spot wherein the tool comes into contact with the tile corner to start the best scoring, benefits of a substantially pantographic amplification. This amplification, is, at the level of the lever control, at least 6x and such run, at least sixuplicated, is assisted by organoleptic features which are correctly determined and easily apprehensible by the operator, such as to reduce many times the finding time of the right starting point of the scoring, corresponding to the nearest tile-edge towards the operator. More precisely, the pair of rollers which limited the gravitation dropping of the tool-carrier, is according to the invention made movable and free to slide, with its own axle, along the slot, longitudinally to the body of the tool holder. Such sliding movement is controlled by a spring, having a power sufficient to bear the weight of the whole tool carrier. Thus it is constantly kept up, to make the roller, providing the fulcrum of the second class lever system, to come constantly into contact the lower side of the sliding guide. Therefore, practically, the dropping of the tool carrier can take place at the end of the scoring, when the disk-like scoring tool drops from the tile, pushed there by the force of the operator. In this case the residual energy is absorbed by the brake, devised in such way that, the force of the operator causes the coming into contact between two indentations or brake blocks, provided in the upper part of the tool carrier body and the pair of wheels with a

mobilized axle, such that the indentations can act on the wheels as brake blocks.

Thus, in spite of its simplicity and only with slightly higher cost in respect of conventional tool carriers, time savings on the whole cutting cycle evaluated in 25% are obtained, whereas the results, in term of cutting neatness and absence of cross deviations, due to scoring not started in the very corner near to the operator, are evaluated in 12%, 5% thereof to be disposed. Moreover, in many cases, cutting thick and very hard tiles, it is advisable to make heavier the scoring by running twice or more times, at least the starting scored segment; thus the advantages offered by the present invention results at any scoring repetition at each starting or recurrence to the corner.

One way of carrying out the invention is described in detail below with reference to drawings which illustrate only one specific embodiment, in which:

Figure 1 is a perspective view of a pushoperable tool carrier having pantographic effect, for scoring the glassy covering layer and particularly the thick body of very hard tiles, according to the present invention. It is shown in resting position, i.e. completely up, in a position highly organoleptic, relatively close to the tile to be cut, while the involved parts of the tile cutting machine are shown in phantom lines, as they were transparent and even broken, to better evidencing the characterising details of the invention, those providing the pantographic effect.

Figure 2 is substantially the repetition of Figure 1, but showing the tool carrier in a lowered position, in comparison with the position of figure 1, so that the disk-like tool engages the upper surface of the tile, starting from the corner close to the user, pushed downwardly, with pantographic effect, by one of his hands, not shown. Figure 3 is substantially the repetition of Figure 2, but in the attitude of the tool carrier assumed when the disk-like tool has scored the tile, drops additionally, to the position wherein the upper section of the same tool carrier, with its arched base engages the wheels of the upper axle, whose pivot slides, substantially vertically, whereby to provide a braking effect.

Figure 4, is the operative scheme silhouette, of the tool carrier according to the invention. Two positions are shown, a first position of approach and a second of effective coming into contact, between the tool and the tile corner comprising the optimum scoring starting point.

Figure 5, is the operative scheme silhouette, of the tool carrier according to the previous state of the art. Two positions are shown: a first position of approach, shown by continuous lines, and a second position, shown in phantom lines, of

failure of coming into contact or slip, between the tool and the tile, whereby the tool starts, without effect, following a tangent line. Such movement is symbolized by two thick dashed lines.

Referring now to the figures of the drawings, a push-operable tool carrier, for scoring the covering layer and particularly the thick body of very hard tiles, particularly for application to tile cutting machines, comprises, conventionally, a tool carrier unit 1. Operatively it is comprised by a second class lever, which has, in power position the arm 2, in weight position, a disk-like scoring tool 3, and in fulcrum position, a sliding wheel 5, idly mounted on a screwed pivot 50. To limit the dropping of the tool carrier 1, there is a pair of idle rollers 6,6', mounted on the axle 4, which, however, permit a limited dropping for operative reasons. Moreover, for limiting its upward excursion, there is the rod 7. Of course, the tool carrier 1 is provided, at its bottom, said tool 3, for scoring of tile 0. Referring now particularly to Figure 5, it may be noted that the conventional system is constitutionally unstable. Either during the search (shown by continuous lines) or in improper working position, an unsteadiness and general blindness is established, with substantial absence of reference contact points. The system is always in a cantilevered situation quite similar to that of the stick of a blind man. The interaction between the tool 3 and the tile 0 may happen to occur only in a mere casual manner, therefore only casually may be as necessary, i.e. coincident with the corner 00 of the tile. In fact, apart from lack of stableness it is impossible to find at least two bearing points before a decision to start the scoring is taken. Thus quite often the starting point 00 of the tile is missed.

According to the present invention the pushoperable tool carrier 1, having pantographic effect, for scoring the glassy covering layer and particularly the thick body of very hard tiles, particularly for application to tile cutting machines, comprises a main body 10, which is provided with a vertical self-pointing device 6, 6', 4, having pantographic effect, as well as a head body 90 provided with self-braking means $R_1 < R$. More particularly the pair of rollers 6, 6', which in the conventional tool carrier had a fixed axle and was provided, only to limit the gravitational sinking, of the tool carrier 1, according to the invention, is mobilized and made idle to slide, with its axle 4, in a direction normal thereto, along a groove 8, longitudinal to the body of the tool carrier 1; such mobility is controlled by a spring 8', whose power is sufficient to bear the weight of the whole tool carrier 1. The spring 8' keeps permanently up the tool carrier 1 (figure 2), in order that the wheel 5, providing the fulcrum of the system, which comprises a second

class lever, which remains constantly in touch with bottom side 9, of the sliding guide 9'. On the other side, a tool carrier excursion limit is provided by a rod 7. With this arrangement, in practice, dropping of the tool carrier 1, occurs upon the end of scoring, when the disk-like scoring tool 3, drops from tile 0 forced by the user, not shown. In this instance, the involved energy is absorbed and dissipated by the brake 60, arranged in such a manner that, the force provided by the operator, provides the coming into contact between the brake-blocks $R_1 < R$, provided in the upper section 90, of the body of the tool carrier 1 and the pair of wheels 6, 6' of radius R, whose axle 4 is mobilized, in order that the indentations $R_1 < R$ act, against the wheels 6,6', as brake-blocks 166, 166'.

Finally in order to help the user of the tool carrier with tile cutting machine, at least until he is not familiar with the tool carrier, on the main frontal wall of the upper body 90 the arrows 91,92 are provided, to help the operator how to drive the tool carrier 1 or its controlling means 2.

From what described hereabove the operation of the tool carrier 1 should be easy to understand, however a short description will be given hereafter.

In position of rest (figure 1), the tool carrier 1, is completely up, i.e. in a position relatively close to the tile 0 to be scored and cut, the involved parts 9,9' of the cutting machine being shown on phantom lines as they were transparent or broken to better make evident the features of the invention.

Lowering the tool carrier 1, the disk-like tool 3, is made to engage the upper surface 9", of the tile 0, so that a scoring 09, is provided thereon, starting from the corner 00. Upon the disk-like tool 3 has scored the tile 0, the tool carrier 1 drops further (figure 3) towards the spot wherein the upper section 90, of the same tool carrier 1, with its base 60 arched at $R_1 < R$, engages the wheels 6, 6', of the vertically slidable upper axle 4. As shown by references $R_1 < R$, the coming into contact of these two means take place substantially between the two bands or flitches 66,66', provided by the projections 166, 166', which comprise proper brake-blocks, which may include sections of the upper body 90 or may added and interchangeable brake-blocks; not shown. In the first case the whole frame 10 is made of suitable material e.g., of light alloy, to avoid its wear and that of the wheels 6,6'.

Between the upper position (figure 1) and the lower position (figure 3), the position of figure 2, is to be localized. It is easily and organolectically localizable, provided that two conditions are complied: 1) the lever 2, or better its controlling end or knob, not shown, at start, is always in the same position. 2) also the tile 0 is to be set in the same position, in order that such lever control is acknowledged by the operator unconscious or instinct so

as to become an habit. Another component, certainly the most important, which can be acknowledged by the operator instinct are the three contact points c1, c2, c3, evidenced by the force opposed by the spring 8' in both moments of coming in touch with the tile 0.

The aforesaid effects may be easily understood from scheme of Figure 4 specially when the latter is compared with Figure 5. From Figure 4 it is evident that this system is constitutionally stable. Both during the search (shown by continuous lines) and in very working position a stableness and general mastership, with substantial reference to the three contact points c1, c2, c3. The system is always in a bearing situation and each operation P is helped forward by a pantographical multiplying which allows to quickly and without doubt to localize lor corner 00 of the tile from which the scoring is to be started.

Claims

1. Pushoperable tool carrier, including a self-pointing device, particularly for application to tile cutting machines, to score very hard and thick ceramic tiles, of the kind substantially providing a second kind lever, wherein its fulcrum is effective only during scoring post-positioning and wherein to a casual longer excursion of the tool in weight position (R) corresponds a shorter excursion of the hand drive in power position P, i.e. $\text{excR} > \text{excP}$, characterized in that it is provided with self-pointing features, rendering the fulcrum (5), the weight (3) and the power (2) of she second class lever permanently effective, whereby the tool carrier (1), when quitted, always goes to a determined constant quote apprehensible by the operator, while the performance of the stroke, between such self-pointing quote and the spot wherein the tool comes into contact with the tile corner (00) to start the best scoring (09), benefits of a reference on three points (c1, c2, c3, or 3,5,6,6') as well as a substantially pantographic amplification (P/R), i.e. $\text{excP} = N \cdot \text{excR}$ in term of excursion of the hand drive lever (2) end, wherein the condition of advantage (N) is (P/R) at least superior than six, i.e., with an excursion at least six times as such, the arrangement being assisted by organolectic determined features which are apprehensible by the operator whereby to reduce the time of right apprehension of the scoring starting point or corner (00) of the tile (0) close to the user.
2. Tool carrier, as claimed in claim 1, characterized in that the tool carrier (1), comprises a

main body (10), provided with a self-pointing device (6, 6', 4), and a head body (90), provided with self-braking means ($R_1 < R$), wherein the pair of rollers (6, 6'), directed to limit the gravitational sink of the tool carrier (1), is mobilized and idle to slide, with its axle (4), along a groove (8), longitudinal to the tool carrier body (1); the movement of such pair of rollers (6,6') being controlled by a spring (8'), whose power is enough to bear the weight of the whole tool carrier (1), to keep it permanently up.

3. Tool carrier, as claimed in claim 2, characterized in that it comprises a second class lever (1), constantly in touch with the bottom side (9), of the sliding guide (9') to comply with the excursion limit provided by rod (7).
4. Tool carrier, as claimed in claim 1, characterized in that the dropping of the tool carrier (1), occurs upon the end of scoring, when the disk-like tool (3), drops from tile (0) forced by the user, such dropping providing a braking effect.
5. Tool carrier, as claimed in claim 4, characterized in that the energy involved is absorbed and dissipated by the brake (60), arranged in such a manner that, the force applied by the operator, provides the coming into contact between the indentations ($R_1 < R$), included in the upper part (90), of the body of the tool carrier (1) and the pair of wheels (6,6') of radius R, whose axle (4) is mobilized, in order that the indentations ($R_1 < R$) engage the wheels or rollers (6, 6') as brake-blocks (166, 166').
6. Tool carrier, as claimed in claim 1, characterized in that, in order to help the user of the tool carrier with the tile cutting machine, at least until he is not familiar with the tool carrier (1), on the main frontal wall of the upper body (90) are provided arrows (91, 92), to help the operator how to drive the tool carrier (1) or its controlling means (2).

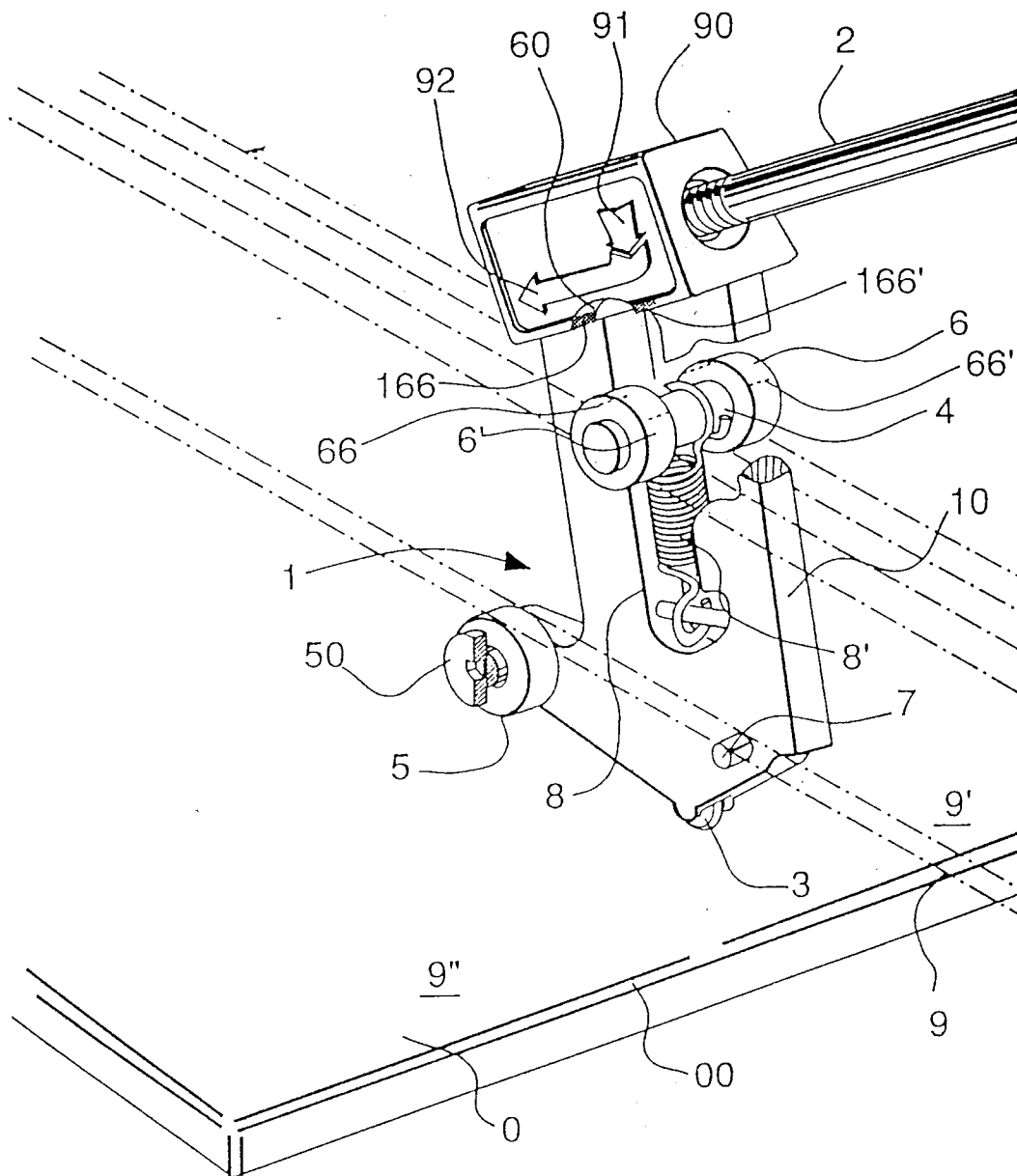


FIG. 1

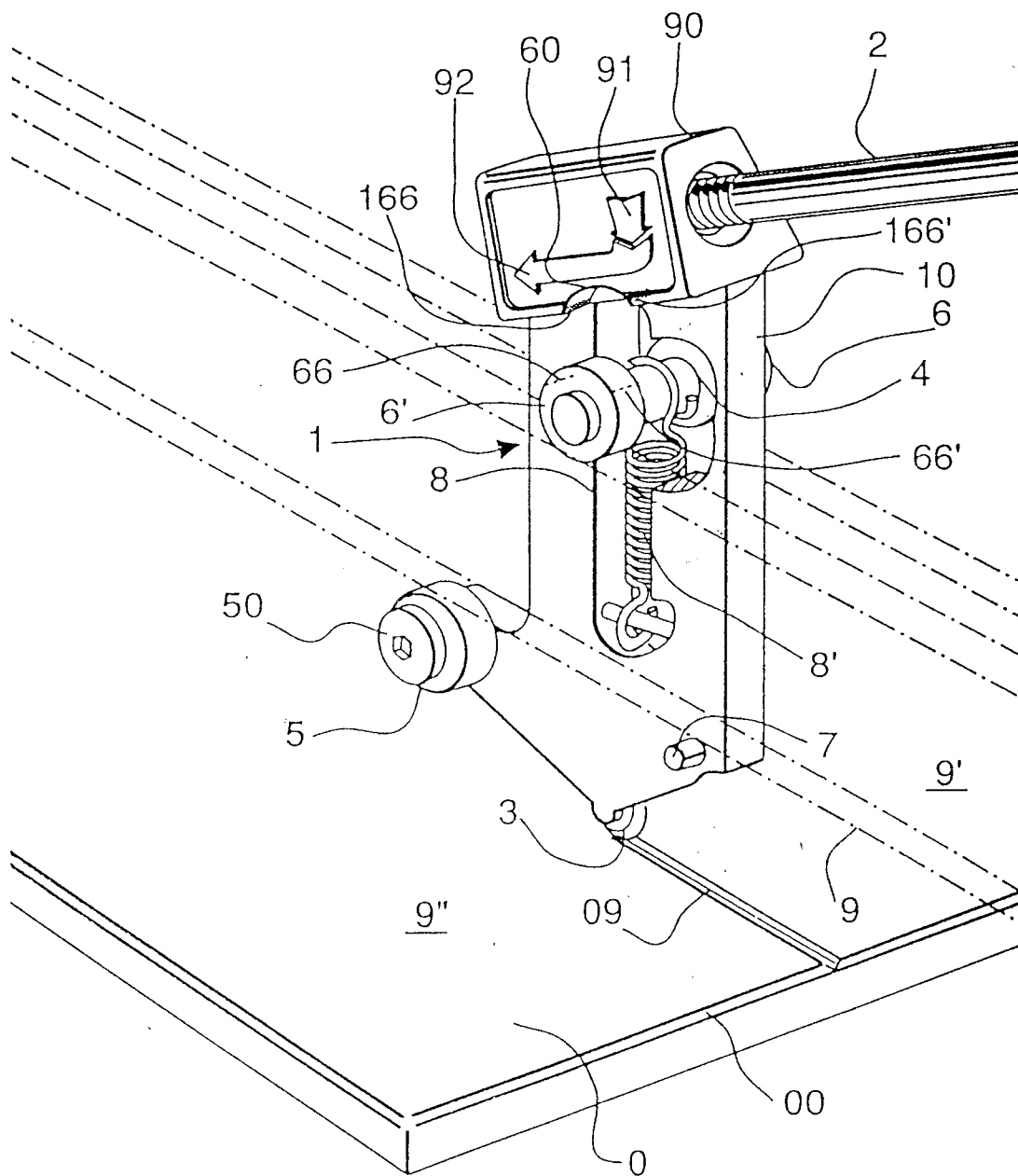
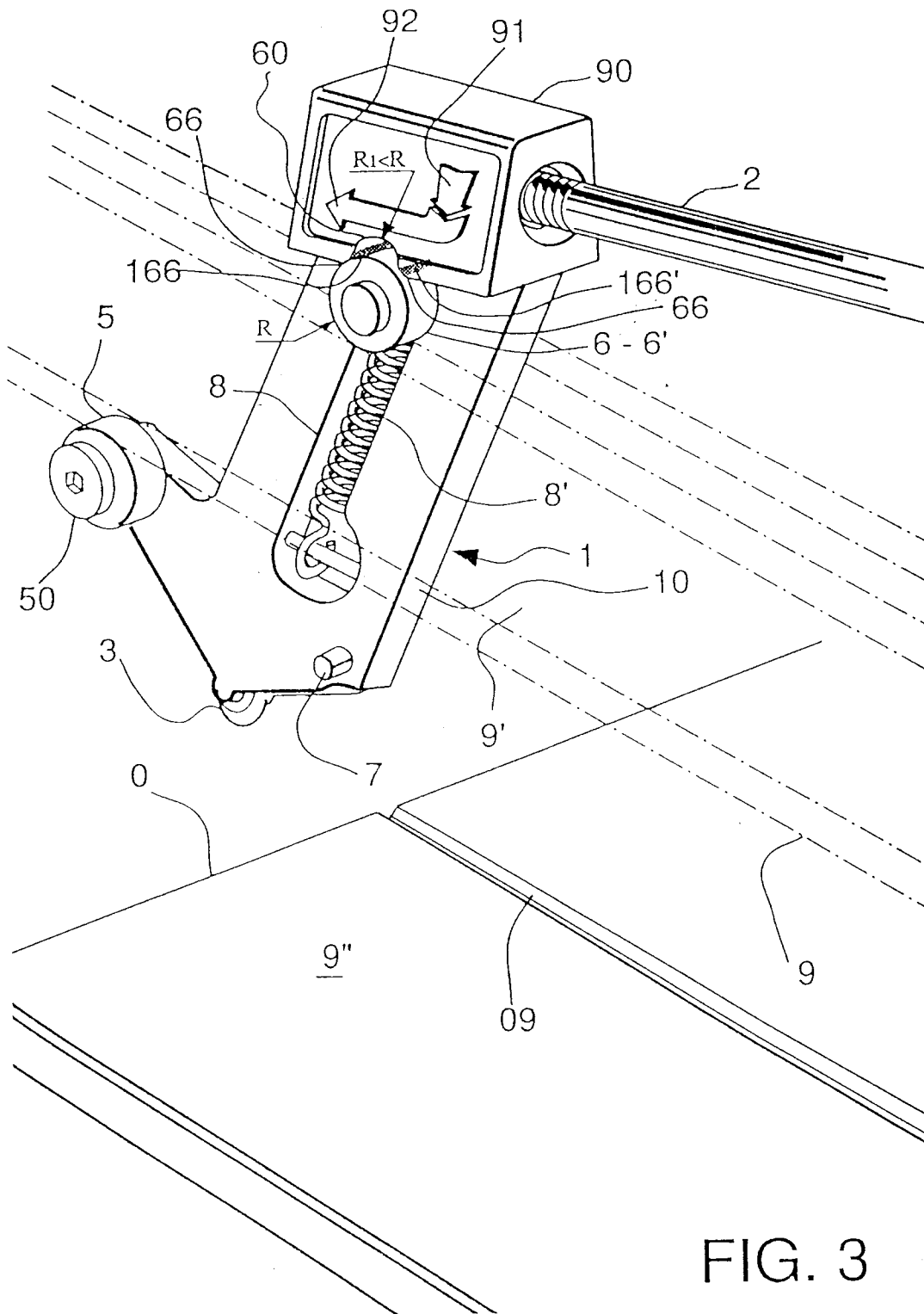
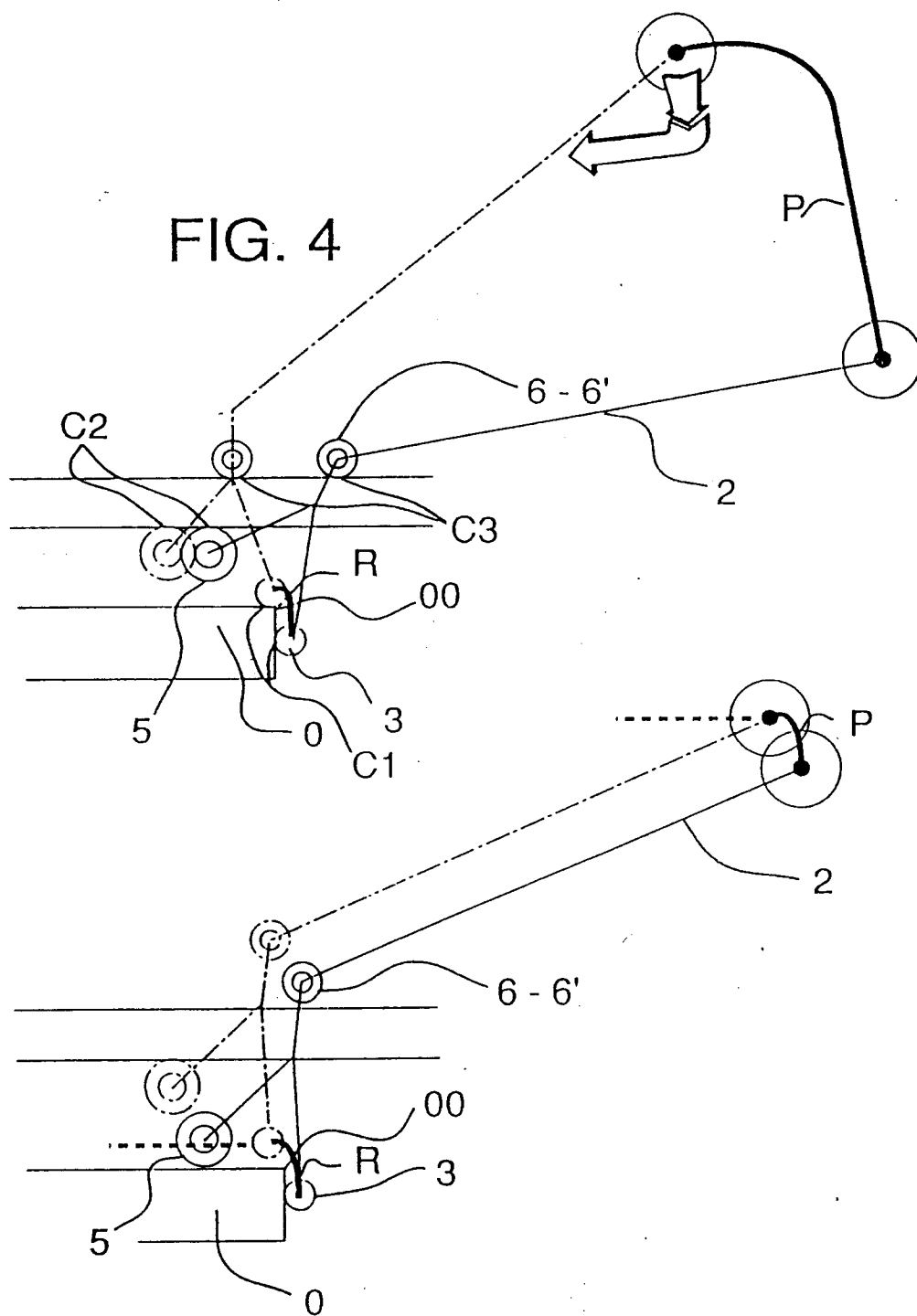


FIG. 2







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EUROPEAN SEARCH REPORT

Application Number

EP 92 11 6115

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)
X	CH-A-384 787 (J.P. COURVOISIER) *the whole document, in particular page 2, lines 7-21*	1,6	B28D1/22
A	---	2,3	
A	DE-A-2 902 497 (FA.HERBERT DÜRING) * page 2, line 1 - line 7 * * page 2, line 20 - page 3, line 12; figures 1-4 *	1,2,4	
A	FR-A-1 175 303 (H.J. LEMARCHAND) * page 1, left column, line 30 - right column, line 6; figures 1-4 * & FR-E-74 749 (H.J. LEMARCHAND) * page 1, left column, line 9 - line 22 * * page 1, right column, line 5 - line 11 *	2	
A	US-A-1 932 659 (S.I. GRANITE) * page 1, line 88 - page 2, line 8; figures 1,5-7 *	1,2	
-----			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B28D C03B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 28 JANUARY 1993	Examiner LILIMPAKIS E.
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