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(54) **Interlocking device for the joining together of two elements placed opposite one another.**

(57) Interlocking device provided with a swingable hook-shaped catch (10), which can engage behind a holding member (12) of a counter-part (13) which counter-part (13) can be abutted against a housing (1) by pulling back said catch (10) into the housing (1).

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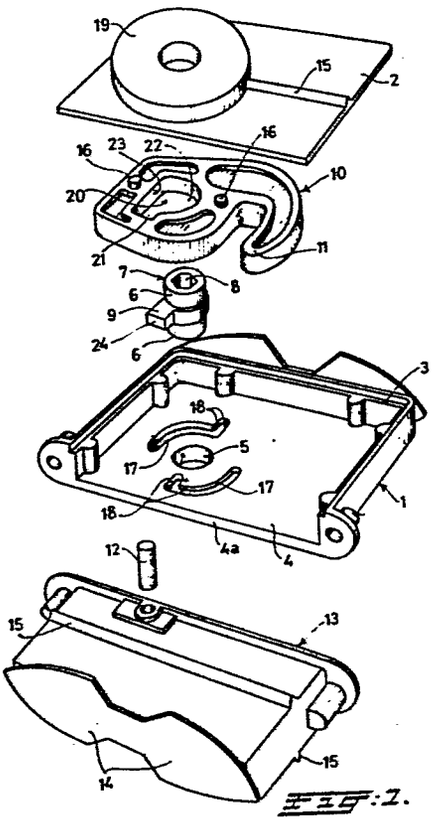
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FIG: 1.

# Interlocking device for the joining together of two elements placed opposite one another

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The invention relates to an interlocking device for the joining together of two elements placed opposite one another, comprising a housing which can be fastened in or to the one element, inside which is provided a cam part which can be turned with the aid of a key or crank-pin and engages with a hook-shaped catch, means being present for the swingable supporting of the catch which, when swung out of the housing, can engage behind a holding member of a counter-part which interacts with the catch side of the housing and can be fastened in or to the other element.

Such interlocking devices are used, for example, when panels are joined together in a close-fitting manner, preferably sandwich-panels provided with an inside insulating layer of foam, when erecting insulated stacking spaces. The housing for the swingable catch is then let into the side edge of the one panel, and the counter-part into the side edge of another panel which has to be joined to the first panel.

With the known interlocking devices employed for this purpose use is made of a swingable hook-shaped catch which is provided with an internal toothed rim, into which toothed rim an eccentrically placed pinion can engage. The pinion is accessible from the outside of the housing and through a hole in the panel, and is provided with an internal hexagonal recess, into which fits a hexagonal crank or key for the turning of the pinion. The disadvantage of these known interlocking devices is that, as soon as the hook comes in contact with the holding member in the counter-part of the interlocking device in the other panel, lateral forces are produced by the friction of the hook-shaped catch along the holding member. With this the panels can easily shift in relation to one another. This drawback could be counteracted by the providing of set pins, for example on the housing on the catch side, which set pins fit into corresponding recesses of the counter-part. However, this has the disadvantage that projecting parts occur on the side edges of the panels which can easily be damaged, and furthermore the counter-part must be positioned in such a manner that it is very accurately aligned in respect of the housing provided in another panel. When, for example, the panels are deformed slightly during transport, it may happen that such set pins no longer fit into the corresponding recesses of an adjacent panel.

The aim of the invention is to create an interlocking device which is less critical with regard to the alignment of the housing and the counter-part, and with which furthermore no lateral forces are produced as soon as the hook-shaped catch engages behind the holding member of the counter-part.

According to the invention this aim is achieved with an interlocking device of the type described at the outset, which is characterized in that the means for the swingable supporting of the hook-shaped catch are designed for the partial pulling back into the housing, under the effect of the turning further of the cam part, of the catch which has been swung out of the housing, which pulling back takes place in a direction transversely to the catch side of the housing.

The advantage of this is that during the swinging of the hook-shaped catch same can remain completely free of the holding member in the counter-part, as a result of which no lateral forces are produced. When turning the cam part further, the hook-shaped catch is then pulled back into the housing so far that a force is exerted on the holding member .....

perpendicularly to the catch side of the housing for the pulling together of two panels which are to be joined together. With this a shifting of the panels in relation to one another is excluded.

Another advantage of this is that no complicated pawls and springs, or complicated rack-and-pinion systems need to be used in the interlocking device, so that same can easily be made of plastic. In a practical embodiment the interlocking device according to the invention is constructed in such a manner that the means for the swingable supporting of the hook-shaped catch are guide-means which in the final swung-out position of the catch permit a movement of the catch in a direction transversely to the catch side, but which during this movement prevent a swinging of the catch. Furthermore the hook-shaped catch of the interlocking device according to the invention is provided with a recess into which fits the turnable cam part, the cam of which interacts with the side edges of the recess. The recess in the hook-shaped catch is preferably mainly L-shaped, and the cam fits into one leg of this L-shape, whilst the other leg serves to permit the moving of the catch along the cam part.

The invention will now be explained in greater detail with reference to the attached drawing of an exemplified embodiment, in which:

Fig. 1 is a perspective view of an interlocking device according to the invention in the pulled-out state; and

Fig. 2 is a diagrammatic view of the interlocking device with the swingable hook-shaped catch in various positions.

The interlocking device according to the invention comprises a dish-shaped housing 1, which may be closed by means of a cover plate 2, which with its edges fits into a rabbet 3 of the side walls of the housing 1 and can, for example, be fastened into same by means of glue. In the wall 4 of the housing 1 an opening 5 is provided, and a similar opening 5 is provided in the cover plate 2. Cylindrical parts 6 of a cam part 7 fit into the openings 5. The cam part 7 is provided with a recess 8 of a, for example, hexagonal or square shape, which recess extends through the cylindrical parts 6. The cam part 7 is provided with a cam 9 for a purpose which will still be described. A hook-shaped swingable catch 10 fits in the housing 1 and around the cam part 7, the hook-shaped free end 11 of which catch can engage behind a holding member 12, which may have the shape of a pin which is stuck through the walls of a counter-part 13 provided in the shape of a housing. The housing 1 as well as the counter-part 13 have wings 14 for a firm attaching of the housing and the counter-part when, during the manufacture of a sandwich ..

panel, same lies along the side edges in the to be foamed cavity between two plates. No further details need to be given of the sandwich panel, since this does not form part of the invention. The counter-part 13 is, furthermore, provided with ribs 15 which contribute to the solid fastening to the foam material of the sandwich panel. Similar ribs can be provided on the housing 1 and on the cover plate. The hook-shaped catch is provided with cams 16 on one or both lateral surfaces, which cams form part of means for the swingable supporting of the hook-shaped catch 10, which means are designed for the partial pulling back into the housing, under the effect of the turning further of the cam part 7, of the catch 10 which has been swung out of the housing (Fig. 2), which pulling back into the housing takes place in a direction transversely to the catch side 4a of the housing. In which manner this takes place will still be described. The means for the swingable supporting of the hook-shaped catch 10 are guide-means which in the final swung-out position of the catch permit a moving of the catch in a direction transversely to the catch side 4a, but which during this movement prevent a swinging of the catch.

It must be possible to swing the hook-shaped catch 10 into and out of the housing 1, and to this end guide-means are required which are formed by two interacting cams of the housing and of the hook-shaped catch respectively. In the illustrated exemplified embodiment the cams 16 form part of these two interacting cams, one of which has a part 17 which extends in the shape of an arc at a constant radial distance around an imaginary swinging axis of the catch 10. This swinging axis of the catch extends through the heart of the openings 5 and through the heart of the cylindrical parts 6 of the cam part. The arc-shaped part 17 changes over at one end into a part 18 which extends perpendicularly to the surface of the catch side 4a of the housing. The cam with the arc-shaped part 17 is formed, therefore, by the wall 4 of the chamber and is the side edge of a groove extending concentrically around the turning axis of the catch 10, which groove is provided with an end part which in relation to this turning axis extends in a radial direction, the other cam 16 fitting into this groove on the side of the catch which is not visible in the drawing. As can be noted from the drawing there are two grooves, which are provided diametrically to one another in relation to the turning axis of the catch, and the radial end part 18 of the one groove is directed towards the turning axis and the radial end part 18 of the other groove away from the turning axis.

The groove or grooves with the side edges 17 are provided in at least one of the side walls of the housing, and the cams 16 which form part of the swingable catch 10, run in these grooves. If only one of the side walls of the housing is adapted for the providing of the grooves, it is not necessary that the cover plate 2 is provided with a thickened part 19, which thickened part can serve, amongst others, for the providing of grooves into which fit the cams 16 of the swingable catch 10 visible in Fig. 1.

The hook-shaped catch 10 has a recess 20, into which fits the turnable cam part 7, and the cam 9 of same interacts with the side edges of the recess 20. This recess 20 in the hook-shaped catch 10 is provided substantially in the shape of a L, the cam 9 fitting into one leg 21 of this L-shape whilst the other leg 22 serves to permit the movement of the catch 10 along the cam part 7. The side 23 of the leg 21 turned away from the other leg 22 of the L-shape of the recess 20, into which fits the cam 9 of the cam part, serves as an abutting surface for the cam during the pulling into the housing of the swung-out hook-shaped catch, as will now be explained further.

The dot-dash line in Fig. 2 illustrates the swingable hook-shaped catch 10 in a position in which same is swung completely into the housing, the cam 9 of the cam part 7 being directed downwards in this figure. When now with the aid of a key which is stuck into the recess 8, the cam part 7 is turned in a clockwise direction, the catch is turned out of the housing due to the fact that the end of cam 9 presses against the abutting surface 23 of the recess 20 in the catch. The cam can not yet run up against this abutting surface because the cams 16 are still positioned in the arc-shaped part 17 of the groove. Accordingly, exclusively a turning movement of the catch 10 is possible, and when during the turning further of the cam part the cam 16 gets to the part 18 of the groove 17, the catch 10 comes into the position indicated by a dot-dash line in Fig. 2. In this position the abutting surface 23 lies laterally against the cam part 7 and against the flank of cam 9. During this turning movement the hook-shaped catch 10 hooks with its hook 11 behind the holding member 12 of the counter-part 13, but remains with its hook 11 completely free of this holding member 12. When the cam part 7 is turned further, the cam 9 runs along the abutting surface 23, as a result of which the catch 10 will shift under the effect of the pressure of the cam. This shifting is possible due to the fact that cam 16 of the catch comes into the part 18 which extends radially in respect of the turning axis. During this movement the hook 11 exerts a force in ..

the direction indicated by the arrow 25. In the end position of catch 10, drawn by a solid line in Fig. 2, the top surface 24 of cam 9 lies against the abutting surface 23. Because the cam 9 is positioned eccentrically in respect of the turning axis of the cam part and of the catch 10, the cam 9 is blocked in this end position and can only be moved back by overcoming a certain force during the turning back of cam 7. Because of the slightly springy properties of the hook 11, the counter-part 13 can be pressed with tension against the housing 1, which tension is indicated by means of the arrows 26. Lateral components which could cause a shifting of the counter-part 13 along the housing 1, do not occur with this, nor do they occur during the releasing of the interlocking device since, during the turning back of the cam part 7 the cams 16 first have to pass through the parts 18 before the cam part 10 can be turned back.

- Claims -

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# CLAIMS

1. Interlocking device for the joining together of two elements placed opposite one another, comprising a housing which can be fastened in or to the one element, inside which is provided a cam part which can be turned with the aid of a key or crank-pin and engages with a hook-shaped catch, means being present for the swingable supporting of the catch which, when swung out of the housing, can engage behind a holding member of a counter-part which interacts with the catch side of the housing and can be fastened in or to the other element, characterized in that the means for the swingable supporting of the hook-shaped catch are designed for the partial pulling back into the housing, under the effect of the turning further of the cam part, of the catch which has been swung out of the housing, which pulling back takes place in a direction transversely to the catch side of the housing.

2. Interlocking device in accordance with claim 1. characterized in that the means for the swingable supporting of the hook-shaped catch are guide-means which during the swinging of the catch do not permit any movement of same in the direction of its housing until the catch is completely swung out, and which in the swung-out position of the catch permit a movement of the catch in a direction transversely to the catch side, but prevent during this movement a swinging of the catch.

3. Interlocking device according to claims 1 and 2, characterized in that the guide means are formed by two interacting cams of the housing and of the hook-shaped catch respectively, one of which cams has a part which extends in the shape of an arc at a constant radial distance around an imaginary swinging axis of the catch, and which at one end changes over into a part extending perpendicularly to the surface of the catch side of the housing.

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4. Interlocking device according to claim 3, characterized in that the cam with the arc-shaped part is formed by a side edge of a groove extending concentrically around the turning axis of the catch, which groove is provided with an end part which extends in a radial direction in relation to this turning axis, the other cam fitting into this groove.

5. Interlocking device according to claim 4, characterized in that two grooves are provided, which are arranged diametrically to one another in relation to the turning axis of the catch, and in that the radial end part of the one groove is directed towards the turning axis and the radial end part of the other groove away from the turning axis.

6. Interlocking device according to claims 1 - 5, characterized in that the groove or grooves are provided in at least one of the side wallsof the housing and in that the cams running in these grooves form part of the swingable catch.

7. Interlocking device according to claims 1 - 3, characterized in that the hook-shaped catch has a recess, into which fits the turnable cam part, and in that the cam thereof interacts with the side edges of the recess.

8. Interlocking device according to claims 1 - 2 and 7, characterized in that the recess in the hook-shaped catch substantially has the shape of a L, and in that the cam fits into one leg of this L-shape whilst the other leg serves to permit the shifting of the catch along the cam part.

9. Interlocking device according to claim 8, characterized in that the side of the leg facing away from the other leg of the L-shape of the recess, and into which the cam of the cam part fits, serves as an abutting surface for the cam during the pulling into the housing of the swung-out hook-shaped catch.

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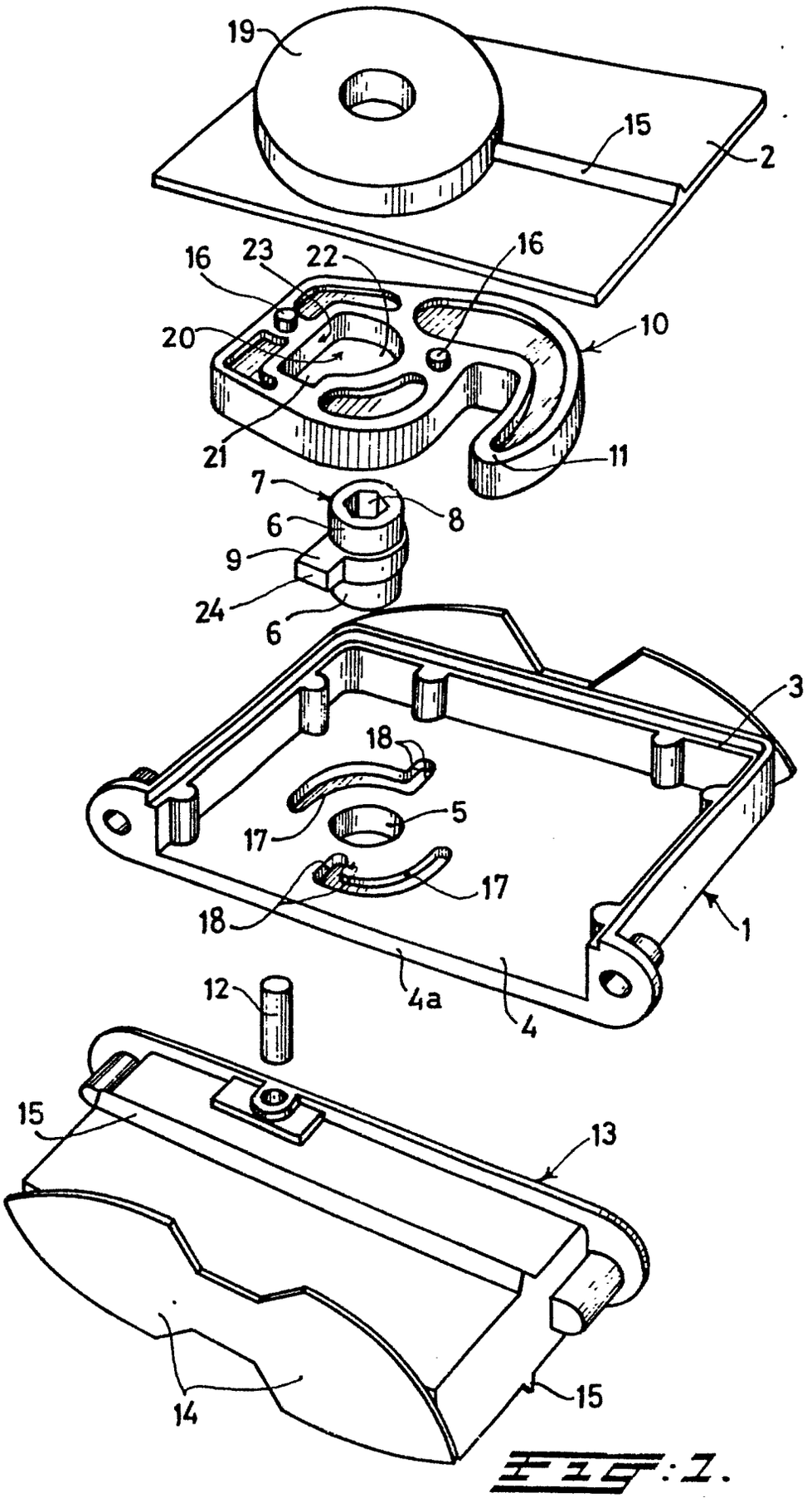


Fig: 1.

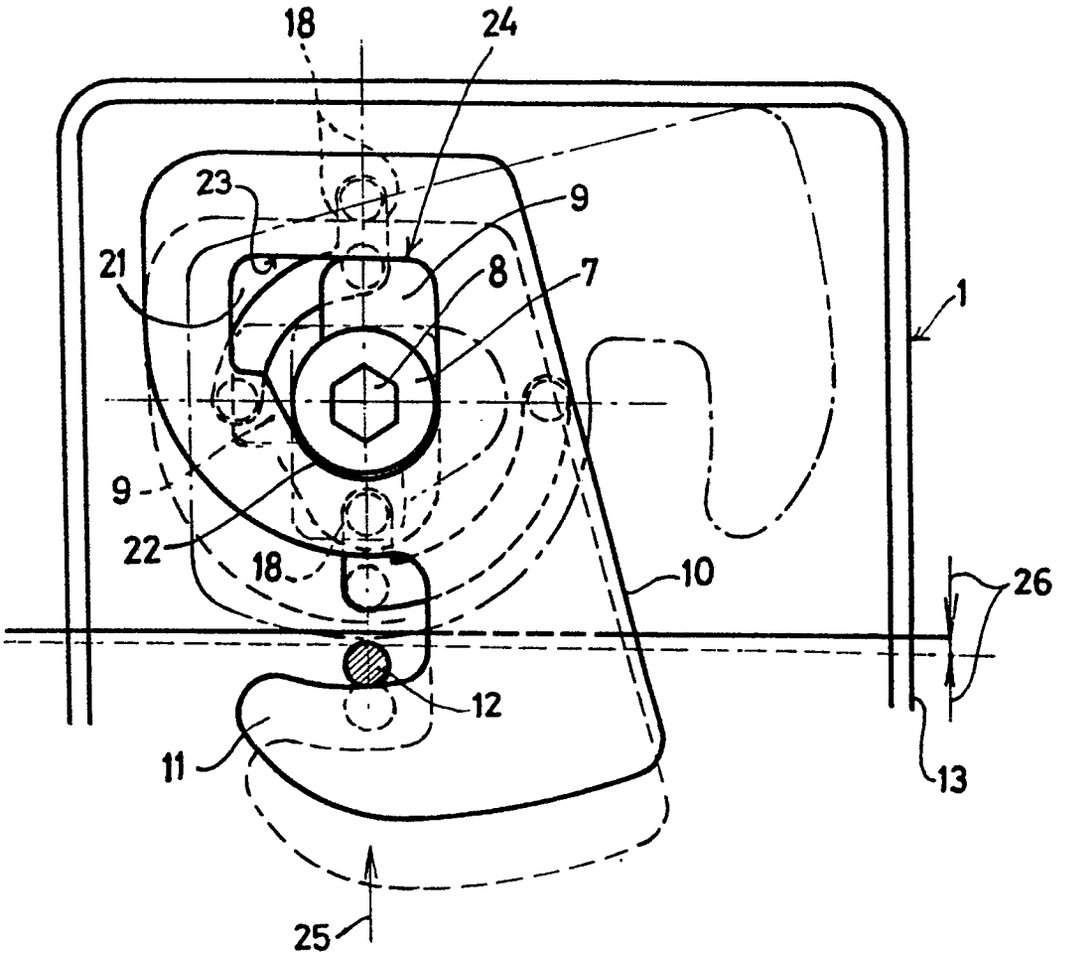


Fig: 2.

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# EUROPEAN SEARCH REPORT

0085998
Application number

EP 83 20 0060

## 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. ³) |
|---|---|---|---|
| X | GB-A-2 066 405 (CAMLOC INDUSTRIAL FIXINGS LTD.) * Figure 1 ; page 2, lines 18-25 * | 1,7 | E 05 C 19/12<br>E 05 B 65/08<br>E 05 C 3/06<br>E 05 C 5/00 |
| X | US-A-3 472 545 (I.L. BERKOWITZ) * Figures 2, 4, 10 ; column 3, lines 43-49, 62-74 * | 1,7 | |
| A | FR-A-1 305 160 (ETAT FRANCAIS) * Figures 1, 4 * | | |

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

E 05 B 65/00
E 05 C 3/00
E 05 C 5/00
E 05 C 19/00

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| BERLIN | 30-03-1983 | KRABEL A.W.G. |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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