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(54) **Locking elements and assemblies thereof for drawer units and drawer units embodying same.**

(57) A drawer unit (1) having a plurality of drawers (2) is provided in which a locking arrangement is provided to prevent a second drawer from being opened whilst another drawer is still open. The locking arrangement comprises a single locking rod (8) or bar, preferably rotatable in operation and conveniently centrally located at the rear (7) of the drawers. The locking rod or bar has locking elements (11) thereon which co-operate with formations, preferably in the form of pins (17), fixed to each drawer to achieve the desired objective in consequence of rotation of the rod or bar. The invention also extends to special locking elements for inclusion in a locking arrangement of this type.

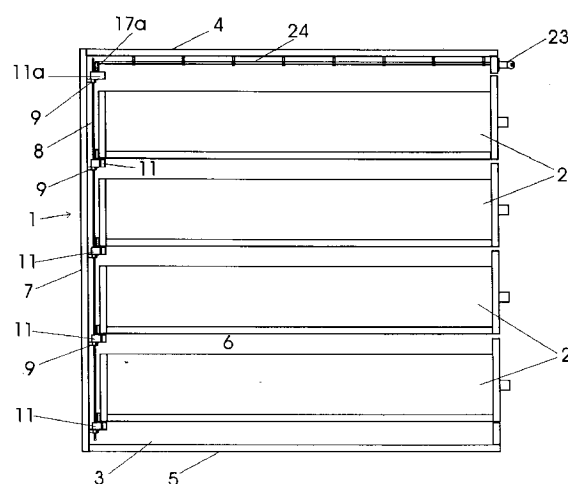


Fig 1

THIS INVENTION relates to locking elements and assemblies thereof for drawer units, and more particularly, drawer units embodying a plurality of superjacent drawers each of which is individually mounted to be pulled outwardly, as and when required, to provide access to the drawer. The invention also relates to drawer units embodying such locking elements and assemblies thereof, whether the drawer unit forms a separate article of furniture, or is embodied in an article of furniture having other uses.

In many cases where drawer units have a plurality of superjacent drawers, and the drawers are adapted to hold heavy material, such as paper for example, it is desirable that only one such drawer be permitted to be open at any one time. If two drawers containing a considerable weight of material therein are open at the same time, there is a danger that the unit can fall forwardly with consequent serious risk of damage to property and personal injury.

The only mechanism of which applicant is aware for preventing the opening of a second drawer, once a first one has been opened, is a mechanism in which each drawer is provided, at each forward side thereof, with a fitting, usually an injection moulded plastics fitting. Each such fitting co-operates with a longitudinally movable vertical locking bar associated with the sidewalls of the drawer unit so as to move the locking bars upon movement of a first drawer to open same. Each locking bar has inwardly directed pins which co-operate with the fittings to achieve said longitudinal movement and which have the added purpose of co-operating with formations associated with each of the other drawers to lock them in the closed position. When the first drawer is closed once more the fittings move the locking bars back to their unlocked position.

In addition, the locking bars are generally interconnected by a suitable mechanism at their upper ends so that both operate in unison. A key operated lock, usually of the push / pull or rotary type, is used to selectively lock all of the drawers in a closed condition.

This whole mechanism has the serious disadvantage in that it is complex and costly. There are two sets of each component (other than the key operated lock) and the interconnection of the locking bars so as to be operable by means of a single key operated lock, is relatively complex. Also, if perchance two drawers are opened simultaneously, and one is then closed, the locking mechanism is returned to its unlocked position in which it will be fouled by the fittings on the second drawer to be closed. There is thus the possibility of permanent damage to the entire locking mechanism and, indeed, the fittings and drawer.

It is the object of this invention to provide locking elements and assemblies thereof for use in drawer units to achieve the aforesaid desirable results whilst being relatively simple and comprising appreciably fewer component parts.

In accordance with one aspect of the invention there is provided a drawer unit comprising a plurality of superjacent drawers, movable into and out of a housing therefor, and wherein a single locking rod assembly is positioned at the rear of the drawers, the locking rod having locking elements associated therewith for co-operation with formations on each drawer, and wherein the elements and formations are adapted to move the locking rod, when a first drawer is opened, to a position in which the locking elements and formations on the other drawers co-operate to lock the other drawers in the closed position, and to reverse the movement of the locking rod when said first drawer is closed.

Further features of this aspect of the invention provide for the locking rod to be located centrally across the width of the drawers at the rear thereof; for the locking rod to be held captive by means of fittings secured to a rear wall or frame member of the drawer unit; for the locking rod to be rotatable rather than longitudinally movable; and for the locking rod to have key operated locking means associated therewith for selectively locking all the drawers in a closed position by movement of the operating rod.

Still further features of this aspect of the invention provide for the formations associated with each drawer to be a pin or rod extending transversely to the direction of movement of the drawers, and in particular, vertically; and for the said pins to co-operate with cam surfaces provided in each locking element to effect required movement of the operating rod.

In accordance with a second aspect of this invention there is provided a locking element having means for enabling it to be mounted to a rotatable operating rod to extend in a generally radial direction therefrom, and such that the locking element has an axis of rotation adapted to be operatively coincident with that of an operating rod; a slot or groove extending in a generally radial but sinuous direction relative to the axis of rotation, the slot or groove having an access opening at its end radially remote from the axis of rotation and communicating at its inner end with a transverse locking notch, and wherein the slot or groove is adapted for co-operation with a locking formation movable towards and away from the axis of rotation such that movement of such formation away from the axis of rotation causes rotation of the locking element in a direction which causes the locking notch to move into registration with the initial position assumed by the formation.

Further features of this aspect of this invention provide for the locking element to have a hole of non-circular shape in cross-section for receiving a complementarily shaped locking rod passing therethrough; for the slot or groove to extend up the entire height of the locking element and to extend in a roughly spiral direction defining

cam faces to the slot for co-operation with an elongate locking formation, conveniently in the form of pin having its axis parallel to that of the axis of rotation; and for the locking element to have two basic angular positions, one in which a radially movable locking formation with which the slot or groove co-operates is located in the inner end of the slot (defining the unlocked position of the element) and one in which the locking notch is located on said radius (corresponding to the locked condition of the element).

Still further features of this aspect of the invention provide for the locking element to have a shaped outer surface for co-operation with a spring loaded element to define click stops in the said two angular positions; and for an additional face to communicate with the outer access opening of the slot or groove for moving the element from the unlocked position to the locked position if a co-operating formation approaches the axis of rotation radially with that element in its unlocked position.

In order that the invention may be more fully understood one form of locking element according to the invention, as well as an assembly embodying same, and a drawer unit fitted with such assembly, will now be described with reference to the accompanying drawings.

In the drawings :-

- FIG. 1 is a schematic side sectional view of a drawer unit comprising four superjacent drawers fitted with locking elements and an assembly thereof according to the invention;
- FIG. 2 is an enlarged view of the rear end of a drawer illustrated in Figure 1;
- FIG. 3 is a still further enlarged view of the locking element and co-operating locking pin and showing further the mounting of the locking rod to the rear wall of the drawer unit;
- FIGS 4a, b, c and d illustrate four different angular positions assumed by a locking element as its associated drawer is opened (or in the reverse direction closed);
- FIG. 5 illustrates the locked position of a locking element and associated locking pin;
- FIG. 6 illustrates the operation of the additional cam face which enables a second drawer to be closed in the event that two were opened simultaneously; and,
- FIG. 7a and b illustrate the two terminal positions of a locking element associated with a key operated push type of lock for locking all the drawers in a closed position.

In the embodiment of the invention illustrated in the drawings a drawer unit, generally indicated by numeral 1, has four superjacent drawers 2 mounted on their own slides (not shown) so as to be movable into and out of a drawer cabinet 3 having top, bottom, side and rear walls 4, 5, 6 and 7 respectively, in the usual manner.

A hexagonal cross-sectioned locking rod 8, rotatable about its own axis, is mounted in spaced journals 9 secured to the rear wall 7 so that the locking rod 8 extends vertically up the centre of the rear wall from substantially the bottom to the top of the cabinet. The journals are each located roughly at the bottom of each drawer unit, and an additional one above the top drawer unit, and each receives a circular cross-sectioned extension 10 formed integral with a locking element 11 through which the rod passes.

As shown more clearly in Figures 4, 5, 6 and 7 the hexagonal cross-sectional locking rod passes through an hexagonal cross-sectioned hole 12 the axis of which defines the axis of rotation 13 of the locking rod. In this manner all of the locking elements 11 are rotatable in unison with the locking rod and each other.

The locking element extends in a generally radial direction away from the axis of rotation and away from the rear wall 7. A slot 14 extends outwardly in a spirally radial direction from an inner end 15 to an outer end or access mouth 16. The slot 14 is shaped such that a transverse locking pin 17 which is movable in a radial direction relative to the axis of rotation will, when moving radially outwardly, engage a locking cam surface 18 to cause the locking element to rotate about the axis 13 from the position illustrated in Figure 4a to the position illustrated in Figure 4d.

A locking pin 17 is attached to the rear 19 of each drawer so that the locking pin moves radially when the drawer is opened.

Accordingly, and since all of the four locking elements rotate in unison, when the one locking pin 17 attached to the one drawer being opened reaches the position illustrated in Figure 4d where it is located in the mouth 16 of the slot in the element 11, all of the other locking elements have assumed the position illustrated in Figure 5 with the associated locking pins 17 located in a circumferentially offset locking notch 20 communicating with the inner end 15 of the slot. All other drawers are therefore locked in the closed position whilst the one remains open.

When the open drawer is closed, its associated locking pin 17 enters the mouth 16 of the slot and engages a wall 21 of the slot which is inclined to the radius and which then causes the locking element to rotate in the opposite direction to the ultimate position where the locking pin 17 is located at the inner end of the slot as illustrated in Figure 4a. Any one drawer may then be opened with the other locking elements rotating to lock the other drawers in the closed position.

In the unlikely event that two drawers are pulled open simultaneously, and one drawer is then closed, the locking element will be rotated to a position corresponding to the unlocked position where the mouth 16 of the slot is no longer in alignment with the radius passing through the axis 13 and along which the locking pin 17a (see Figure 6) will move to close the second drawer. The locking element is provided with a protective cam face 22 adjoining the slot mouth which will cause, upon engagement by the locking pin 17a, the locking element 11 to rotate to the locked position firstly and then, subsequently, in consequence of engagement of the inclined surface 21 by the pin 17a, the elements will rotate to the normal unlocked position.

It will be understood that the locking elements and assembly thereof which are described above will be substantially less costly than the existing locking arrangement which is used to prevent any drawer from being opened once a first drawer has been opened.

The locking elements and assemblies thereof according to this invention can also be employed for locking all of the drawers in the closed position with the aid of a push / pull type of key operated lock 23. It is generally preferred that with a push / pull type of lock the innermost position desirably corresponds to the locked position and, in order to accommodate this requirement, a locking element 11a is inverted and positioned on the operating rod so as to co-operate with a transverse locking pin 17a carried on one end of an elongate, axially movable, rigid wire 24 attached at its other end to the push / pull type lock 23.

With the lock in the outwardly extending position, which corresponds to the unlocked condition of the drawers, the locking pin 17a will be in a position radially out of contact with the locking element 11a. When it is pushed towards the element in consequence of the lock being depressed to lock the unit, the locking pin 17a will firstly contact the reverse directed inclined face 21 and rotate the locking element anti-clockwise to the position illustrated in Figure 7b in which all the locking elements 11 are in their locked positions. Thus a complete lock assembly is provided in extremely simple manner simply by using an additional locking element 11.

It will thus be seen that the locking elements basically assume one of two angular positions and it is preferred that a spring loaded roller, or like element 25 (see Figure 7b), be engaged with a suitable formation 26 on the outer surface of the locking element so as to provide two "click" stops to the locking rod in these two positions. The "click" stops could be provided also by engaging the hexagonal rod with a suitable spring loaded element.

It will be understood that the locking element described above will conveniently be massed produced by injection moulding and leads to an extremely effective and inexpensive locking assembly for a set of drawers.

Numerous variations may be made to the embodiment of the invention described above without departing from the scope hereof, the specific embodiments simply being illustrative of the invention.

Claims

1. A drawer unit (1) comprising a plurality of superjacent drawers (2), movable into and out of a housing (3) therefor, and wherein a single locking rod assembly is positioned at the rear (4) of the drawers, the locking rod (8) having locking elements (11) associated therewith for co-operation with formations (17) on each drawer, and wherein the elements and formations are adapted to move the locking rod, when a first drawer is opened, to a position in which the locking elements and formations on the other drawers co-operate to lock the other drawers in the closed position, and to reverse the movement of the locking rod when said first drawer is closed.
2. A drawer unit as claimed in claim 1 in which the locking rod is located centrally across the width of the drawers at the rear thereof.
3. A drawer unit as claimed in either of the preceding claims in which the locking rod is held captive by means of fittings (9) secured to a rear wall (7) or frame member of the drawer unit.
4. A drawer unit as claimed in any one of the preceding claims in which the locking rod is rotatable to effect movement of the locking elements.
5. A drawer unit as claimed in any one of the preceding claims in which the locking rod has a key operated locking means (23,24) associated therewith for selectively locking all the drawers in a closed position by movement of the operating rod.
6. A drawer unit as claimed in any one of the preceding claims in which the formation associated with each drawer is a pin (17) or rod extending transversely to the direction of movement of the drawers.

7. A drawer unit as claimed in any one of the preceding claims in which each formation co-operates with cam surfaces (18,21) provided in its co-operant locking element to effect required movement of the operating rod.
- 5 8. A drawer unit as claimed in any one of the preceding claims in which each locking element has means (12) for enabling it to be mounted to a rotatable operating rod to extend in a generally radial direction therefrom, and such that the locking element has an axis of rotation adapted to be operatively coincident with that of the operating rod; a slot (14) or groove extending in a generally radial but sinuous direction relative to the axis of rotation, the slot or groove having an access opening (16) at its end radially remote from the axis of rotation and communicating at its inner end with a transverse locking notch (20), and wherein the slot or groove is adapted for co-operating with a locking formation (17) on a drawer movable towards and away from the axis of rotation such that movement of such formation away from the axis of rotation of the locking rod causes rotation of the locking element in a direction which causes the locking notch to move into registration with the initial position assumed by the formation so that the other drawers thereby become locked until the open drawer is closed.
- 10 9. A drawer unit as claimed in claim 8 in which the locking element has a hole (12) of non-circular shape in cross-section for receiving a complementarily shaped locking rod (8) passing therethrough.
- 20 10. A drawer unit as claimed in either of claims 8 or 9 in which the slot or groove in the locking element extends up the entire height of the locking element and extends in a roughly spiral direction in plan view defining cam faces (18,21) to the slot for co-operation with the elongate locking formation extending parallel to the axis of rotation of the element.
- 25 11. A drawer unit as claimed in any one of claims 8 to 10 in which the locking element has two basic angular positions, one in which the radially movable locking formation with which the slot or groove co-operates is located in the inner end of the slot (defining the unlocked position of the element) and one in which the locking notch is located on said radius (corresponding to the locked condition of the element).
- 30 12. A drawer unit as claimed in any one of claims 8 to 11 in which the locking element has a shaped outer surface (26) for co-operation with a spring loaded element to define click stops in the said two angular positions.
- 35 13. A drawer unit as claimed in any one of claims 8 to 12 in which the locking element has an additional face (22) to communicate with the outer access opening of the slot or groove for moving the element from its unlocked position to the locked position if a co-operating formation approaches the axis of rotation radially with that element in its unlocked position.
- 40 14. A locking element (11) having means for enabling it to be mounted to a rotatable operating rod to extend in a generally radial direction therefrom, and such that the locking element has an axis of rotation adapted to be operatively coincident with that of an operating rod; a slot or groove extending in a generally radial but sinuous direction relative to the axis of rotation, the slot or groove having an access opening at its end radially remote from the axis of rotation and communicating at its inner end with a transverse locking notch, and wherein the slot or groove is adapted for co-operating with a locking formation movable towards and away from the axis of rotation such that movement of such formation away from the axis of rotation causes rotation of the locking element in a direction which causes the locking notch to move into registration with the initial position assumed by the formation.
- 45 15. A locking element as claimed in claim 15 and embodying any one or more of the features defined in any one of claims 9 to 13.

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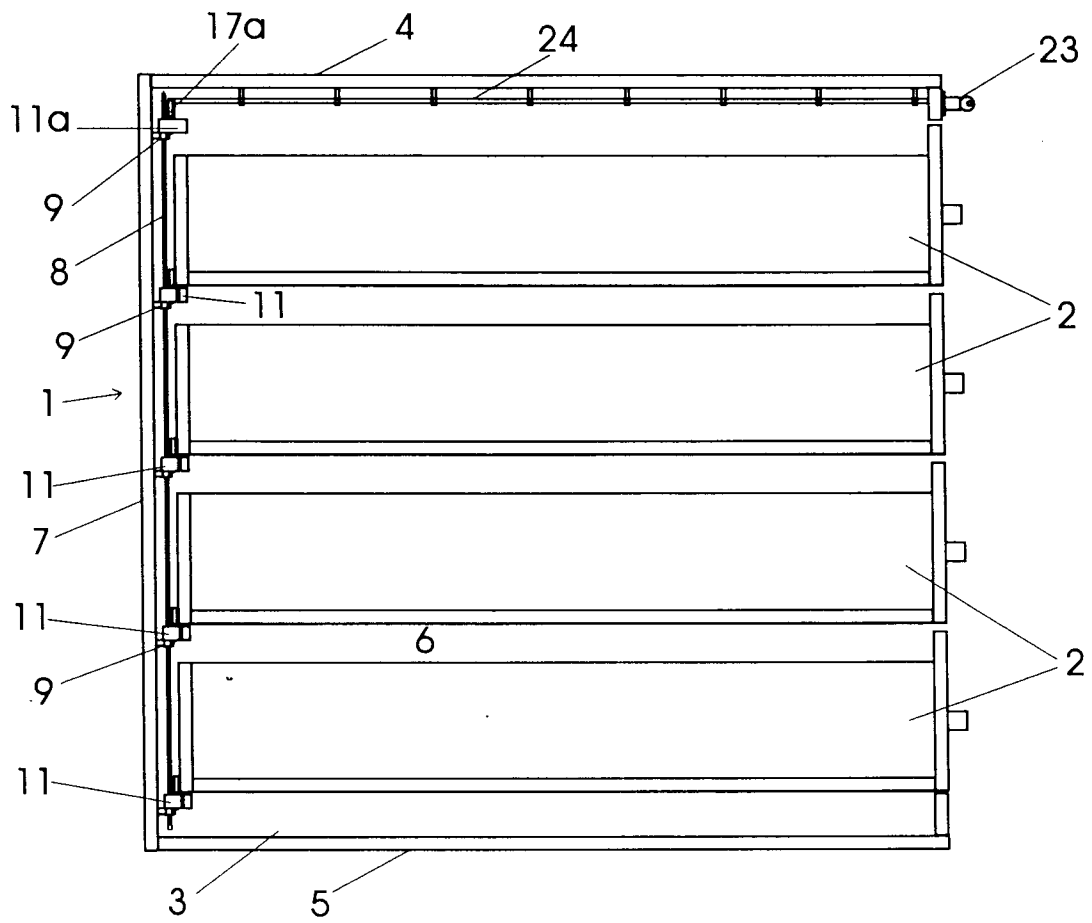


Fig 1

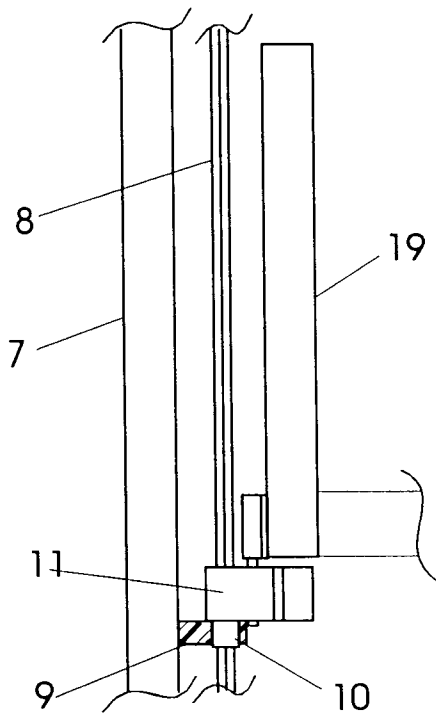


Fig 2

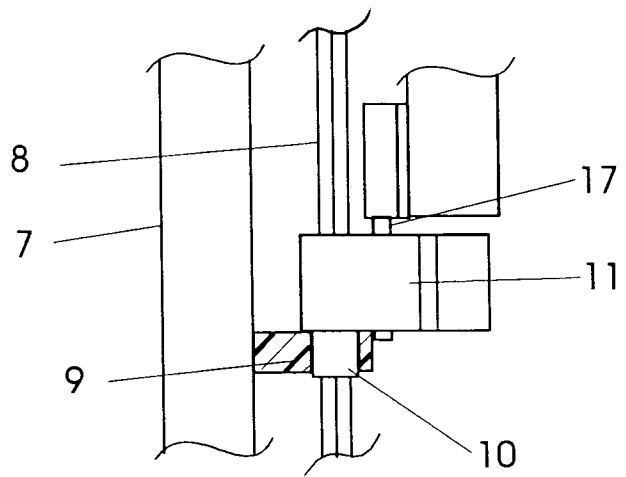


Fig 3

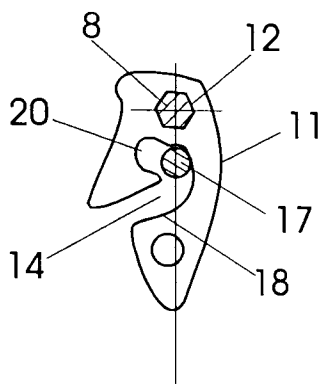


Fig 4a

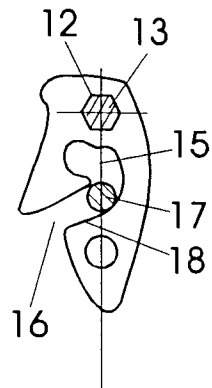


Fig 4b

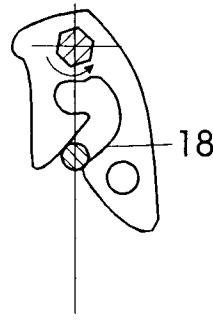


Fig 4c

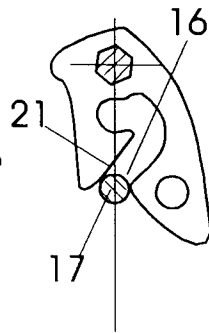


Fig 4d

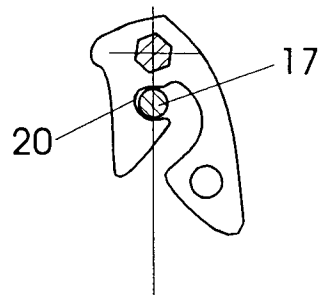


Fig 5

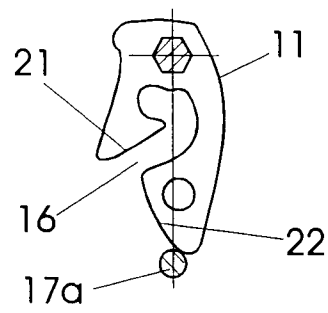


Fig 6

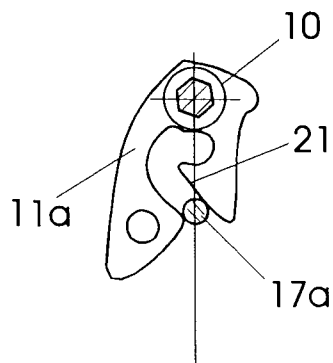


Fig 7a

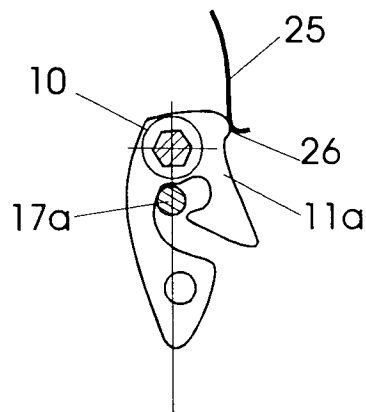


Fig 7b



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 30 9327

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.6)
X	FR-A-2 542 179 (STRAFOR SA.) * the whole document *	1-11, 13-15	E05B65/46
X A	DE-U-92 02 751 (GRAF) * the whole document *	1-5 6-15	
X A	FR-A-2 532 533 (STRAFOR SA.) * the whole document *	1-5 6-11, 13-15	
X A	DE-U-93 00 171 (HEKNA HERMANN KNAPP GMBH & CO. KG) * the whole document *	1-5 6-8, 10-15	
X A	US-A-4 804 876 (LANNERT ET AL.) * the whole document *	1-5 6-15	
X A	DE-A-25 53 424 (ZELENKA STAHLBAU HG) * the whole document *	1-5 6-15	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6) E05B
Place of search THE HAGUE		Date of completion of the search 24 March 1995	Examiner Vestin, K
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