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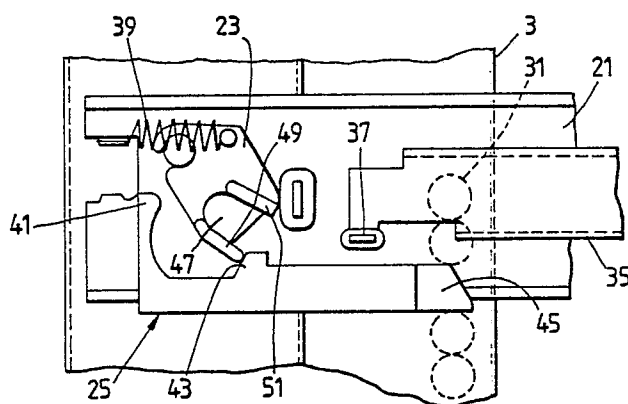
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54 Improved file interlock system.

57 An interlock system for an array of retractable storage elements, eg. a filing cabinet, prevents opening of more than one element at a time. The interlock system includes a channel (30) containing spheres (31) which leave only sufficient room in the channel for the entry of only one insert portion (45) on a slide (25) actuated by sliding of the storage element (15). The slide (25) is linked to the storage element (15) via a cam member (23) which can only release the storage element (15) for sliding if the insert portion (45) can enter the channel (30), thereby permitting the slide (25) to move. Since there is room in the channel (30) for only one insert portion (45) at a time, opening of more than one storage element at a time is prevented.

FIG.4.



IMPROVED FILE INTERLOCK SYSTEM

FIELD OF THE INVENTION

The instant invention relates generally to an interlock system for use in an array of vertically stacked storage elements. The interlock system is used to prevent the opening of more than one storage element at one time. Certain interlocks described in the prior art can be defeated by simultaneously opening more than one element. The instant invention also prevents this simultaneous opening. The incorporation of such an interlock system is necessary to insure the safety of employees and users of vertically disposed storage elements.

DESCRIPTION OF THE PRIOR ART

File interlock systems are necessary, and in some situations required by law, in order to protect personnel from the potential "tipping" hazard created if more than one storage element of a vertical array of file drawers is opened at one time. The prior art describes many types of interlocks for use in office cabinets. These interlock devices all depend on various complex combinations of sliding bars, springs, cables, and cams.

U.S. Patent No. 3,378,321 for "Filing Cabinets", relates to a filing cabinet having a series of laterally stacked drawers, each attached to each other by a cable. Tension on this continuous cable prevents more than one drawer from being withdrawn from the cabinet at any one time.

U.S. Patent No. 3,870,387, for a "File Drawer Interlock Mechanism", describes a mechanism in which a channel is mounted on each drawer and a series of corresponding rollers are mounted on a single sliding lock bar mounted within the cabinet. The lock bar is configured in such a manner that when one drawer is withdrawn the channel attached to that drawer engages a corresponding roller on the lock bar causing the lock bar to shift in position. In this shifted position, none of the remaining channels can engage any of their respective rollers and therefore, opening of any of the remaining drawers is prevented. This type of interlock mechanism is one of several in the prior art which use a sliding lock bar mounted in a cabinet, which shifts in position when engaged by a cam or other mechanism mounted on an opened drawer.

U.S. Patent No. 3,900,236 for a "File Interlock" describes a side mounted interlock for use in a filing cabinet in which a series of individual lock bars are used rather than one continuous lock bar.

In addition, a rotating cam is used to maintain the lock bars in a blocking position when any one of the drawers is open. The multiple lock bar system has an advantage in preventing the defeat of the interlock by opening more than one drawer simultaneously.

U.S. Patent 4,272,138 describes a "Cabinet Drawer Antitip Lock Device" which uses a series of multiple lock bars held in place by a fixed cam mounted to each drawer.

The instant invention uses a slidable mounting means to retractably mount the storage elements. The slidable mounting means represents prior art and is commonly used in file cabinets to support lateral file drawers. They are manufactured by companies such as Thomas Regout NV, the Netherlands. Each slide features a movable slide section or sections upon which a storage element is mounted and a stationary slide section which is affixed to a supporting wall or post of the cabinet or array structure. The movable slide section features a detent cam mechanism which is used to hold the drawer in a closed position until force is applied to open it, thereby preventing the drawer from opening by itself due to vibration or imperfect placement.

All of the interlock devices known to the applicant are cabinet based and feature complex structures which must be installed as part of the cabinet at the time the cabinet is manufactured. None of these devices are designed to be retrofitted into an existing cabinet or prefabricated shelving system.

Therefore, it is one object of the present invention to provide an interlock system for use with an array of retractable storage elements which prevents more than one element from being open at any one time.

It is a further object of the present invention to provide an interlock system which can be installed in an existing cabinet or prefabricated structure.

It is still a further object of the present invention to provide an interlock system for use in an array wherein the spacing between the storage elements can be adjustable and irregular.

SUMMARY OF THE INVENTION

The instant invention replaces the sliding lock bar, multiple lock bar and cable systems known in the prior art with an interlock system utilizing a substantially filled member mounted on or within one or more walls of a cabinet or prefabricated vertical array of retractable storage elements.

These storage elements are generally comprised of cradles each of which can, with the addition of a front side, act as drawers, or alternatively form a base for a file shelf. As used hereinafter "cradles" include drawers, shelves and platforms.

File cabinets are designed basically to comprise two side walls and optionally a rear wall. Cradles can be retractably mounted within a cabinet on telescoping slides known in the prior art. Similarly the cradles of a prefabricated array can be slide mounted to the support members of the array.

In the instant invention, the prior art telescoping slide is modified by installing a plunger cam along a portion of the stationary section of the slide and in contact with the detent cam of the slide. Each side wall of a cabinet, or vertical support member of a prefabricated array, is fitted with a vertical side trough with a retaining lip. One or more partially filled blocking members are installed within one or more of the troughs and held in position by the lip. Each blocking member is generally tubular in shape and can be made out of extruded plastic or other rigid or semi-rigid materials.

In one embodiment of the invention, the partially filled blocking member comprises a channel containing a plurality of slidable components which can move freely within the available space of the channel. Each of these slidable components is of equal diameter or dimension. The channel contains a number of components such that the unfilled portion of the channel is substantially equal to this same component dimension. When a cradle is opened, the detent cam of the stationary section of the slide is forced to rotate by an engaging tab attached to the movable section of the slide means which is attached to the cradle. The detent cam in turn engages a portion of the plunger cam causing it to slide along an edge of the stationary section of the slide means thereby urging an insert portion of the plunger cam into the channel. The insert is dimensioned generally equal to that of each component so that when it enters the channel it generally occupies the remaining unfilled portion of the channel, causing the slidable components therein to shift position as necessary. The respective inserts of the plunger cams associated with the remaining closed cradles are thus blocked from entering the channel and therefore these cradles cannot be opened.

If an attempt is made to open two or more cradles simultaneously no drawers will open because the unfilled portion of the channel will allow the entry of only one plunger cam insert at a time and each cradle's insert will enter the channel only partially, blocking both inserts from completely entering the channel and their corresponding cradles from opening.

In a second embodiment, the substantially filled housing comprises a sealed tube containing gaseous or viscous material. The amount of material is such that when a cradle is opened and the insert of its plunger cam depresses a portion of the tube, the remainder of the tube assumes a generally rigid state. The respective inserts of the plunger cams associated with the remaining cradles are thus blocked from entering the channel and therefore these cradles cannot be opened.

The instant interlock is designed so that the spacing between the storage elements can be irregular and adjustable when used in a prefabricated shelving system. This is because the number and spacing of the storage elements are not dependent on a matching number of blocking elements, e.g. lock bars.

It is, therefore, a feature of the present invention to provide an interlock which can be easily installed in a file cabinet or a prefabricated structure.

It is a still further feature of the invention to provide an interlocked vertical array of retractable storage elements which can be irregularly spaced.

It is yet a further feature of the invention to provide an easily installed plunger cam which is controlled by the detent cam built into a drawer slide mounting means.

It is another feature of the invention that it can be used with a prefabricated filing structure built to meet design requirements specified by an architect or customer.

These and other objects and features of the present invention will become more apparent when taken in conjunction with the following description and drawings, wherein like characters indicate like parts.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric, partially sectional view of an array of vertically mounted retractable cradles incorporating one embodiment of the instant invention.

FIG. 2 is side sectional view of a portion of FIG. 1 showing a cradle in the closed position.

FIG. 3 is a top plan view of FIG. 2.

FIG. 4 is side sectional view of a portion of FIG. 1 showing a cradle in the opened position.

FIG. 5 is a top plan view of FIG. 4.

DESCRIPTION OF THE INVENTION

In order to prevent tipping, safety dictates that a prefabricated array of vertically stacked retractable cradles or a similarly designed cabinet be

provided with means to prevent more than one cradle from being opened at any one time. An array of vertically stacked retractable cradles 1 comprising one embodiment of the instant invention is described in FIG. 1. The cradles are mounted to a plurality of prefabricated structural members by horizontally mounted slides. As stated hereinabove these slides, each supplied with a detent cam, are in the prior art.

FIG. 1 describes four vertical, rectangularly disposed posts 3, 5, 7 and 9 which are designed to be fastened together by various horizontal members 4 and with other structural members (not shown) in order to form a prefabricated office shelving system or office dividing wall system 1. This type of prefabricated structure is designed to be constructed to the specifications of the customer and the posts can support a variety of storage elements such as stationary or retractable cradles which in turn can support document files, recording files, shelves with adjustable dividers etc. Posts 3, 5, 7 and 9 are each formed with a trough 11 running along the longitudinal axis of each member, each trough having a retaining lip 13. Three retractable cradles 15 are each mounted on pairs of slides 21. These slides 21 include biased detent cams 23 which, in the prior art, have been used to retain retractable cradles in a closed position. As part of the instant invention however, the slides 21 mounted to post 3 each have been modified to include a slidably attached plunger cam 25, having an insert portion 27 offset within post 3 and its remaining portion in proximate contact with detent cam 23. Only the plunger cam 25 of top cradle 15 is shown in FIG. 1 but it is to be understood that a similar plunger cam 25 is mounted upon the slide 21 for each lower cradle 15 mounted upon post 3. Mounted within trough 11 of post 3 is channel 30 which is partially filled with a plurality of spheres 31 which all have the same diameter. Channel 30 can be a plastic extrusion which is inserted into trough 11 and held in place by retaining lip 13.

The center cradle 15 is shown in the open position and its corresponding slides 21 are shown in the extended position showing stationary slide section 33 and movable slide sections 35 common to all of the slides 21.

FIGS. 2 through 5 are detailed views of top cradle 15 in the closed position, showing an enlarged view of slide 21, plunger cam 25, post 3, trough 11, channel 30 and spheres 31. FIG. 2 is a partially sectional view from the inside of the structure 1. Detent cam 23 is shown held in the "closed" position by the tension of spring 39. Movable section 35 of slide 21 is retracted within stationary section 33 and engagement tab 37 of movable section 35 is held in place within slot 47 of detent cam 23. Slot 47 is formed with two ridges

49 and 51 which are perpendicular to the plane of the detent cam 23 and which contact the tab 37 and portions of plunger cam 25. The plunger cam 25 is slidably mounted upon the lower edge of stationary member 33 of slide 21.

As shown in FIG. 3, channel 30 is formed with an open face 50, resembling the letter "C" when viewed from the top. Spheres 31 are slidably stacked within the channel 30, and are held horizontally in place by the arms of channel 30. The insert of plunger cam 35 is disposed within post 3, in alignment with the opening of trough 11 and the open face 50 of channel 30. All of the spheres 31 have the same diameter. Insert 45 of plunger cam 25 has a height dimension which equals the diameter of each of spheres 31. Channel 30 is filled with enough spheres so that, when the cradle 16 is in the closed position, the unfilled volume of the channel 30 will permit the entry of one, and only one, insert 45 of a plunger cam 25.

FIGS. 4 and 5 describe the embodiment of the invention shown in FIGS. 2 and 3, with the cradle in the open position. When the cradle is withdrawn, the movable section 35 of slide 21 extends outwardly from stationary section 33. Movable section 35 supports the cradle in the open position as shown in FIG. 1. As movable section 35 is urged forward by the force applied to open the cradle, engagement tab 37 engages ridge 51 of detent cam 23 causing it to overcome the bias provided by the spring 39 and rotate to its "open" position. The rotating ridge 51 contacts projection 43 of plunger cam 25 causing the plunger cam 25 to shift forward along the edge of the stationary section 33 of slide 21, causing insert 45 of plunger cam 25 to enter the open face 50 of channel 30. As insert 45 enters channel 30, the spheres 31 shift position with respect to the entering insert 45, generally filling the remaining volume within the channel 30. Therefore, with any one cradle in the open position, effectively no room remains in the channel for the entry of another insert of a plunger cam corresponding to another cradle. The result is that one and only one cradle can be opened at one time.

Spring 39 is attached to the detent cam 23 in such a manner as to exert retaining tension on the detent cam 23 in both its "open" and "closed" position. This tension tends to retain cam in which ever position it is in. In its "open" position, ridge 49 of detent cam 23 contacts projection 43 of plunger cam 25 holding insert 45 in place until the cradle 15 is closed.

When cradle 15 is returned to the closed position, the engaging tab 37 of movable member 35 engages ridge 49 of detent cam 23 urging it to rotate against the tension of spring 39 and into its "closed" position once again. As detent cam 23

rotates it engages projection 41 of plunger cam 25 shifting it backwards so that its insert 45 withdraws from channel 30. In its "closed" position, ridge 49 of detent cam 23 contacts projection 41 of plunger cam 25, holding it in place.

When none of the cradles are open, channel 30 has generally enough empty volume to fit only one insert 45 of one plunger cam 25. Because the height of each of the inserts 45 are the same, and are in turn equal to the diameter of one sphere 31, if two cradles are withdrawn simultaneously, neither of the cradles will open because neither the inserts 45 will penetrate completely into the channel 30.

Although the embodiment described in the drawings utilizes a plurality of spheres, any uniformly sized, slidable components can be used. These members should be shaped to allow efficient integration with and separation by the plunger cam insert and ease of movement within the channel. The members should be hard but not brittle and can be made of metal, plastic, hard rubber, wood, ceramic, or other resilient materials. The posts and other structural members can be made of steel or sheet metal and the channel can be a plastic extrusion or other suitable molded or cast material. The plunger cam can be made of plastic, metal or other suitably hard material. In the embodiment described in the drawings, the spheres are made of plastic and have a diameter of .5 inch. The height of the insert portion of the plunger cam is also .5 inch. With all of the cradles closed, the unfilled area of the channel will accept only one insert with this height. However, it is to be understood that the size of the spheres and inserts be various sizes depending on the size of the cradles and the specific application.

A cabinet can be configured using the components described in FIGS. 2 through 5, with the necessary trough being formed in either or both of the side walls of the cabinet.

In a prefabricated array of shelves, the instant invention allows the cradles to be spaced at irregular intervals within the limits of cradle size and the mounting constraints of the slide mounts. In addition, the instant interlock system permits an array of stationary prefabricated shelves to be converted at a later date to an array of retractable cradles by inserting a prefabricated channel with slidable components e.g. spheres, into at least one of the support posts (which must already have the trough formed within it) and mounting the cradles upon slides as modified by the instant invention described above.

A lock can also be provided by mounting a rotating or sliding cam on the post in which the channel is installed. The cam can be made to enter the channel when all of the cradles are closed, thereby taking up the remaining volume and pre-

venting any of the cradles from being open.

Although the embodiment described above, are shown mounted along only one side of the structure, it is to be understood that the embodiments described can be placed on both sides and work together to accomplish in reinforced fashion, the interlock effect of the instant invention. In addition, combinations of the embodiments can be used within one particular cabinet.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and details may be made therein without departing from the spirit and scope of the invention.

Claims

1. An interlock system for an array of retractable storage elements having a plurality of support members (3, 5, 7, 9) the interlock system preventing the opening of more than one element at any one time, characterised in that it comprises:

at least one partially filled blocking member (30) having a partial void, said blocking member (30) being longitudinally disposed within at least one of said support members (3); and

engaging means (25) mounted adjacent to each of said storage elements positioned to engage said blocking member when any one of said storage elements (15) is placed in an open position, said engaging means interacting with the contents (31) of said blocking member (30) to substantially fill said void thereby preventing engaging means of the remaining unopened storage members from effectively interacting with said contents of said blocking member, whereby the remaining storage elements are prevented from simultaneously being placed in an open position.

2. An interlock system according to claim 1, characterised in that said blocking member comprises a channel (30) filled with a plurality of movable components (31) each having the same dimensions.

3. An interlock system according to claim 2, wherein said components are spheres (31).

4. A structure having a plurality of vertically stacked retractable storage elements (15), a plurality of vertical support members (3, 5, 7, 9), and a plurality of telescoping slide means (21) for supporting said storage elements (15), each of said slide means (21) having a stationary section (33) fixed to at least one of said support elements (3,5,7,9) and at least one movable section (35) attached to each of said storage elements (15), each stationary section (33) having a positional

retaining means (23) and each movable section having an engagement means (37) which urges said retaining means (23) to a first position when a storage element is placed in an open position and a second position when said storage element is placed in a closed position, and an interlock system for preventing more than one storage element from being placed in an open position at the same time, said interlock system comprising:

a) at least one vertical support member (3) having a trough (11) running along its longitudinal axis;

b) a channel (30) disposed within said trough, said channel being partially filled with a plurality of movable components (31) retained in axial alignment with and by said channel;

c) for each of said storage elements, a cam (25) movably mounted on said slide means (21) proximate to said channel (30), said cam (25) having an insert portion (45) disposed within said vertical support member (3) and in alignment with said channel (30), said insert portion (45) being actuated by said retaining means into entering said channel when said storage element is placed in an open position and withdrawing from said channel when said storage element is placed in a closed position; each insert portion (45) of each of said storage elements being of uniform size each sufficient in size so that when any one of said storage elements is placed in the open position, its insert portion (45) substantially fills said channel (30) so that none of the remaining inserts (45) can subsequently enter it, effectively blocking the remaining storage elements from being placed in an open position until the opened storage element is returned to the closed position and its respective insert is thereby removed from the channel.

5. A structure according to claim 4, characterised in that the movable components are spheres (31) of uniform size.

6. A structure according to claim 5, characterised in that said spheres (31) are made of a plastics material.

7. An interlock system according to claim 1, characterised in that the storage elements (15) are irregularly spaced.

8. An interlock system according to claim 1, characterised in that each of said vertical support members, slide means, channels, and cams is prefabricated for custom design and assembly.

FIG.1.

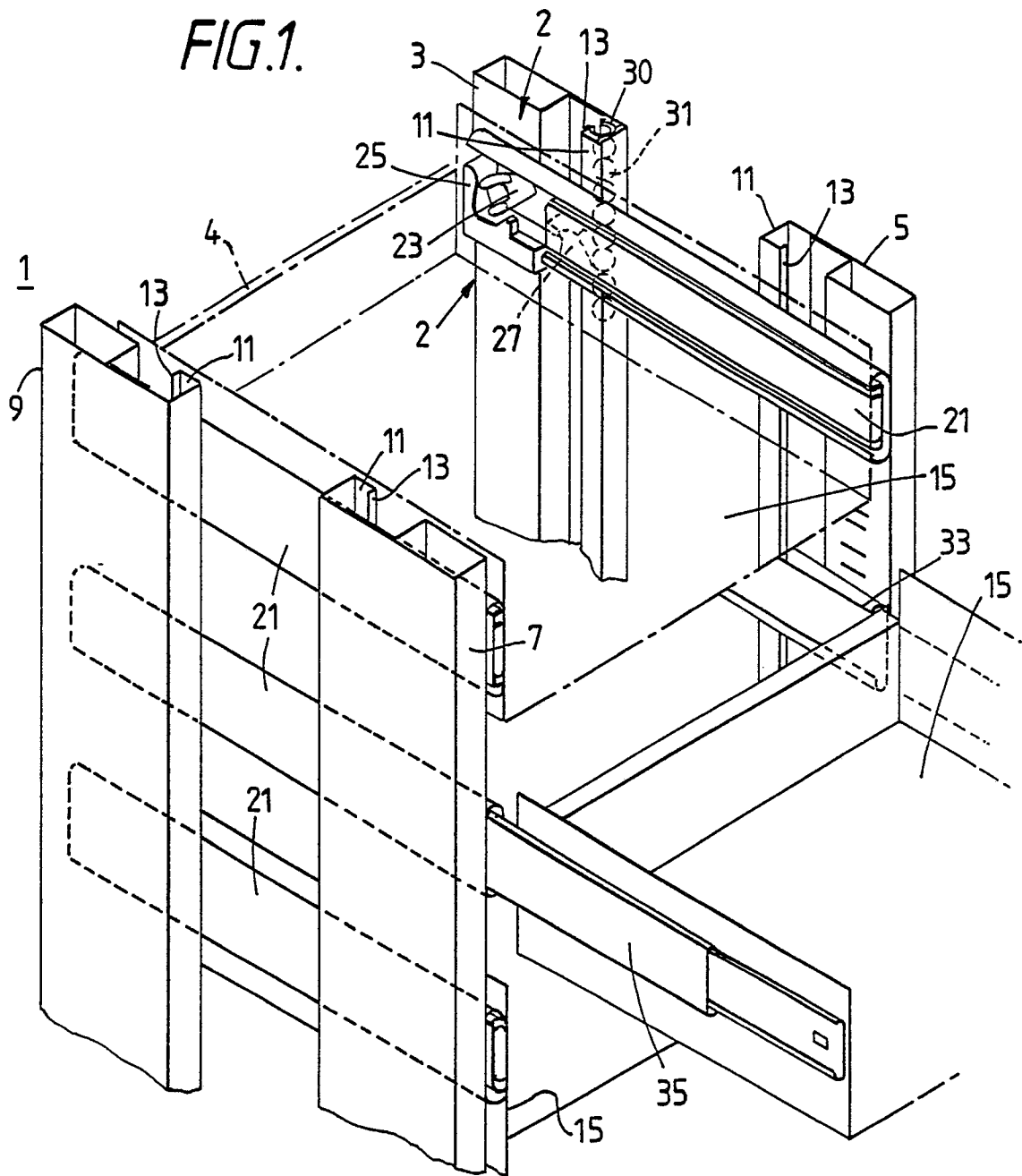


FIG. 2.

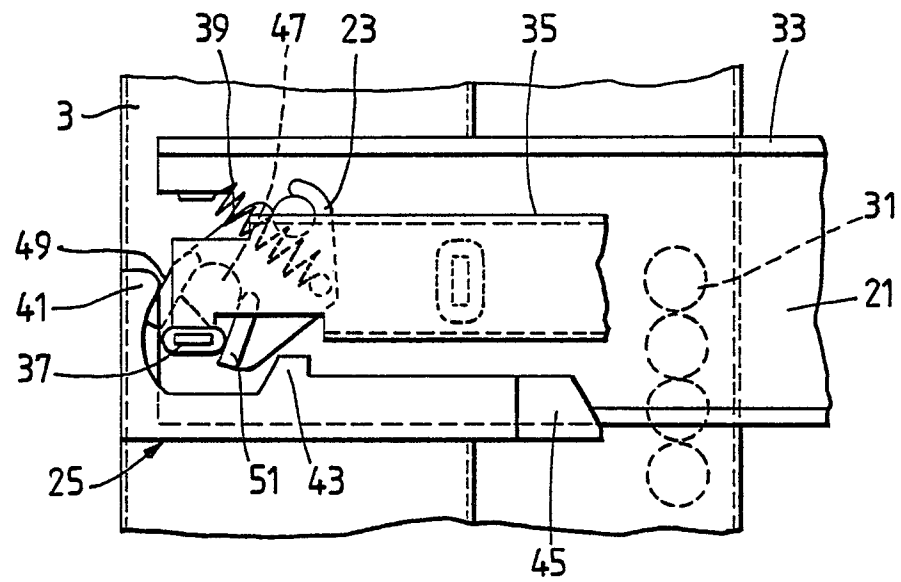


FIG. 3.

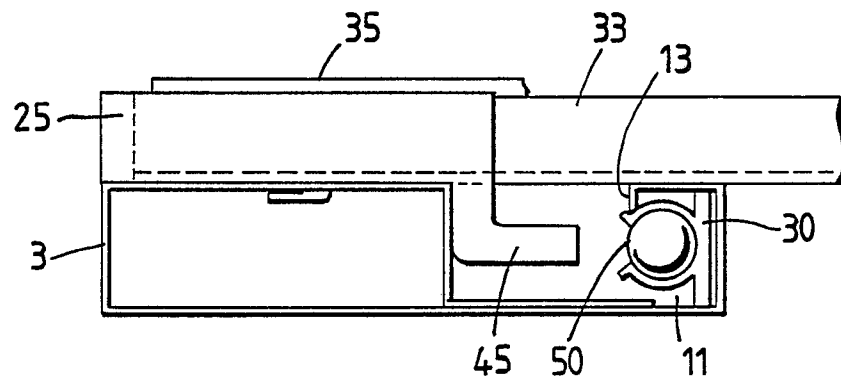


FIG.4.

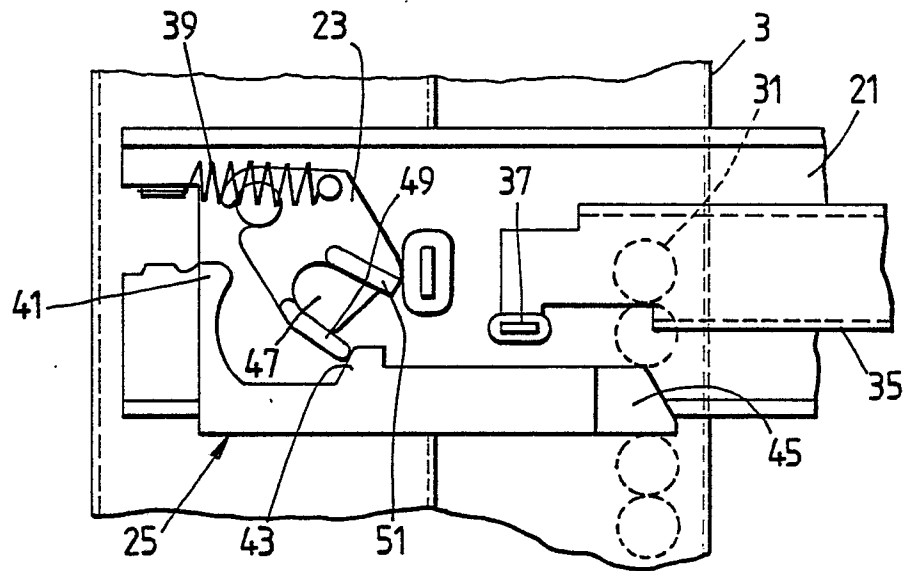
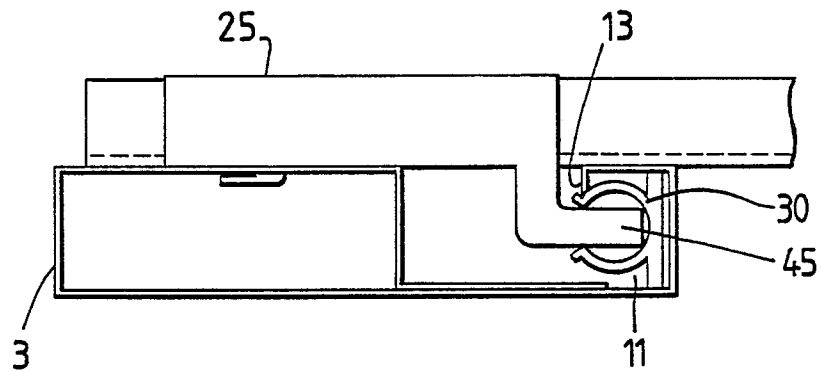


FIG.5.





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 87 31 1395

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. 4)
X	NL-A-7 604 359 (WERKVOORZIENING PARTICULIERE MIJNEN) * Whole document * -----	1-8	E 05 B 65/46
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			E 05 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20-07-1988	Examiner VAN BOGAERT J.A.M.M.
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			