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EUROPEAN PATENT APPLICATION

Application number: 87307076.7

Int. Cl.4: **E05B 37/16**

Date of filing: **10.08.87**

The title of the invention has been amended
(Guidelines for Examination in the EPO, A-III,
7.3).

Priority: **31.07.87 US 80070**

Date of publication of application:
01.02.89 Bulletin 89/05

Designated Contracting States:
BE CH DE ES FR GB IT LI NL SE

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EP 0 301 143 A1

Child-resistant cabinet lock.

This is a continuation-in-part of United States Patent Application Serial No. 06/800,549, filed November 21, 1985.

The present invention provides a child resistant lock for a door drawer or the like. The lock comprises a base which is secured to the inside face of

the door drawer or the like. A primary finger push mechanism is positioned to be manipulable by an adult's middle finger and is movably connected to the base. A pair of secondary finger push mechanisms are movably secured to the base and are located on either side of the primary finger push

mechanism. The secondary finger push mechanisms are manipulably operable by the index and third fingers of an adult. The lock also has obstruction means which are normally positioned in locking position to prevent manipulation of the secondary finger push mechanisms and are movably associated with the primary finger push mechanism so as to be movable upon manipulation of the primary finger push mechanism away from locking position to free the secondary finger push mechanisms for manipulation. Catch means are operatively associated with the secondary finger push mechanisms to be moved, on manipulation of the secondary finger push mechanisms, away from a rest position obstructing the opening of the door drawer or the like. The primary and secondary finger push mechanisms are arranged for manipulation by a single directional thrust of the adult operator's hand. The lock provides sequential operation of its parts and is engineered to be operable by a hand the size of an adult's, hereby preventing most young children from operating it.

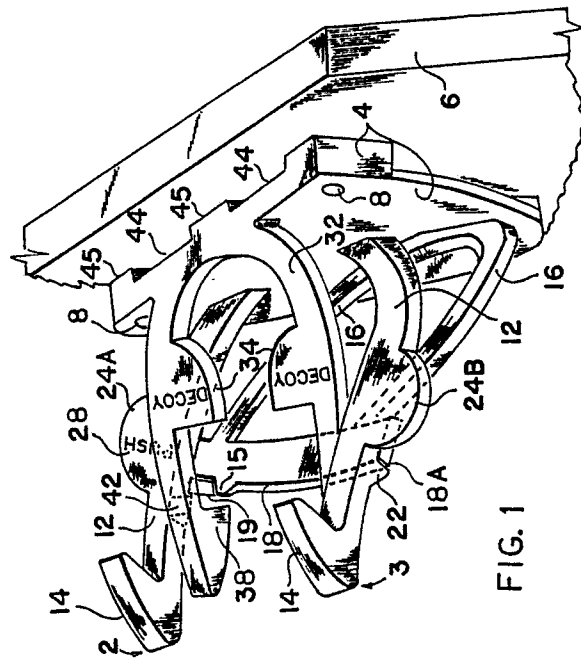


FIG. 1

Child Resistant Cabinet Lock Combination Finger Lock

BACKGROUND OF THE INVENTION

The present invention relates to a child resistant lock, and more particularly to such a lock which requires more than one step reasoning for its operation (i.e. it is not immediately obvious as to how it works). As well, the lock in accordance with the present invention relies on the difference in hand sizes between an adult and a child to prevent most children from simply imitating the parent to operate it.

The need for child resistant locks, for example for cabinet doors, drawers and the like, where hazardous or poisonous compositions may be stored, has been long known. Many attempts to develop a foolproof child resistant lock have taken place previously.

Conventional child resistant locks, for example in Bailobreski U.S. Patent No. 4,416,477, Leck U.S. Patent No. 4,505,526 and Friedman U.S. Patent No. 3,889,992 require only one step reasoning by a child to operate them; children who are able to observe a parent opening such locks soon imitate effectively.

In testing done on such locks in eight daycare centres in Ottawa Canada in 1983-85, children were quick to figure out that the locking levers that extended from the door to underneath the cabinet frame on which such locks were fitted were the mechanisms which prevented the door from being opened. In comparative testing with 42 children, 77 percent of 3 year olds that had the lock open in front of them were able to open the Friedman or Leck type lock. 100% of the 4 year olds were able to open such lock, whether they were shown or not.

Today's children are surrounded by many toys which quickly develop their mechanical aptitude and their hand-eye coordination. In the tests in question, children were given an implement commonly found in the kitchen or workshop to see if their newly acquired mechanical skills would help them in opening the lock. Many of the children who previously could not open the lock by hand were successful with an implement.

It is thus an object of the present invention to provide a lock for drawers, doors or the like which will significantly restrict the ability of a child to unlock it. It is a further object of the present invention to develop or to provide such a lock which may be operated by one's hand, without any other special implements or keys, and which may be operated even by persons with reduced finger or wrist mobility, for example, by those suffering from arthritis in the finger or wrist joints; the lock also

requires no twisting or wrist bending. It is a further object of the present invention to provide such a lock mechanism which would resist the use of implements by children to operate them.

SUMMARY OF THE INVENTION

In accordance with the present invention there is provided a child resistant lock for a door drawer or the like. The lock comprises a base which is secured to the inside face of the door drawer or the like. A primary finger push mechanism is positioned to be manipulable by an adult's middle finger and is movably secured to the base. A pair of secondary finger push mechanisms are movably secured to the base and are located on either side of the primary finger push mechanism. The secondary finger push mechanisms are manipulably operable by the index and third fingers of an adult. The lock also has obstruction means which are normally positioned in locking position to prevent manipulation of the secondary finger push mechanisms and are movably associated with the primary finger push mechanism so as to be movable upon manipulation of the primary finger push mechanism away from locking position to free the secondary finger push mechanisms for manipulation. Catch means are operatively associated with the secondary finger push mechanisms to be moved, on manipulation of the secondary finger push mechanisms, away from a rest position obstructing the opening of the door drawer or the like. The primary and secondary finger push mechanisms are arranged for manipulation by a single directional thrust of the adult operator's hand.

In a preferred embodiment of the present invention the primary finger push mechanism comprises an elongated finger push surface secured to the base in pivotal fashion to move between rest position and unlock position. The elongated finger push surface has biasing means urging it towards rest position. The ends of the finger push surface constitute the obstruction means.

In yet an alternative preferred embodiment according to the present invention, the base comprises three aligned finger-receiving channels which open to the front of the door drawer or the like. The primary finger push mechanism comprises a movable bearing surface positioned at the end of the middle channel. A means is provided so as to cause movement of the bearing surface when the middle finger of an adult is inserted in this channel. The bearing surface is operatively associated with the obstruction means so that move-

ment of the bearing surface causes the obstruction means to move away from blocking position. finger

In still a further alternative preferred embodiment, the primary finger push mechanism comprises a finger push button mounted on a post for depression by the user's middle finger. The post has an angled cam surface. The secondary finger push mechanisms comprise a pair of finger push buttons mounted on posts for depression by the user's index and third fingers in a direction parallel to that of the finger press button of the primary finger push mechanism. The depression of these latter buttons is normally obstructed by a bar movable in a direction normal to the direction of movement of the posts. The bar has a slot through which the post of the primary finger push mechanism extends. The cam surface of the post moves the bar sideways to free the posts of the secondary finger push mechanisms for unobstructive depression.

The various embodiments of the lock of the present invention have several elements in common:

(1) they operate on the principle of the combined difference in length of the middle finger and index and third fingers;

(2) more than one step is required to unlock them; and

(3) their construction in many cases permits the implementation of decoy mechanisms which will, if actuated by a child, cause the lock to seize and be inoperable until the decoy mechanism is forcibly readjusted, normally by an adult.

The lock of the present invention has proven to be considerably more effective than conventional locks of the aforementioned type. In testing with 44 children which was carried out using the lock of the present invention, it has been determined that only 5% of 3 year olds and 13% of 4 year olds tested were able to open the lock according to the present invention. The few children who were successful in opening the lock according to the present invention did so, in the main by pushing everything with both hands until, through this investigation, they figured out how it worked. A smaller number of children were big enough and strong enough to imitate the instructor.

As will be described in more detail hereinafter when decoy mechanisms were included in the lock in accordance with the present invention in a way which would make the decoy mechanisms relatively prominent features of the locks a probing child would invariably activate such decoy mechanisms first. The decoy mechanisms when activated would immobilize the lock mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of the invention will become apparent upon reading the following detailed description and upon referring to the drawings in which:

FIGURE 1 is a perspective view of an example embodiment of the lock of the present invention attached to the inside of a door;

FIGURE 2 is a partial perspective view of an example embodiment of a catch, used in conjunction with the lock of FIGURE 1;

FIGURE 3 is a perspective view of an alternative embodiment of the lock according to the present invention, to be attached to a door or drawer, and shown in its rest or normal position;

FIGURE 4 is a perspective view of a section of FIGURE 3, showing the lock in an unlocked position;

FIGURE 5 is a perspective view of another preferred embodiment of the lock according to the present invention set into the face of a pair of doors;

FIGURE 6 is a detail enlarged perspective view of the lock of FIGURE 5 according to the present invention;

FIGURE 7 is a section view of the lock of FIGURE 6 along line VII-VII; and

FIGURE 8 is a perspective view of a catch to be used in conjunction with the lock of FIGURE 6 in accordance with the present invention.

While the invention will be described in conjunction with example embodiments, it will be understood that it is not intended to limit the invention to such embodiments. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE PRESENT INVENTION

In the drawings similar features have been given similar reference numerals.

Turning to FIGURES 1 and 2, there is shown a first embodiment of the present invention in which the base 4 of the lock is attached to a door 6 with screws through holes 8. Ribs 45 and grooves 44 on the one side of base 4 allow one to place this base over top of screw heads which may protrude from the inside face of the door. Such screws for example usually attach a door handle to the door.

Flexible catch interlocking levers 12, with hooks 14 at their ends protrude upwardly and inwardly from the bottom of the base 4 and are flexibly pivotable with respect thereto. They rigidly

interconnect with the bar 18. The ends 18A of the bar interconnect with stop 22 which is part of the hooked levers.

Blocking levers 16, the ends 18A of the bar 18 and the stop 22 prevent the hooked levers 12 from being lowered when the hooked levers 12 or their associated pads 24A and 24B are being pushed by a curious child. However if an adult presses bar 18 first with the longer middle fingers, the ends of the bar 18A disengage, that is they swing lower with respect to the stop 22, thus allowing the adult to depress pads 24A and 24B with the middle and third fingers. This action lowers the hooked levers 12 and disengages them from the catch 29 (Figure 2) on the cabinet frame. The adult can now open the door. The pads 24A and 24B are set to one side of the locking levers 12 so that women with long finger nails are able to operate the levers 12 without having the levers 12 press against their finger nails.

To facilitate closing the door without manipulating the lock, stops 22 have been placed a distance from the end of the hooks allowing the end portion of the hooked levers 12 to flex downwards when the hooks hit the catch when the door is closed. To reduce impact stresses, on the hooked levers 12 and the screws which hold base 4 on to the door 6 when the door is pulled open or closed forcefully, the hooked levers 12 are curved downwards and the blocking levers 16 are curved upwards.

Lettering 28 can be printed on the pads and the bar as illustrated so as to indicate to adults how to operate the lock.

Flexible pivotable decoy levers 32 protrude from the top of the base 4. When a curious child presses on the pads 34 associated with decoy levers 32, the decoy levers swing lower and are forced sideways towards each other by the angled stops i.e. "remove" 42, which are attached to the hooked levers 12; being flexible when they clear stops 42 below these stops, the decoy levers 32 spring back sideways and remain lodged underneath the angled stops 42. When the decoy lever 32 is in this lowered position, the decoy block 38 blocks the protrusion 15 on the bar 18 from moving outwards and therefore stops bar 18 from being moved downwards and from disengaging from the hooked levers 12. The decoy block 38 also sits in front of stops 19 which are attached to the hooked levers 12 and prevents the hooked levers 12 from being lowered.

When buttons or pads 34 have been depressed, in order to disengage the decoy levers 32 and the decoy blocks 38 from the stop 15 and 19 and return them to starting position, decoy levers 32 must be squeezed together by the index finger and the thumb. Buttons 34 are at a more convenient width apart for young children.

Although not shown in the drawings rigid hooked implement stops, to prevent a child from using implements such as kitchen utensils or the like to pry open the lock can be attached to the base 4. These hooked implement stops would protrude outward by a distance slightly shorter than the decoy levers 32 and in close proximity to the catch interlocking levers 12. They would be attached to the lock so as to prevent children from opening the lock with the use of implements. Such implement stops could also be incorporated as part of the decoy levers; for example a channel could be made in the decoy levers so as to catch implements jacked into the lock

FIGURE 2 illustrates a catch 20 which is attached to the cabinet frame and to which the hooks 14 of levers 12 interconnect to normally prevent opening of the cabinet door. In the orientation illustrated catch 20 is comprised of inverted hooks 21 and 23 which are spaced such a distance apart as to have points 25 and 27 wider apart than the outer edges of the hooks 14 of the lock (FIGURE 1). The inverted hooks 21 and 23 are also horizontally angled, whether straight or curved, from the center of the catch outwards they extend further into the cupboard. This and the sideways location of the installation of the catch 20 allows for both hooks on the lock to mate with the catch at different angles when the door is slightly opened. This is needed to accommodate different door widths causing different angles of contact. The horizontally and vertically angled nature of the inverted hooks 1 and 23 reduces the impact stresses on the lock and on the screws which hold the base 4 to the door 6 when the door is forcibly pulled.

In the embodiment of FIGURES 3 and 4 the embodiment of hooks 14 similarly interlock with a catch (not shown) which is attached to the cabinet frame to prevent the door from being opened. Vertical posts 80 and lateral bars 81 rigidly interconnect hooks 14 to buttons 84A and 84B.

Hooked protrusions 85A and 85B will lodge securely into holes 86A and 86B if buttons 84A and or 84B are pressed by a curious child. All the buttons 84A, 84B, 82 and 90 have springs similar to spring 89 so as to maintain the buttons in an upright position. When the buttons 99 are pulled on the left or pushed on the right they will move the slide stop 87 to the left and as such release the hooked protrusions 85A and 85B from the holes 86A and 86B.

If a curious child presses decoy buttons 82, stops 83 will lodge against edge 49 of sliding stop 87 and will prevent it from moving to the right far enough so as to allow posts 85A and 85B from being lowered to a point where hooks 14, which interconnect with them, lower also and clear the catch on the cabinet frame. Decoy button 82 could

have attached to it a protrusion and hooked end similar to that of 85A and react in a similar manner with the sliding stop as does 85A and 85B.

Decoy buttons 82 are illustrative of decoy arrangements which more generally, may be incorporated in child resistant locks. Such a decoy, if actuated by a child before the proper sequence of lock unlocking steps has been carried out, will cause the lock to remain in locked position and prevent the door or drawer from opening.

In the embodiment of FIGURES 3 and 4, if button 90 is pressed first its angled slide cam surface 91, shown in FIGURE 4 will move edge 96 of the slide stop 87 far enough to the right to allow 85A and 85B to be lowered to a point where hooks 14, Figure 3, clear the catch on the cabinet frame.

In the embodiment of the present invention illustrated in FIGURES 5, 6 and 7, openings 52A and 52B allow the insertion of an adult's third and index fingers; into opening 53 one can insert one's middle finger. In FIGURE 6 these openings are connected to slots, curved to direct one's fingers and to conceal an operating mechanism within, with curved faces 55A, 55B, 55C and 57. It is preferred that these channels be curved sharply enough to prevent the actuation of the finger push mechanism with the insertion therein of a rigid, non-curved implement and openly enough so as to guide one's fingers to those mechanisms. The curved channels allow a person with poor manual dexterity (for example one suffering from arthritis or partial paralysis of the hand) to have his fingers guided to the operating pads 78 and 58. As well, this lock design allows one to unlock the door, or drawer without first opening the door and then reaching behind it to operate the lock.

When one inserts one's (adult) fingers into the slots, the middle finger being longer, will go under flexible bar 76 and come into contact with operating pads 58 of the flexible bar 76. As the middle finger continues up the slot, flexible bar 76 bends and operating pad 58 moves away from the curved face 55C. Stop 62, which is rigidly connected to flexible bar 76 also moves in the same direction as sloped end 58, that is away from the flexible hooked posts 56. This allows flexible hooked posts 56 to move inwards when the index and third fingers push against operating pads 78. This action pushes operating pads 78 and flexible hooked posts 56, as well as catch interlocking means-hooks 54 together. When hooks 54 are pushed together, they can pass through hole 72 between catch 74, as shown in FIGURE 7, thus allowing the door to be opened.

Openings 52A and 52B are preferably wide enough to allow the entry of the third and fourth fingers together.

It will be understood from the foregoing de-

scription of preferred embodiments of the lock according to the present invention that such locks are extremely difficult for children to open because the locks have been designed to take into account the combined differences in the length of the adult middle finger and the adult index and third fingers, as well as the difference in average length and width apart between these fingers of an adult's hand and those of a child's hand. As well a sequence of finger actions arising from the difference in length of the adult middle finger and the adult index and third fingers is built into the construction and operation of such locks. This sequence takes into account the different mental abilities between an adult, on the one hand and a young child who is intended to be deprived entry to the locked cabinet or drawer, on the other. This includes the adult's mental ability to read and understand instructions and the adult's, ability in problem solving. Despite the apparent complexity of the lock mechanisms however, they are intended to be operated by a single adult hand movement and, unlike many prior art lock mechanisms, do not require actual flexing of one's one fingers or wrist to cause them to operate for most adults and a comparatively slight flexing for the rest. Obviously, for elderly person and those with impaired hand, wrist and finger motion, who would additionally wish to operate the lock according to the present invention, this is an important advantage of this invention.

Thus it is apparent that there has been provided a lock in accordance with the invention that fully satisfies the objects, aims and advantages set forth above. While the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, it is intended to embrace all such alternatives, modifications and variations as fall within the spirit and broad scope of the invention.

Claims

1. A child resistant lock for a door drawer or the like, the lock comprising:

(a) a base to be secured to the inside face of the door drawer or the like;

(b) a primary finger push mechanism positioned to be manipulable by an adult's middle finger and movably connected to the base;

(c) a pair of secondary finger push mechanisms movably connected to the base and located on either side of the primary finger push mechanism, the secondary finger push mechanism being manipulably operable by the index and third fingers of an adult;

(d) obstruction means normally positioned in locking position to prevent manipulation of the secondary finger push mechanisms and movably associated with the primary finger push mechanisms so as to be movable upon manipulation of the primary finger push mechanism away from locking position to free the secondary finger push mechanisms for manipulation; and

(e) catch means operatively associated with the secondary finger push mechanisms to be moved, on manipulation of the secondary finger push mechanisms, away from a rest position obstructing the opening of the door drawer or the like, the primary and secondary finger push mechanisms being arranged for manipulation by a single directional thrust of the adult operators hand.

2. A lock according to claim 1 further comprising biasing means mechanically associated with the obstruction means to return the obstruction means to blocking position after being moved.

3. A mechanism according to claim 1 wherein there are further provided with biasing means to urge the catch means to rest position when the catch means is moved.

4. A lock according to claim 3 wherein the primary finger push mechanism comprises an elongated finger push surface secured by an arm to the base in pivotal fashion to move between rest position and unlock position, and having biasing means urging it towards rest position, the end or ends of the finger push surface constituting the obstruction means.

5. A lock according to claim 4 wherein the pair of secondary finger push mechanisms comprise a pair of arms secured to the base in pivotal fashion, the catch means comprising obstruction surfaces secured to the free ends of the arms to bear against a catch or a frame of the door drawer or the like to prevent its opening when in rest position, the end or ends of the primary finger push surface when in blocking position bearing against the arms of the secondary finger push mechanisms to prevent manipulation thereof.

6. A lock according to claim 5 where the arms of the primary and secondary push mechanisms have a continuous curve along most of their length.

7. A lock according to claim 5 wherein there are pads attached to the sides of the arms of the secondary push mechanisms sufficiently wide enough to allow long finger nails of a user to protrude unobstructed during operation.

8. A lock according to claim 4 further comprising an elongated finger push surface secured to the base in pivotable fashion to act as a decoy finger push mechanism and movable between rest position and lock position, this finger push surface

when moved to lock position obstructing manipulation of the primary and secondary finger push mechanisms to prevent unlocking of the lock.

9. A lock according to claim 1 in combination with a frame mountable catch having, when mounted horizontally on the frame, horizontally and vertically angled wide hooks to co-operate with the catch means.

10. A lock according to claim 9 wherein the catch has two oppositely horizontally angled wide hooks whose outside edges are wider apart than the outer edges of the catch means on the lock.

11. A lock according to claim 3 wherein the primary finger push mechanism comprises a finger push button mounted on a post for depression by the user's middle finger, the post having an angled cam surface, and the secondary finger push mechanisms comprise a pair of finger push buttons mounted on posts for depression by the user's fingers in a direction parallel to that of the finger press button of the primary finger push mechanism the depression of these latter buttons being normally obstructed by a bar movable in a direction normal to the direction of movement of the posts and having a slotthrough which the post of the primary finger push mechanism extends, the cam surface of said post to move the bar sideways to free the posts of the secondary finger push mechanism for unobstructed depression.

12. A lock according to claim 11 wherein the posts for the secondary finger push buttons have hooked attachments connected thereto to engage the sliding bar and prevent its further movement when the secondary push buttons are depressed before the primary push button.

13. A lock according to claim 11 further provided with a decoy finger press button mounted on a post for depression in a direction parallel to that of the other posts, the decoy finger press button being provided with lock means which becomes activated upon depression of the decoy finger press button to immobilize the bar against sideways movement and thereby prevent the posts of the secondary finger press buttons from being depressed.

14. A lock according to claim 3 wherein the base comprises a housing within which is located the finger push mechanisms, having three aligned finger-receiving channels to open to the front of the door drawer or the like and curved to direct the operator's fingers and to conceal the finger push mechanisms.

15. A lock according to claim 14 wherein the primary finger push mechanism comprises a movable bearing surface positioned at the end of the middle channel and wherein a means is provided so as to cause movement of the bearing surface when the middle finger of an adult is inserted in

this channel, the bearing surface operatively associated with the obstruction means so that movement of the bearing surface causes the obstruction means to move away from blocking position.

16. A lock according to claim 14 wherein the secondary finger push mechanisms comprise movable bearing surfaces positioned at the ends of the outer channels, these movable bearing surfaces to be moved by contact with the user's index and third fingers when inserted in the channels. 5 10

17. A lock according to claim 15 wherein the channels are curved sharply enough to prevent the actuation of the finger push mechanism with the insertion of a rigid non-curved implement, and gently enough so as to guide the fingers to push mechanisms. 15

18. A lock according to claim 1 wherein the base comprises a housing enclosing portions of the movable elements of the lock other than finger push surfaces which are attached to the finger push mechanisms. 20

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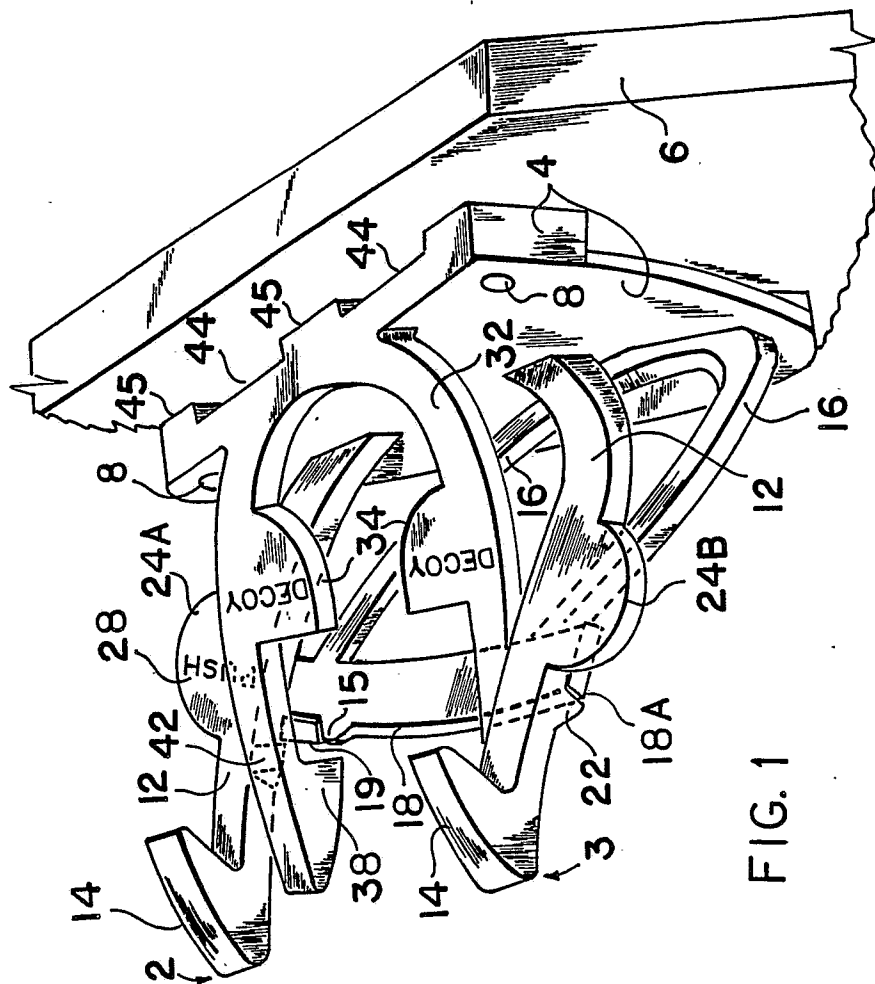


FIG. 1

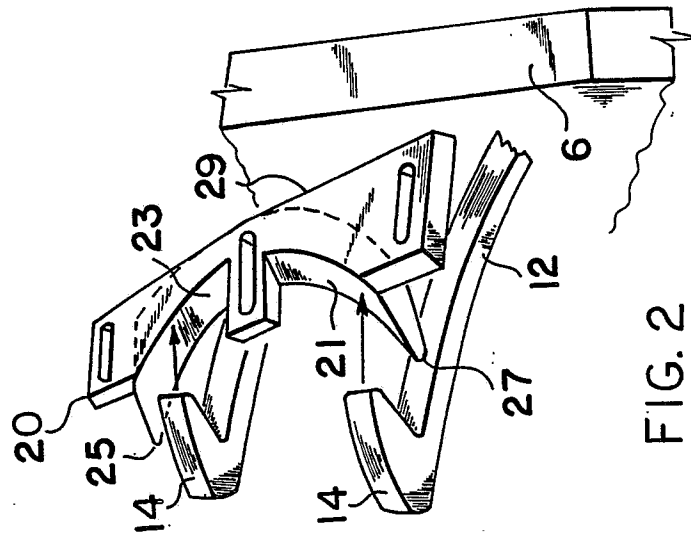
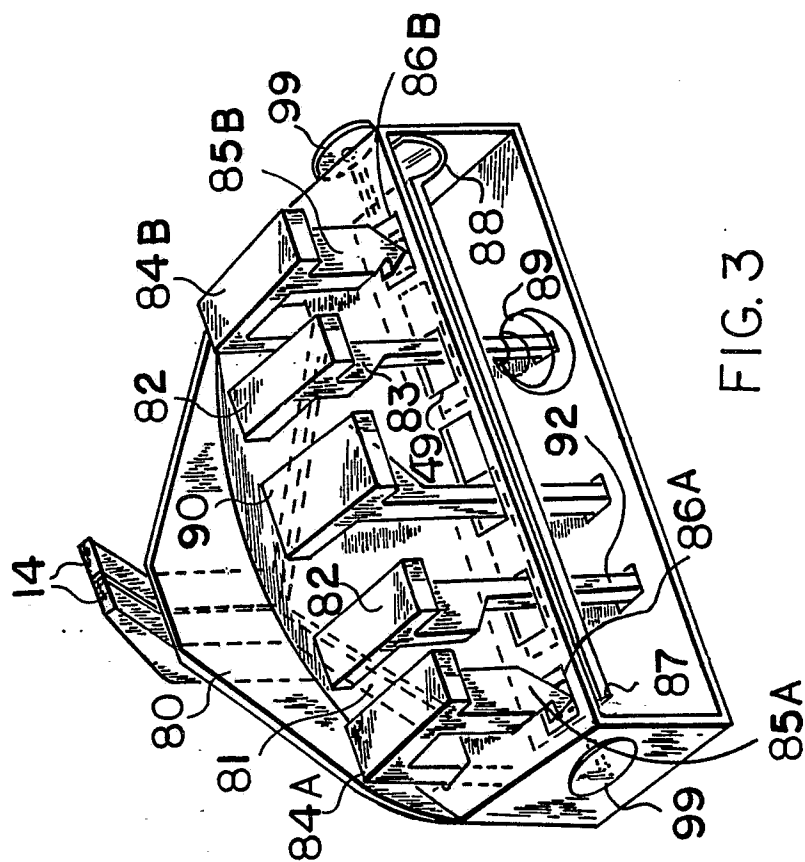
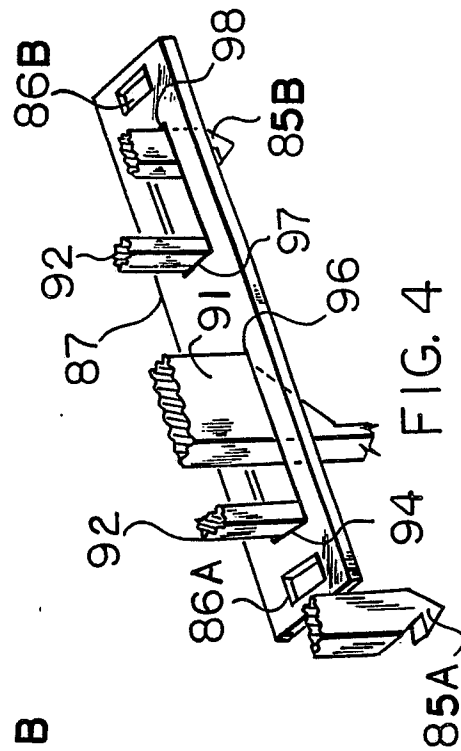


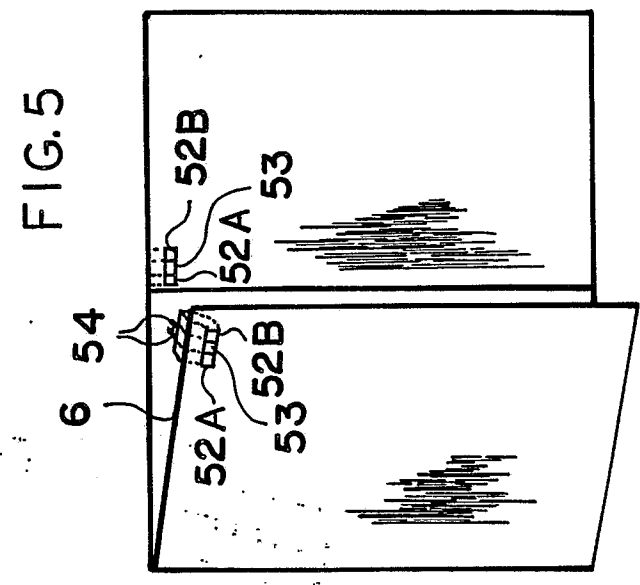
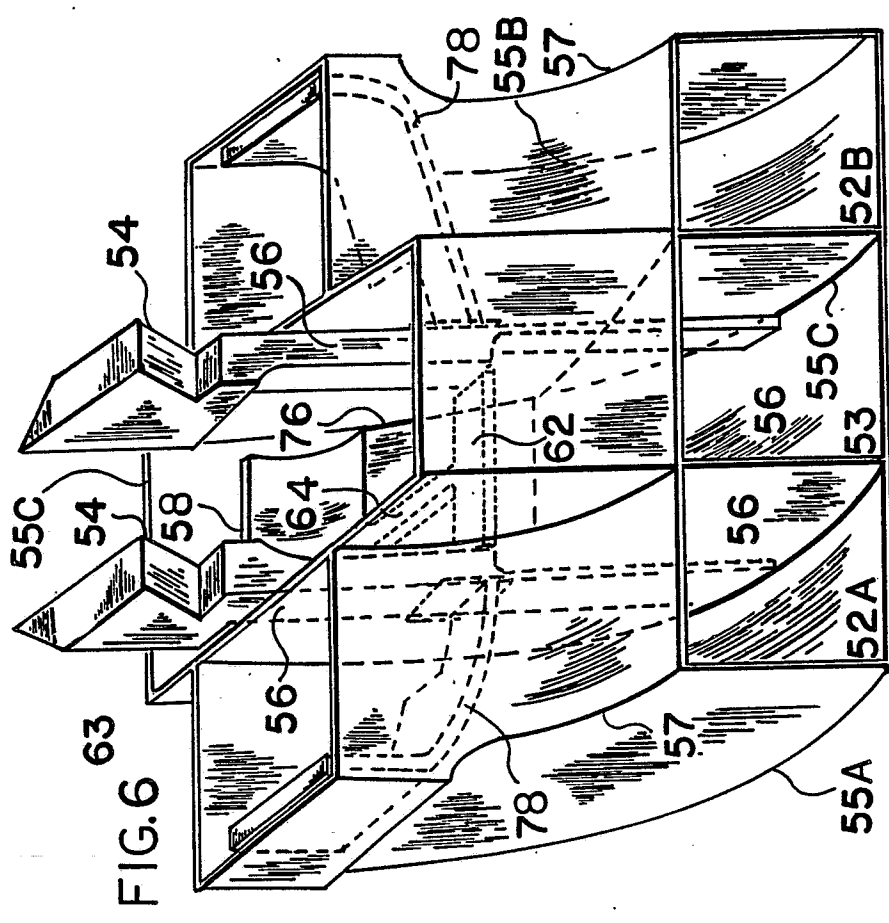
FIG. 2



மெ



4/G/F



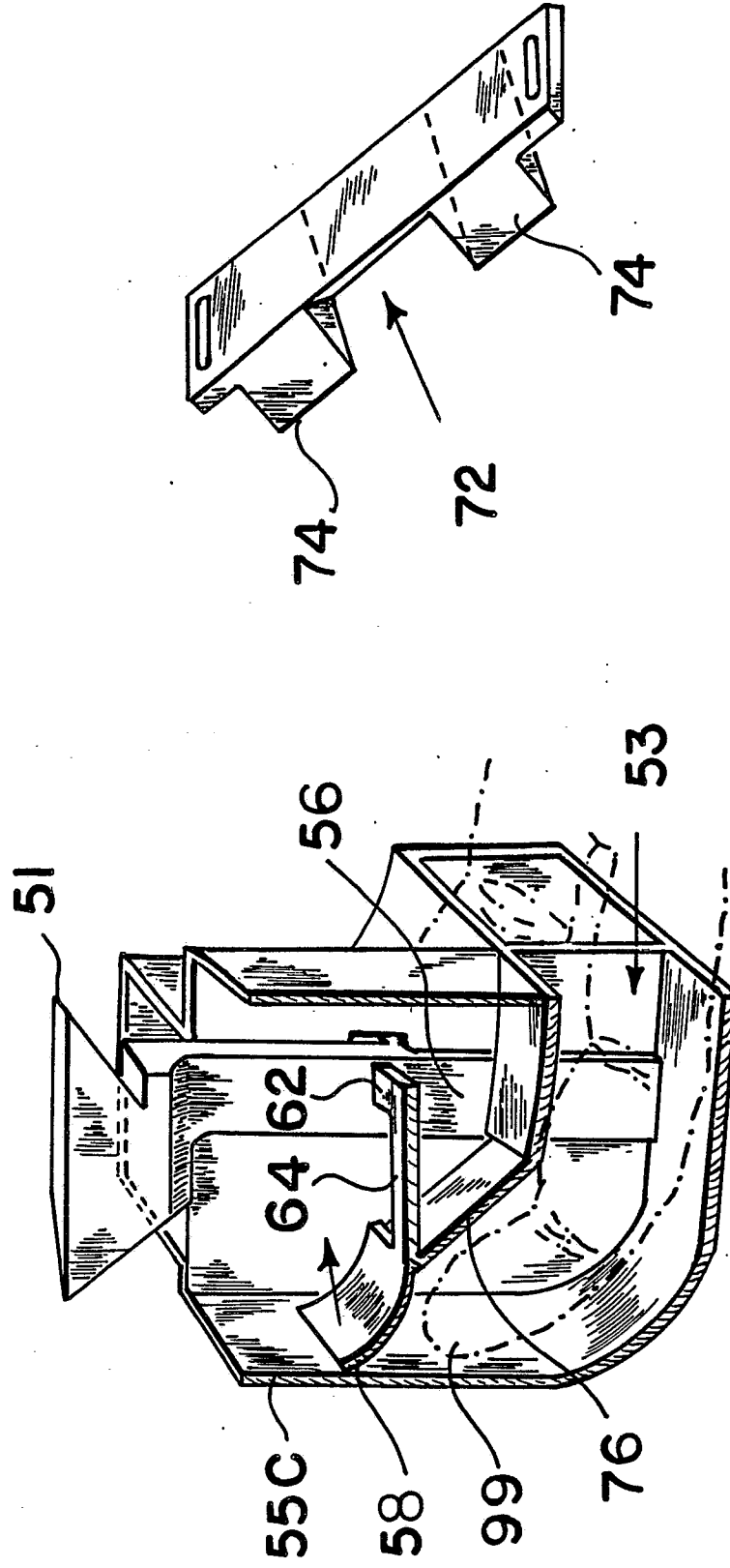


FIG. 8

FIG. 7



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)
A	US-A-4 378 948 (CHRONES) ---		E 05 B 37/16
A	US-A-4 416 477 (BIALOBRZESKI) ---		E 05 C 19/06
A	US-A-3 027 743 (MONAHAN) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			E 05 B E 05 C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20-04-1988	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			