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(12) # EUROPEAN PATENT APPLICATION

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(71) Applicant: **COMPAGNIE DE SIGNAUX ET D'ENTREPRISES ELECTRIQUES**
17, place Etienne-Pernet
F-75738 Paris Cedex 15(FR)

(72) Inventor: **Le Hong, Son**
5, rue de Chevreuse
F-91120 Villebon Sur Yvette(FR)
Inventor: **Martin, Henri**
19, rue Pasteur
F-63140 Chatel Guyon(FR)

(74) Representative: **Chameroy, Claude et al**
c/o Cabinet Malemont 42, avenue du Président Wilson
F-75116 Paris(FR)

(54) **An automatic toll collecting device and a cash box for the same.**

(57) A toll-collecting device (10) is provided with a removable, lockable cash box (14). The cash box (14) has an access hole for collecting coins which opens as the box (14) is inserted into the device, and closes after the box (14) has been removed. After the box (14) has been removed its access hole cannot be re-opened until its door mechanism is reset.

EP 0 201 427 A2

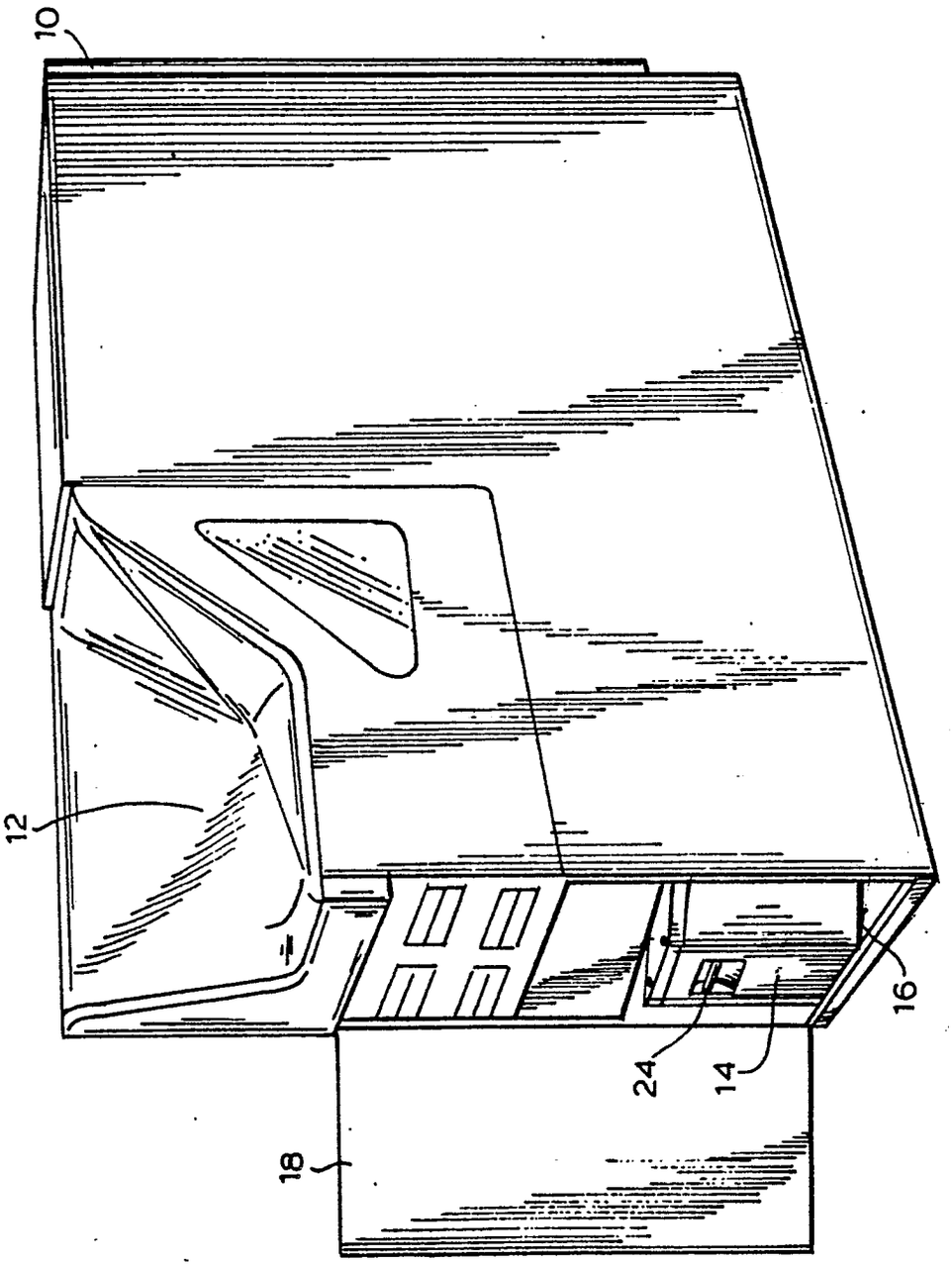


FIG.1

AN AUTOMATIC TOLL COLLECTING DEVICE AND A CASH BOX FOR THE SAME

BACKGROUND OF THE INVENTION

1. Field of Invention

This invention pertains to automatic toll collecting or similar devices and more particularly, to devices having a cash box which after removal, is completely locked and tamper-proof.

2. Background of the Invention

Devices for collecting tolls and similar coin or token-operated devices or turnstiles are usually provided with a cash box. A cash box or strong box usually comprises a locked box with an access door used for collecting said coins or tokens. After a box is filled up, it is removed from the toll collecting box and taken to a collecting station, while an empty box is placed in the toll collecting device. At the collecting station, the box is opened and its contents are transferred into a coin-counting device.

Usually the cash boxes are made large enough to contain coins collected over several hours. In addition, they must be tamper proof so that only authorized personnel can open them.

OBJECTIVES AND SUMMARY OF THE INVENTION

A primary objective of the present invention is to provide a collecting device with a removal cash box which may be safely removed and transported without fear that its contents may be accessed by unauthorized persons.

A further objective is to provide a strong cash box capable of resisting non-perceived physical abuse.

Yet another objective is to provide a cash box shaped to insure an efficient use of its interior space.

Other objectives and advantages of the invention shall become apparent from the following description.

According to the present invention, a cash box comprises two matting parts which may be locked by suitable locking means to form an integral, substantially featureless unit. The toll collecting device associated with the cash box is arranged and constructed to house the cash box. The cash box is provided with a closed access door which is automatically opened as the box is inserted into the toll collecting device. The access door is constructed and arranged to latch automatically after the cash box is removed from the toll collecting device, and to open only after its latching mechanism has been reset by opening the cover by using an authorized key.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 illustrates a toll collecting device with a cash box constructed in accordance with this invention;

Figure 2 shows an isometric view of the cash box constructed in accordance with the invention;

Figure 3 shows several stacked cash boxes of the type illustrated in Figure 2;

Figure 4 shows an enlarged view of the cash box of Figure 2;

Figure 5a shows a cross-sectional view taken along line 5-5 in Figure 4;

Figure 5b shows optional alignment pins provided for the cash box;

Figure 6 shows the cash box of Figure 4 in an open position;

Figure 7 shows how prior art cash boxes fill up with coins;

Figure 8 shows how the cash box of Figure 5 fills up with coins;

Figure 9 shows details of the locking mechanism for the cash box of Figure 4;

Figure 10 shows the cash box being engaged by the toll collecting device of Figure 1;

Figure 11 shows further details of the engagement between the box and the toll collecting device of Figure 1;

Figure 12 shows the elements of the door mechanism of the cash box of Figure 4;

Figure 13 shows the strong box with the door mechanism initially closed;

Figure 14 shows the position of the door pin for Figure 13;

Figure 15 shows the cash box of Figure 4 with its door mechanism open;

Figure 16 shows the position of the door pin for the open door mechanism of Figure 15;

Figure 17 shows the cash box of Figure 4 with its door mechanism in the latched position;

Figure 18 shows the door pin for the door mechanism of Figure 17;

Figure 19 shows a hinge for the cash box of Figure 4;

Figure 20 shows a perspective view of another embodiment of the invention; and

Figure 21 shows how the cash box of Figure 20 fills up with coins

DETAILED DESCRIPTION OF THE INVENTION

This device can be used in several applications including, but not limited to, toll roads, parking lots, garages, etc.

A vehicle toll collecting device 10 is shown in Figure 1. The device is normally adjacent to individual traffic lanes and is provided with a hopper 12 for depositing tokens, coins

and the like. After these deposited items are checked for authenticity and counted they are fed into a removable cash box 14. As shown in Figure 1, cash box 14 is normally housed within a cavity 16 of device 10, behind a normally closed and locked access door 18.

Details of the cash box 14 are shown in Figures 2 and 4. The box has a preferably rectangular shape with a flat top surface 20 so that a plurality of such boxes may be stacked on top of each other as shown in Figure 3. The box has two cavities at its ends, such as at 22, for housing a horizontal handle 24. Handle 24 is used to manipulate the box into and out of device 10. Furthermore, when the box is positioned within the cavity 16 (Figure 1), the handle (not shown) at inner box end 26 may be engaged by a hook or other similar means (not shown) located within device cavity 16, which may be electronically activated to release the handle. Thus box 14 may be removed from device 10 only when an appropriate releasing signal is generated, thereby further insuring that the cash box is not removed by unauthorized personnel.

Box 14 comprises two portions: a main portion 28 which is provided to hold the articles collected from the hopper and a top or cover portion 30 used to close bottom portion 28. The two portions 28 and 30 are hingedly connected by hidden hinges 32. On top surface 20 of portion 30 there is a shallow, generally rectangular depression 34 extending from box end 26 as shown. Within this depression there is a generally circular access hole 36 covered by a door 38. When the door 38 is in an open position, hole 36 is uncovered and allows access into the box 14. Within the depression 34, there is also a curved slot 40 which holds an operating knob 42. This knob extends upwards, but below the top suface 20 so as not to interfere with stacking of multiple cash boxes nor to cause injury to box handlers. Moving knob 42 in the direction 44 (see Figure 4) moves door 42 towards the open position, as shall be described more fully below. Portion 30 is also provided with a lock mechanism 46 which may be operated by a security key to lock said portion 30 to portion 28.

As can be seen in Figures 5a, 5b and 6, the cash box has a double-walled construction and is made of heavy gauged welded steel so that if it is locked, it is very difficult to open. Portion 28 is provided with an inner peripheral ledge 48 connecting its outer wall 50 to an inner vertical lip 52. Portion 30 rests on ledge 48 as shown.

The box 14 is provided with a plurality of support pins 54, and portion 30 has complementary holes 56 corresponding to pins 54 so that if several boxes are stacked the legs 54 engage holes 56 of the corresponding boxes thereby eliminating lateral movement therebetween during transportation. All pin positions and all hole positions may be, as a group, arbitrarily set into upper - (cover) portion or bottom portion 28.

The bottom surface 58 of portion 28 is provided with a plurality of bumps 60 extending into the interior space of the box as shown. These bumps are spaced at a distance smaller than the diameter of the articles collected through hole 36, and are provided to insure that when the box 14 is opened and turned over, none of the articles stick to said bottom surface 58. The box is also provided with a plurality of ventilation holes 62 to insure that the interior of the box remains relatively dry and to evacuate any water that may be present inside the box.

Portion 28 is also provided with one or more reinforcing rods 64 extending horizontally as shown in Figure 6a. Furthermore, portion 30 may also be provided with pins 65 shown in Figure 5b welded as at 67 and portion 28 could be formed with corresponding holes 69 for housing pins 65. The pins 65 and holes 69 also provides a means of avoiding box deformation, and or unauthorized access to box contents in the event the box falls or is dropped on its ends.

Prior art cash boxes were constructed so that their width exceeded their height. As a result, as shown in Figure 7, the articles collected within such prior art boxes tended to block the access hole 36 even if when the boxes werely only one third full. The present box is constructed so that its height exceeds its width thereby permitting a larger number of articles to be collected before blockage of access hole 36 occurs, as illustrated in Figure 8.

As can be seen in Figure 6, attached to lip 52, there is a vertically extending spring loaded pin 66 which is allowed to move axially. In Figure 6, pin 66 is shown in its maximum extended position.

Portion 30 is provided with an inner whole 68 adjacent to access hole 36 positioned so that as portion 30 is pivoted to close on portion 28, pin 66 enters through hole 68. The function of pin 66 and registering hole 68 shall be described below in conjunction with the operation of access door 38.

Lock mechanism 46 is mounted on the inner surface of portion 30 as shown in Figure 6. The lock mechanism is provided with a sliding tongue 70 operated by a security key in the normal manner. As best shown in Figure 9, the tongue 70 is adapted to engage a slot 72 formed in portion 28 thereby locking portion 28 to portion 30. Slot 72 is split into two sections by a wall 74. The two slot sections have a maximum width W which does not exceed the diameter of the collected articles. Thus, when the box is emptied, no articles can be stuck in slot 72. Tongue 70 is provided with a slit 76 to match wall 74 as shown.

Within device 10 there is a member 78 (shown in Figure 10) adapted to engage the cash box and open its access door 38. This engagement cannot occur if the access hole 36 is open. Member 78 is dimensioned so that as cash box 14 is inserted into cavity 16 of device 10, at least a portion of member 78 is positioned within depression 34 below the top surface 20 of the box. Member 78 is provided on its bottom surface 80 with a groove 82 having first and second straight portions 84 and 86. The straight portions are offset from each other and joined by an intermediate portion 88. The groove 82 is positioned so that as the box 14 is pushed into cavity 16, access door operating-knob is engaged by groove 82. Initially, in the position shown in Figure 10, access door 38 is closed over hole 36 and remains closed while knob 42 remains in portion 84 of groove 82. However, as box 14 is pushed further into the cavity 16, knob 42 (as shown in Figure 11) enters portion 88 of groove 82 and is gradually forced to move in slot 40 in the direction of arrow 44 thereby opening door 38. By the time knob 42 reaches groove portion 86, the door 38 is fully opened. When box 14 is removed, the whole process is reversed, automatically closing door 38. As a result, the box 14 cannot be removed if door 38 is opened. This greatly enhances box security against unauthorized tampering.

Preferably the top 20 of portion 30 is double walled so that the door 38 can be housed inside it. Details of the access door 38 are shown in Figure 12. The door comprises a plate 90 with a semicircular cut-out 92. The cut-out is provided to insure that when the door 38 is in its open position, it clears access hole 36. The plate is provided with a mounting pin 94 used to pivotally mount the door to portion 30. A second pin 96 is secured to plate 90 and is provided as an anchoring point for two coil springs 98 and 100. Pin 96 extends through plate 90 to form operating knob 42. A T-shaped member 102 is pivotally mounted on pin 94 on top of plate 90 as shown. A distal end of coil spring 98 is connected to T-shaped member 102 so that coild spring 98 urges said member 102 against stop 104. Similarly, distal end of coil spring 100 is secured to a stationery pin 106 which is positioned so that coil spring 100 urges the plate 90 towards its closed position. The access door 38 is arranged and positioned within portion 30 so that when the portion 30 is initially closed, pin 66 mounted on portion 28 enters through hole 68 (Figure 6) and is urged against the T-shaped member 102 as shown in Figure 12.

The access door 38 operates as follows. Prior to the insertion of box 14 into device 10, door 38 closes off hole 36 as shown in Figure 13. As previously mentioned, pin 66 is urged against T-shaped member 102 by spring 104 as shown in Figures 13 and 14. As box 14 is inserted into device 10, operating knob 42 is moved clockwise by groove 82 (as described above) within slot 40 pivoting plate 90 around pin 96 until hole 36 is completely opened as shown in Figure 15. In the open position, coins deposited in device 10 are fed by a hopper (not shown) through hole 36 into box 14. During the clockwise movement door 38, the pin 66 slides across the surface of the T-shaped member 102 and clears it so that in the open position of Figure 15, the pin is resting against the face of plate 90 as shown in Figures 15 and 16.

After the box 14 is full, it is withdrawn from device 10. As the knob 42 moves through groove 82, spring 100 urges the door 38 back toward its closed position covering hole 36 as shown in Figure 17. Under the action of spring 100, plate 90 turns couter-clockwise and pin 66 slides across the face of the plate. Since the top section of the pin 66 is above the T-shaped member 102, the T-shaped member turns with plate 90 only until it (the T-shaped member) is stopped by pin 66. Thus as the plate 90 moves back through towards the closed portion pin 66 continues to slide across plate 90 until it clears plate edge 110 at which point spring 108 pushes pin 66 upwards past plate 90 as shown in Figure 17 and 18. Thus, as can be seen in Figure 17, after the door 38 has been operated once with portion 30 closed against portion 28, pin 66 is positioned between the T-shaped member 102 and plate 90. As a result, the door is latched in a closed position any attempt to re-open access door 38 by turning plate 90 clockwise merely brings plate edge 110 into contact with pin 66, and no further. Therefore, pin 66 cooperates with plate 90 and prevents unauthorized access into box 14.

When box 14 is opened by unlocking lock 46, to remove the coins stored therein, pin 66 mounted on portion 28 is retracted from hole 68 of portion 30 allowing T-shaped member 102 to complete its counter-clockwise motion under the influence of spring 98 until it engages stop 94 as shown in Figure 13 and the door is reset so that it may be opened again. As previously mentioned, the box 14 has a double-walled construction so that it is difficult to open without the proper means for deactivating its lock while at the same time facilitating the authorized evacuation of the coin contents. Furthermore, the hinges 32 are mounted so that they are normally substantially hidden from view as shown in Figure 19 to prevent tempering.

Advantageously, lock 46 is covered when the box is inserted in device 10 so that the box may be opened by a key only after the box has been removed. Furthermore, hole 36 is made sufficiently small so that a person's hand cannot fit therethrough.

Another, somewhat preferred embodiment of the cash box is shown in Figure 20. In this embodiment access hole 38' has been shifted to the geometric center of box top surface 20'. As a result, as shown in Figure 21 even more coins can be collected by the box before it overflows.

Numerous modifications and additions may be made to the invention without departing from its scope as defined in the appended claims.

Claims

1. A device for collecting coins comprising:

a housing adapted to accept coins;

a cash box removably disposed within the housing, said box having an access opening through which coins may fall into the box and door means for selectively opening and closing said access opening;

control means disposed within said housing for opening said door means when the box is inserted in the housing; and

means for latching said door means closed after said door means has been opened at least once at any stage of removal of the box from the housing.

2. The device of claim 1 wherein said cash box further comprises locking means which must be opened before the contents of the cash box may be removed.

3. The device of claim 1 wherein said door means is pivotable between an open and a closed position by a control knob and said control means comprises a member with a groove shaped to shift said control knob to open said door means as said box is inserted in said housing.

4. The device of claim 3 wherein said means for latching comprises means for preventing the reinsertion of the box into said housing after the box has been removed.

5. A cash box comprising;

an enclosure with an access hole for depositing coins within said enclosure;

opening means for opening said enclosure for removing coins therefrom;

door means for selectively opening and closing said access hole;

latching means for latching said door means in a closed position after said door means has been opened and closed; and

deactivating means for deactivating said latching means after said enclosure has been opened.

6. The cash box of claim 5 wherein said enclosure is double-walled and comprises a first portion for holding coins with a top opening and a second portion for closing said top opening.

7. The cash box of claim 6 further comprising means for facilitating the removal of all coins contained therein when said box is reversed.

8. The cash box of claim 6 wherein said second portion is hingedly connected to said first portion, and further comprises locking means for securing said second portion to said first portion, the hinges being substantially hidden.

9. The cash box of claim 8 wherein said first portion has a bottom provided with a plurality of internal protrusions said protrusions being spaced at a distance smaller than a coin diameter.

10. The box of claim 9 further comprising ventilation and water evaporation holes disposed on said bottom.

11. The box of claim 7 wherein said locking means is disposed on said second portion and includes a slideable tongue, and said second portion comprises a cavity engaged by said tongue to lock second portion to said first portion.

12. The box of claim 10 wherein said cavity is partitioned by a wall means to form cavity sections having a width smaller than a coin diameter.

13. The box of claim 5 further comprising two opposed external handle means.

14. The box claim 5 having a width and a height, said height exceeding said width.

15. The cash box of claim 5 wherein said door means comprises a plate pivotable between a first position in which said plate blocks said hole, and a second position in which said plate is disposed away from said hole, spring means for urging said palte toward said first position, an intermediate member pivotably mounted on said plate; and said latching means comprises a latching pin urged toward said plate by a latching spring.

16. The box of claim 14 wherein said intermediate member is initially positioned between said latching pin and said plate when said plate is in said first position, said intermediate member pivoting away from said latching pin when said plate moves from said first to said second position, said latching pin being positioned to block the plate after it has moved from said second to said first position.

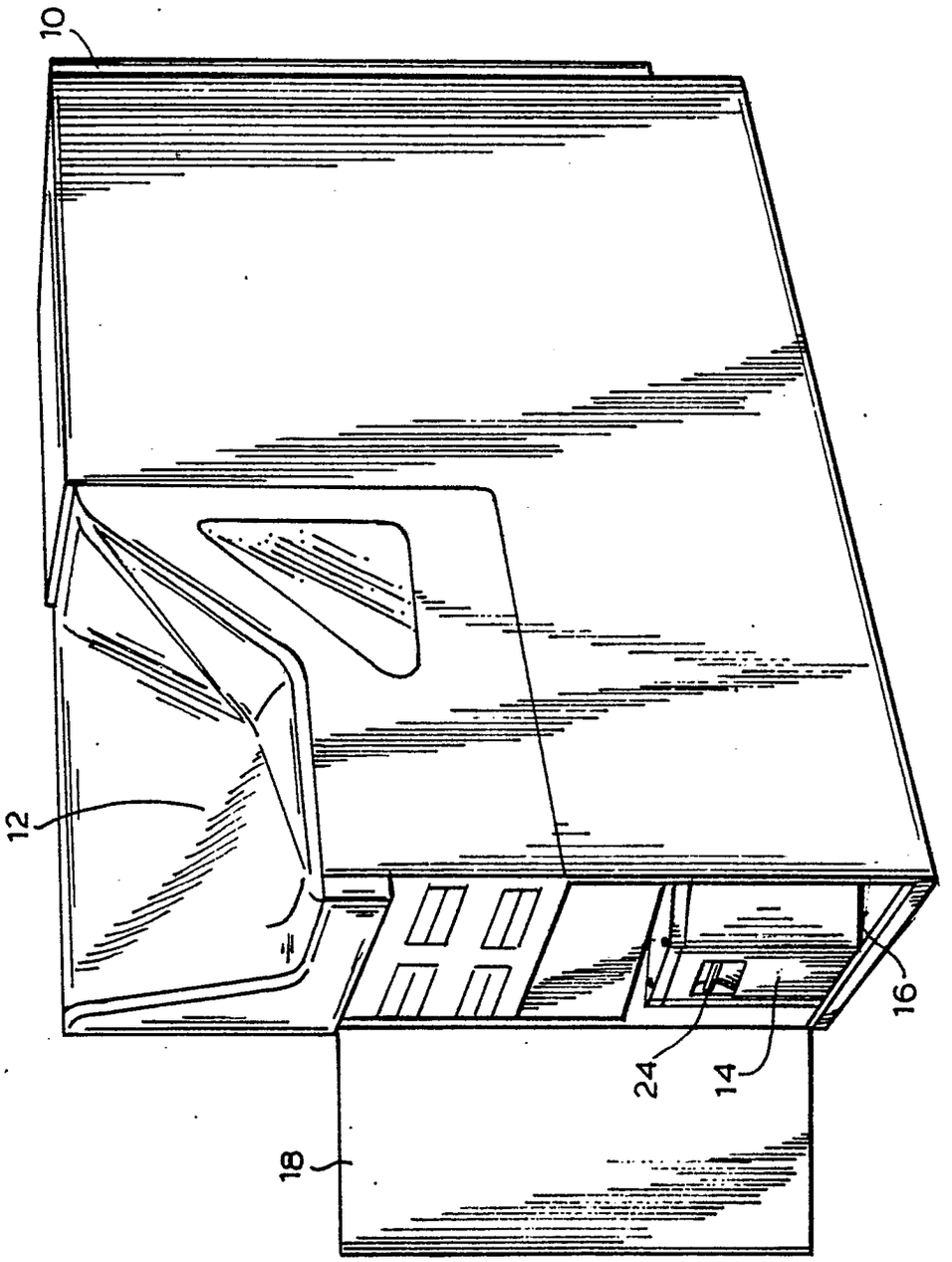


FIG.1

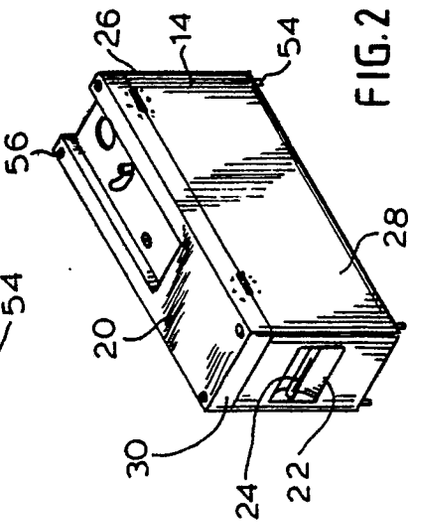


FIG.2

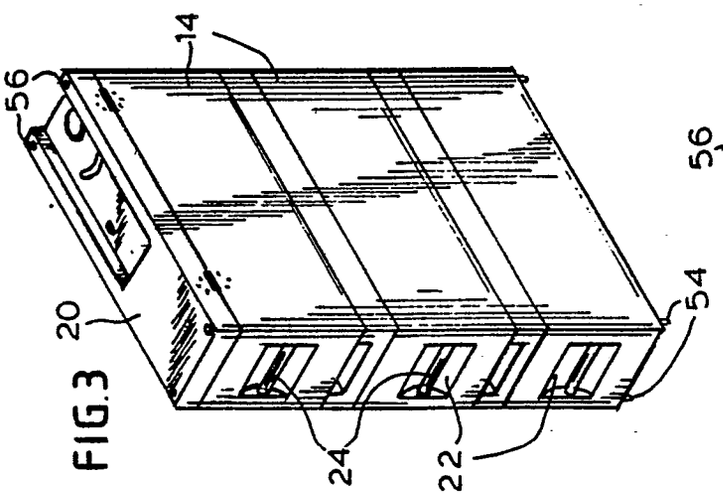


FIG.3

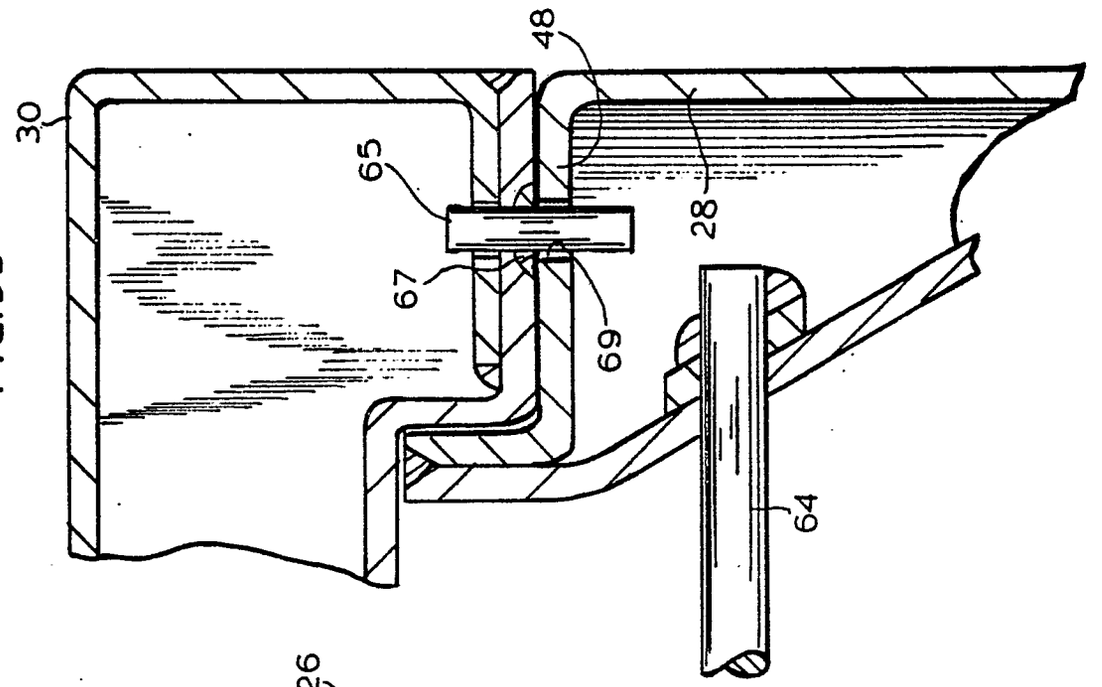


FIG.5b

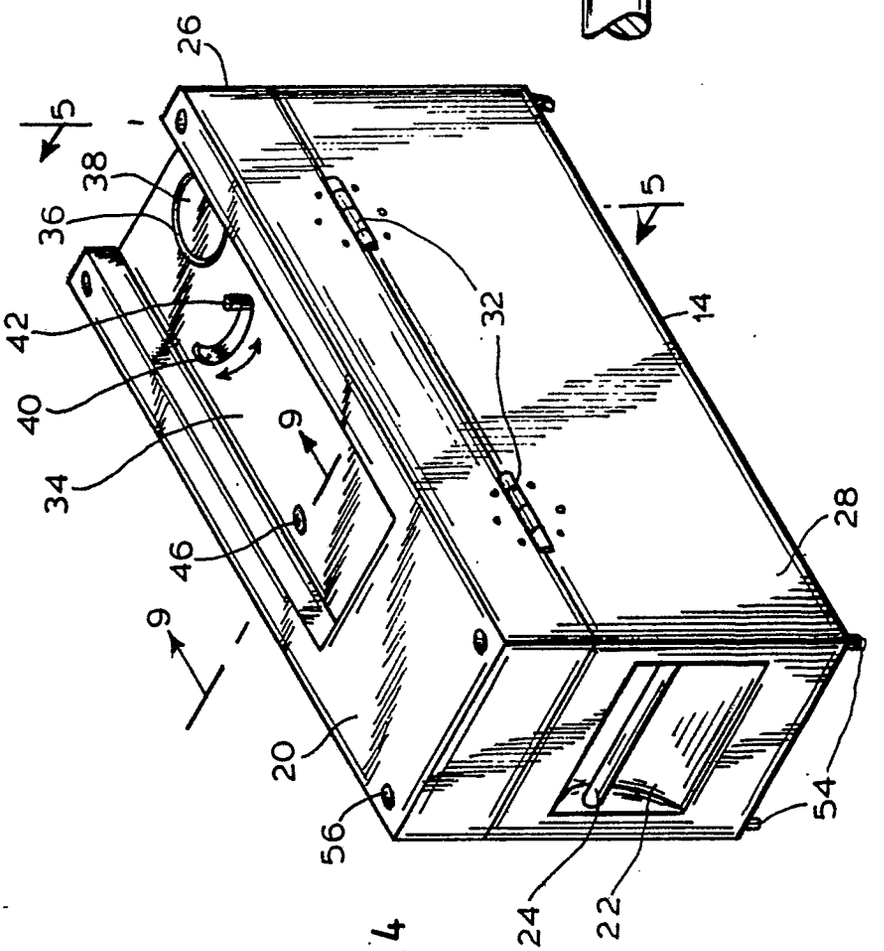


FIG.4

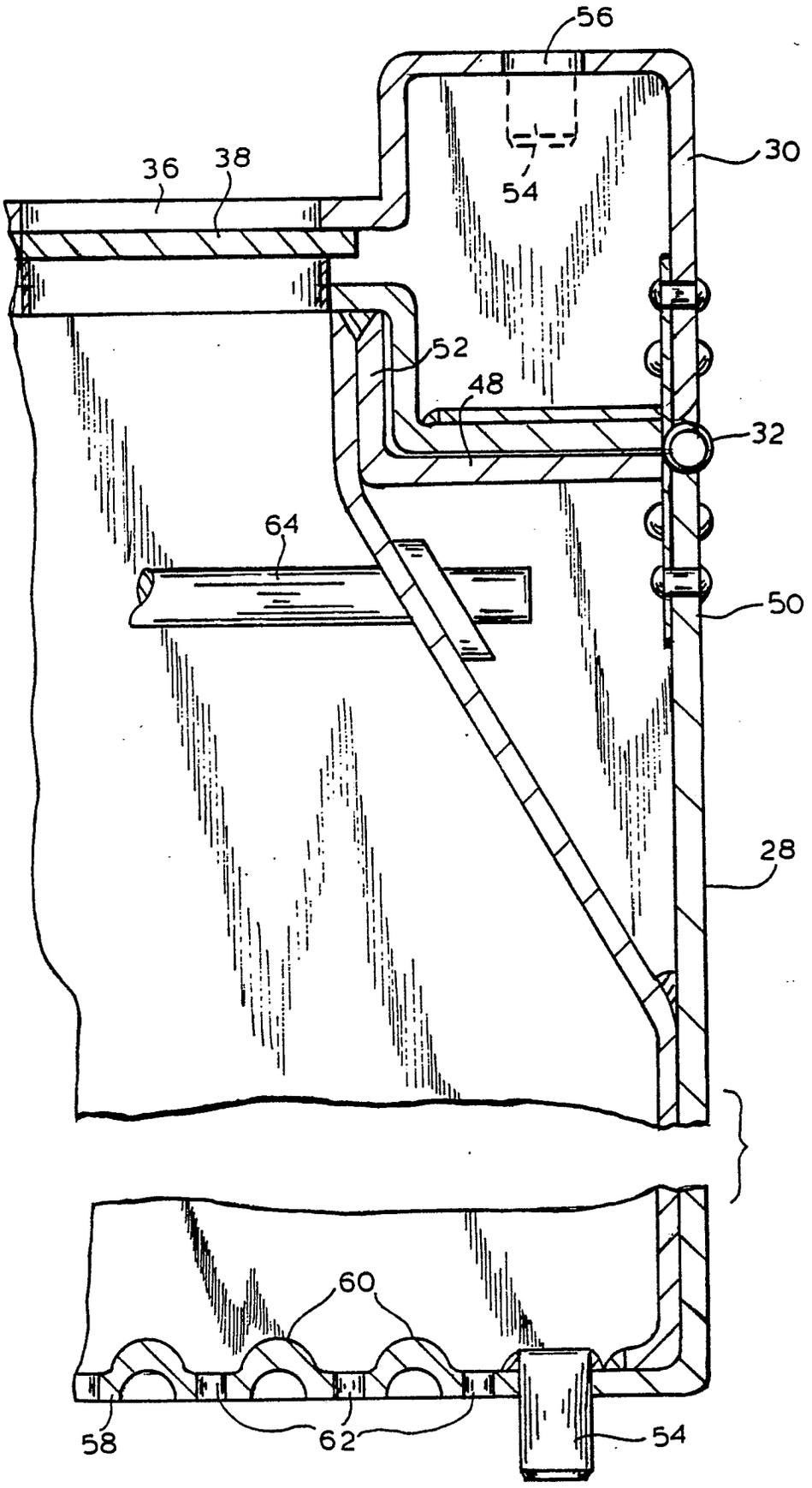


FIG. 5a

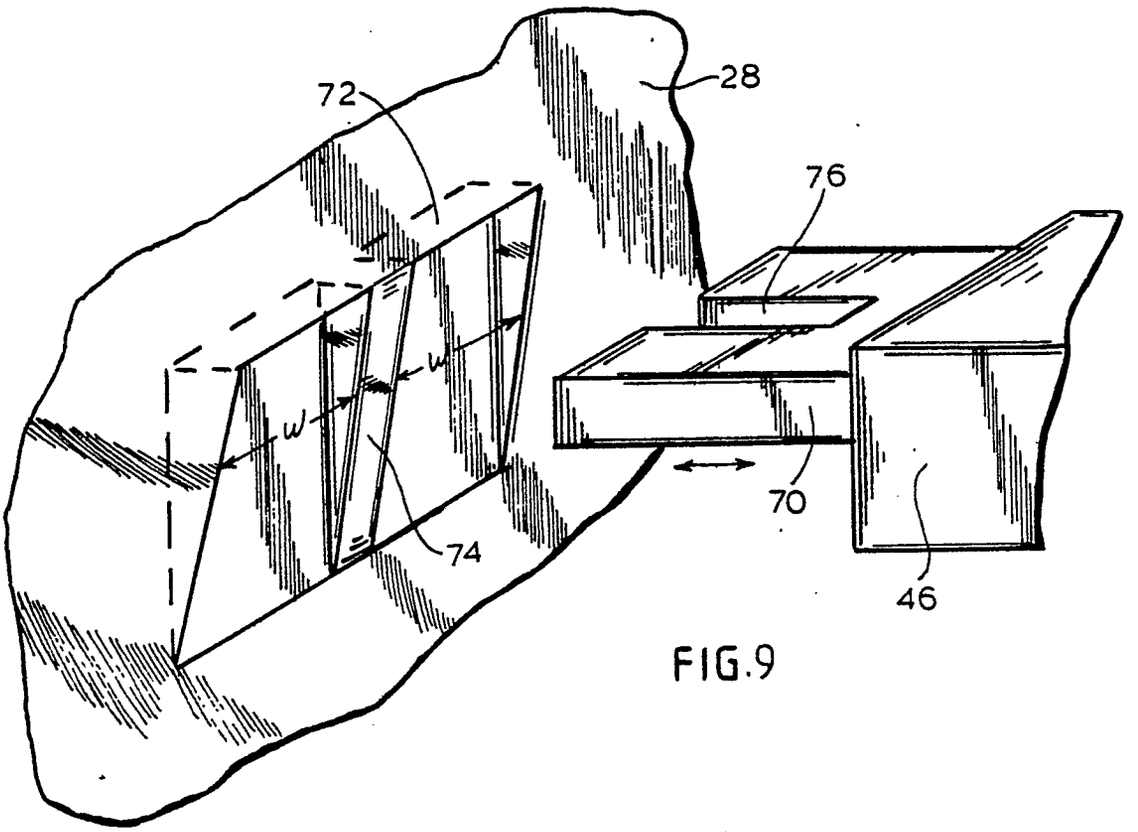


FIG.9

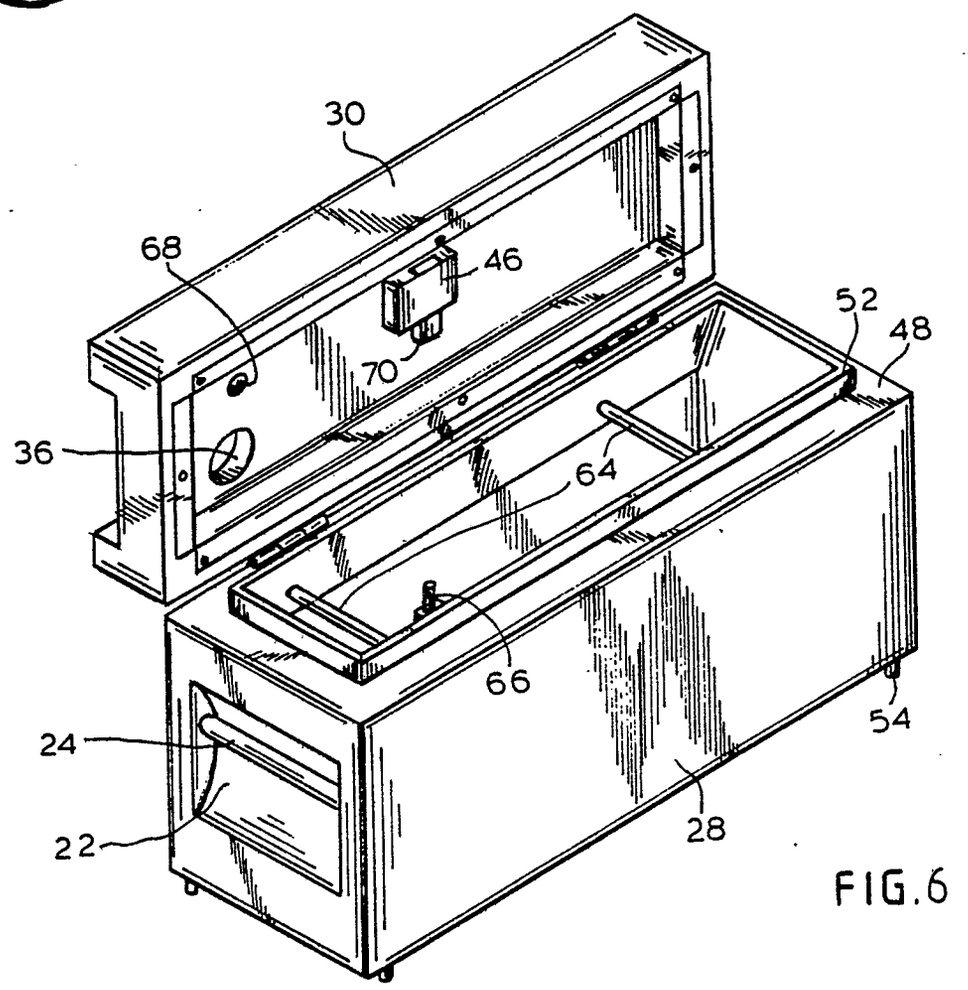


FIG.6

FIG.7
PRIOR ART

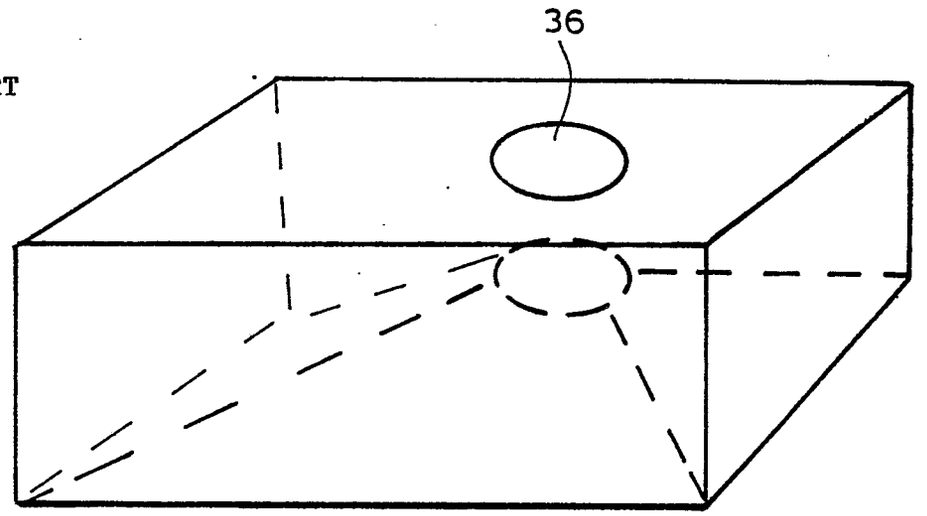


FIG.8

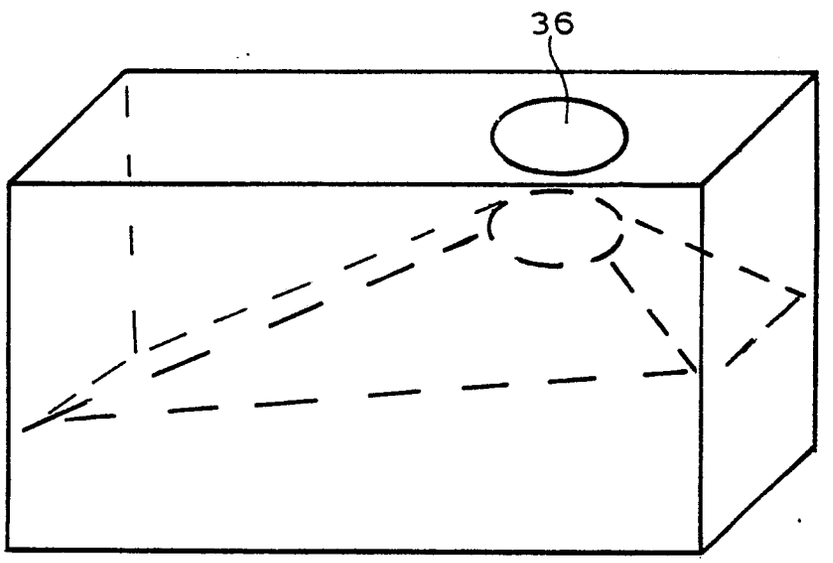


FIG.13

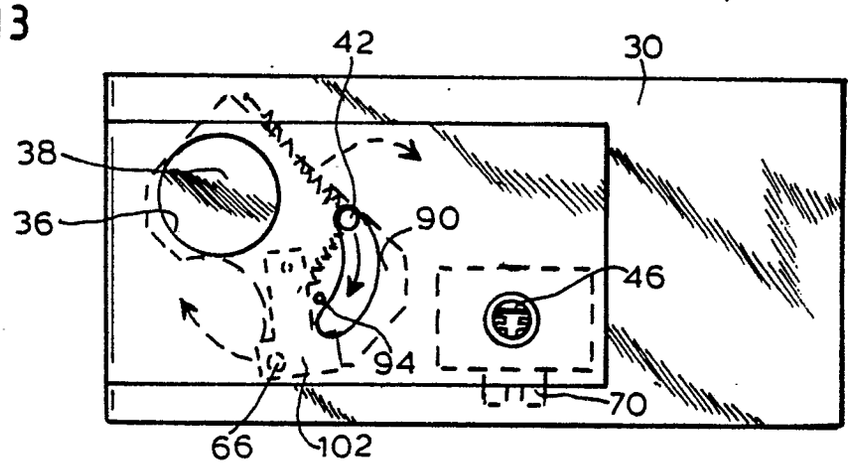


FIG.11

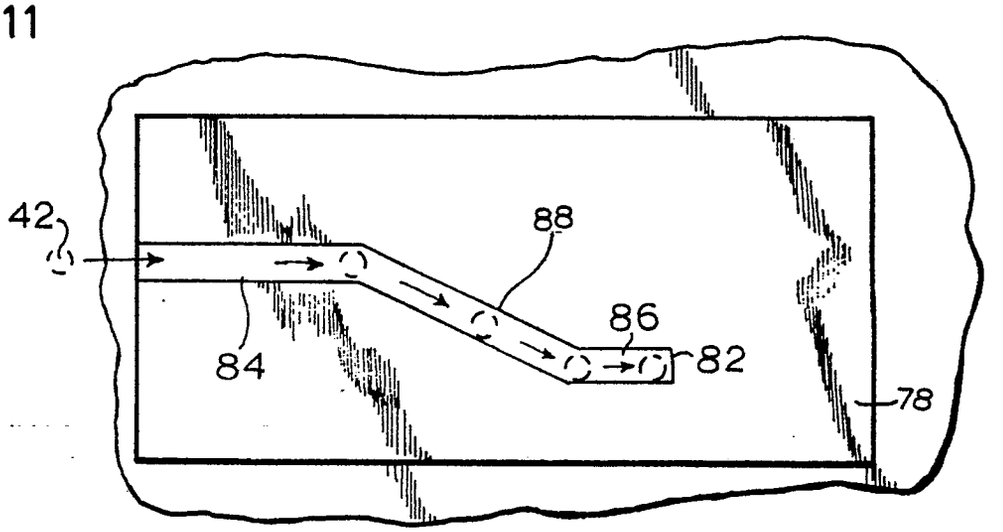
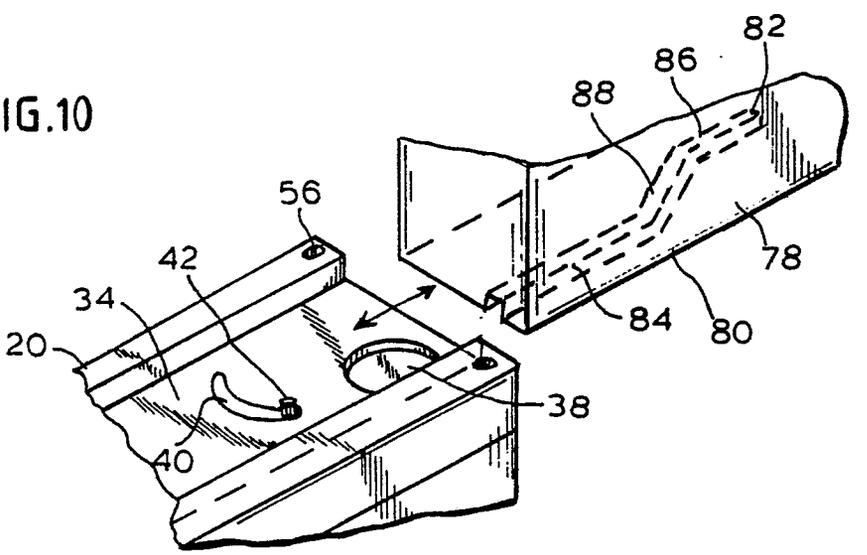


FIG.10



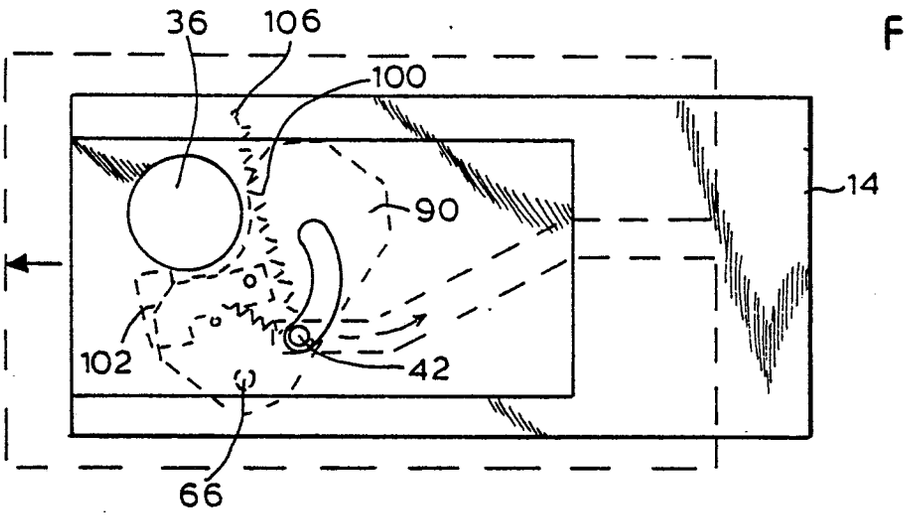


FIG.15

FIG.17

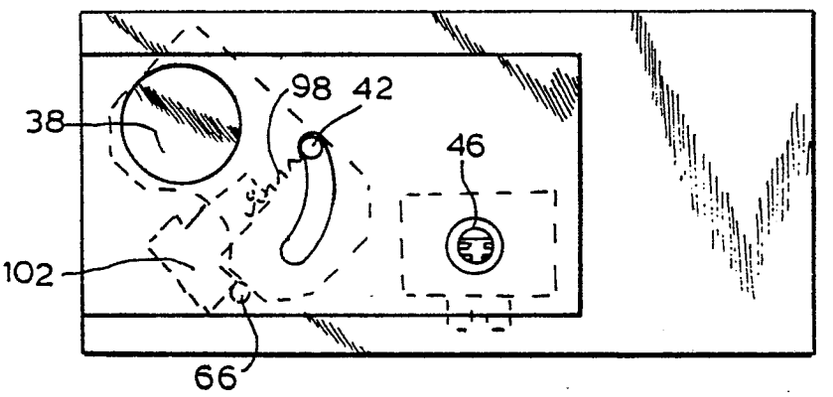
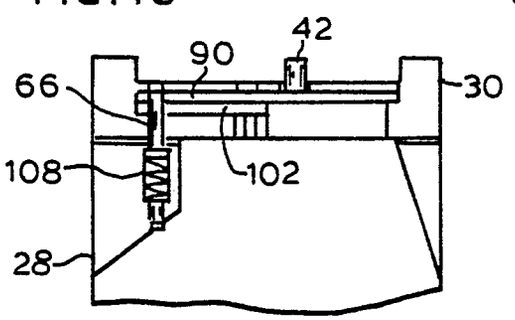


FIG.18



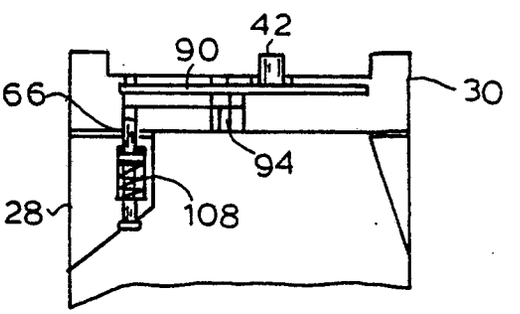


FIG.14

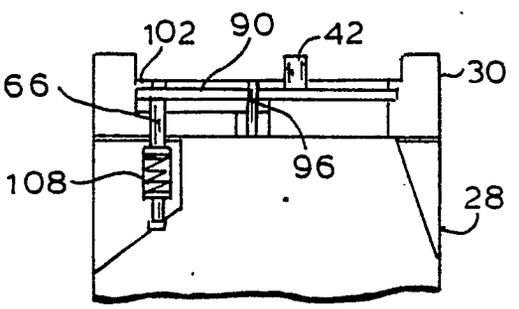


FIG.16

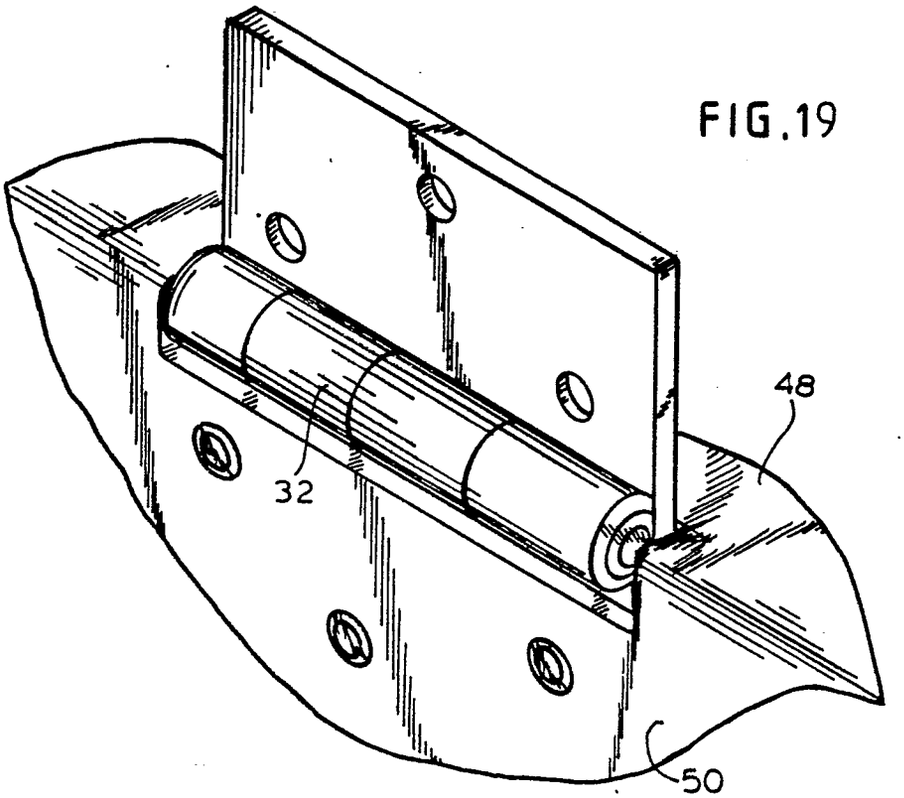


FIG.19

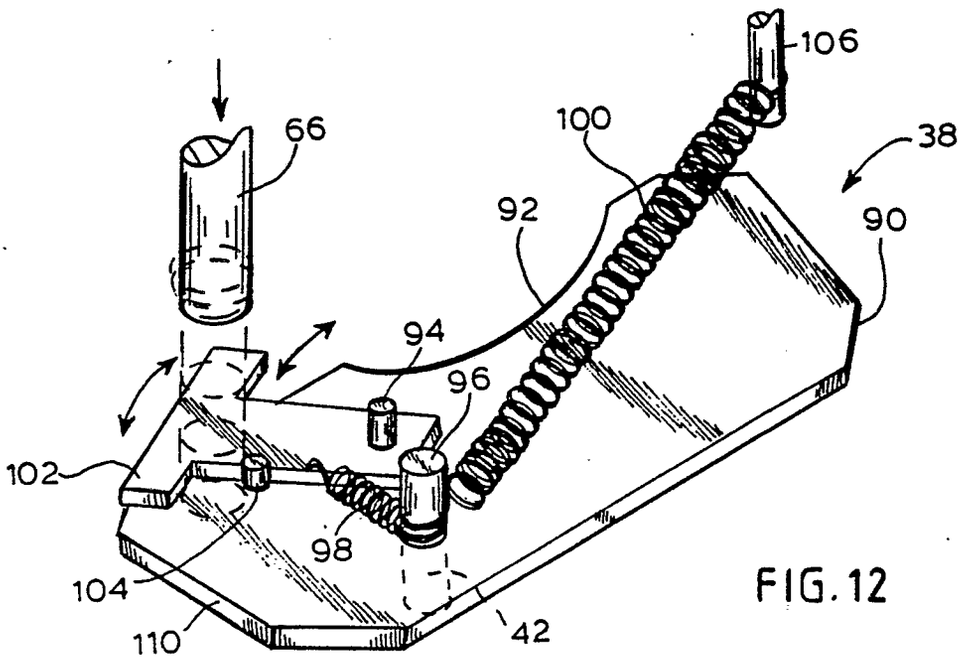


FIG.12

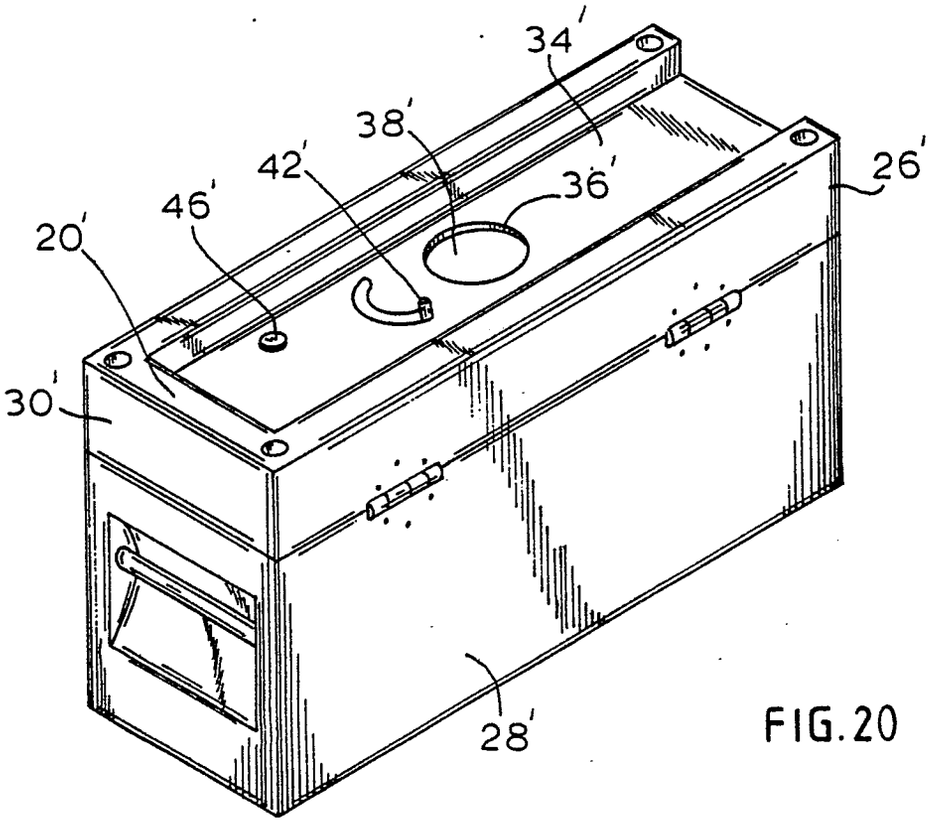


FIG.20

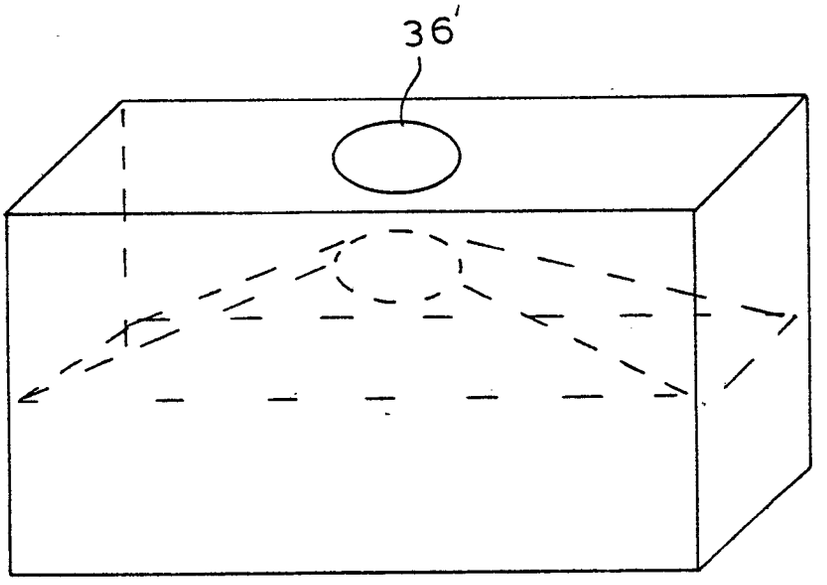


FIG.21