A smooth operating cargo box which is simply and easily assembled by first erecting the side panels on the box base by engaging outwardly opening end hooks extending along the bottom edges of the sides with inwardly opening side hooks extending along the side edges of the base, then erecting the back panel by sliding it in a direction perpendicular to the plane of the panel toward the rear of the container to engage outwardly open end hooks along the side and bottom edges of the back panel with inwardly directed side hooks extending along the rear edges of the base and side panels, then erecting the front panel by engaging an outwardly opening end hook extending along the bottom edge of the panel with an inwardly opening side hook extending along the front edge of the base and rotating the panel around its bottom edge from inside toward the outside of the container to engage inwardly opening end hooks along the side edges of the front with outwardly opening side hooks extending along the front edges of the sides, and finally sliding the top panel in the direction of its plane from the rear toward the front of the box to engage inwardly opening end hooks along the sides of the top with outwardly opening side hooks on the top edges of the sides and to engage an inwardly opening side hook along the back edge of the top with an outwardly opening end hook extending along the top edge of the back panel. Latches are provided for clamping the front edge of the top to the top edge of the front. An alarm system gives a signal in the event that an unauthorized person attempts either to open the container or to break through a panel thereof in an effort to gain access to the contents.

8 Claims, 14 Drawing Figures
SMOOTH OPERATING CARGO BOX

BACKGROUND OF THE INVENTION

There are known in the prior art boxes or containers which are especially adapted to receive articles of cargo for shipment by aircraft. These containers must be sufficiently strong to handle cargo having a relatively large aggregate weight. They must effectively withstand gravity loads from inside the container toward the outside thereof which are incident to operation of the aircraft. In addition to being sufficiently strong to meet these requirements, they must be as light in weight as is possible. Containers of this type are relatively inexpensive to manufacture and consequently are not disposable. For this reason, the containers should be able to be knocked down so as to be shipped flat while being relatively readily assembled at the location at which cargo is to be loaded. This, moreover, should be achieved with a minimum of manipulation and without the use of separable auxiliary devices such as ropes and straps and the like which may be misplaced or lost.

Containers of the general type described above are shown, for example, in U.S. Patent No. 3,563,403 for a Cargo Box, U.S. Patent No. 3,575,312 for a Refrigerated Cargo Box and in the application of Luisada Ser. No. 6855, filed Jan. 29, 1970 for a Lightweight Knockdown Container, now U.S. Patent No. 3,655,087. The boxes or containers shown in the patents and application referred to all generally fulfill the requirements outlined above of being strong, lightweight and readily assembled and disassembled. We have invented a smooth operating cargo box which not only fulfills the requirements outlined above for aircraft cargo containers, but also is able to be erected and knocked down with a minimum of effort. Our smooth operating cargo box is strong and lightweight. It is readily assembled and disassembled for shipment in a stacked condition. Our container may be assembled and disassembled smoothly with a minimum of effort. It does not require separable ropes or straps or the like.

SUMMARY OF THE INVENTION

One object of our invention is to provide a smooth operating cargo box which is strong and lightweight.

Another object of our invention is to provide a smooth operating cargo box which can be easily assembled and disassembled to permit the box to be stored and shipped with the panels thereof stacked.

A further object of our invention is to provide a cargo box which can be erected smoothly with a minimum of effort.

A still further object of our invention is to provide a smooth operating cargo box which is relatively simple in construction for the result achieved thereby.

Other and further objects of our invention will appear from the following description.

In general our invention contemplates the provision of a smooth operating cargo box which is assembled by sliding the back panel thereof in a direction perpendicular to its plane along the base between the previously erected side panels, then erecting the front by rotating the front panel around its bottom edge from inside toward the outside of the container and finally sliding the top panel in the direction of the plane thereof from the rear toward the front of the container to complete the assembly. Latches are employed to hold the front edge of the top down on the upper edge of the front panel.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings which form part of the instant specification and which are to be read in conjunction therewith and in which like reference numerals are used to indicate like parts in the various views:

FIG. 1 is a perspective view of our smooth operating cargo box with the panels thereof stacked for shipment.

FIG. 2 is a perspective view of our smooth operating cargo box in assembled condition.

FIG. 3 is a fragmentary sectional view of our smooth operating cargo box taken along the line 3—3 of FIG. 2 and drawn on an enlarged scale.

FIG. 4 is a fragmentary sectional view of our smooth operating cargo box taken along the line 4—4 of FIG. 3.

FIG. 5 is a fragmentary sectional view of our smooth operating cargo box taken along the line 5—5 of FIG. 2 and drawn on an enlarged scale.

FIG. 6 is a fragmentary sectional view of our smooth operating cargo box taken along the line 6—6 of FIG. 2 and drawn on an enlarged scale.

FIG. 7 is a fragmentary sectional view of our smooth operating cargo box taken along the line 7—7 of FIG. 2 and drawn on an enlarged scale.

FIG. 8 is a fragmentary sectional view of our smooth operating cargo box taken along the line 8—8 of FIG. 2 and drawn on an enlarged scale.

FIG. 9 is a fragmentary sectional view of our smooth operating cargo box taken along the line 9—9 of FIG. 2 and drawn on an enlarged scale.

FIG. 10 is a perspective view of our smooth operating cargo box in the first stage of assembly thereof.

FIG. 11 is a perspective view of our smooth operating cargo box in an intermediate further stage of assembly thereof.

FIG. 12 is a perspective view of our smooth operating cargo box with parts broken away illustrating a further stage in the assembly thereof.

FIG. 13 is a perspective view of our smooth operating cargo box illustrating the final stage of assembly thereof.

FIG. 14 is a schematic view of one form of alarm circuit which may be used with our smooth operating cargo box.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1 and 2 of the drawings, our smooth operating cargo box, indicated generally by the reference character 10, includes a base, indicated by the reference character 12, which may, for example, be provided with skids 14 so arranged as to permit a fork lift to raise the container. Container 10 includes sides, indicated generally by the respective reference characters 16 and 18, a back, indicated generally by the reference character 20, a front, indicated generally by the reference character 22 and a top, indicated generally by the reference character 24. In the condition of the box illustrated in FIG. 1 the various panels have been separated and stacked on top of the base 12. If desired,
any suitable means such as straps 25 or the like may be employed to hold the stacked panels together. Referring now to FIGS. 2 to 4, the base 12 includes a core 26 of any suitable material which is light yet strong. It may, for example, be constructed in the manner described in the patents and application referred to hereinafter. Alternatively, it may be reinforced in the manner described in the copending application of Leonard P. Frieder, Ser. No. 113,366, filed Feb. 8, 1971, now abandoned, for a Rigid Lightweight Cargo Pallet. We provide a plurality of channels 28 extending around the perimeter of the base 12. Channels 28 are formed with inwardly opening side hooks 30. The channels 28 with the hooks 30 may be formed in any suitable manner. For example, they may be made as aluminum extrusions. Each of the two side panels 16 and 18 includes a core 32 of any suitable material. For example, it may be made from polystyrene foam and provided with suitable reinforcing members and with skins of aluminum sheeting, plastic or resin-impregnated glass fibers. Alternatively, as a filler, basa wood blocks or urethane foam or any other suitable material might be used. The cores, if formed from a plastic foam, may be made by foaming the plastic in place. Since the structure of the panel cores per se does not form a part of our invention, it will not be discussed in further detail.

We provide a channel 34 running along the lower edge of each of the sides 16. Channel 34, which may be extruded from a suitable material such, for example, as aluminum, is formed with an outwardly opening end hook 36. When the side panels are erected on the base in a manner to be described, the end hooks 36 on the sides engage the side hooks 30 along the side edges of the base 12. We place respective gaskets 38 and 40 in the recesses formed by hooks 30 and 36 to form a seal between the base and the sides.

Preferably we provide each of the side panels 16 and 18 with a pair of spaced locking plates 42 at the lower edge thereof. Any suitable means such, for example, as rivets 44 or the like, are employed to secure the plates 42 to the channels 34 along the lower edges of the sides. The plates 42 are adapted to engage in grooves 46 formed in the base channels 28 to hold the sides in position.

Referring now to FIGS. 2 and 5, we provide each of the sides 16 and 18 with a channel 48 running along the rear edge thereof. Each channel 48 is formed with an inwardly opening side hook 50.

The back panel 20 includes a core 52 formed in a manner similar to that in which the core 32 is formed. We provide the back panel 20 with respective channels 54 running along the side edges thereof. Each channel 54 is formed with an outwardly opening end hook 56 adapted to cooperate with one of the hooks 50 when the back panel is erected on the base. We dispose respective gaskets 58 and 60 in the recesses formed by the hooks 56 and 50.

We provide each of the side panels 16 and 18 with a pair of spaced snap latches 62 located slightly inboard of the rear edges of the panels. Each of the latches 62 is received by a housing 64 in one of the side panels and is normally urged to an extended position by means of a spring 66. A tab 68 limits the movement of the latch out of the housing. When the back is erected in a manner to be described, it slides past the latches 62. When the panel is in position the latches snap back to retain the back panel in position.

Referring now to FIGS. 2 and 7, we provide each of the side panels 16 and 18 with a channel 70 running along the top edge thereof. Channel 70 is formed with an outwardly opening side hook 72. The front panel 22 includes a core 74 similar to that of the other panels of the box 10. We provided the front panel 22 with respective channels 76 running along the side edges thereof and formed with inwardly opening end hooks 78. When the front panel is erected in a manner to be described, the hooks 78 cooperate with hooks 72. Gaskets 80 and 82 provide a seal along the front side edges of the box. We mount respective pivoting latches 84 on pins 86 on the channels 76 at the inside of the front 22. After the front has been erected the latches 84 are moved to positions at which they are located behind hooks 72 to retain the front in its erected condition.

We provide the bottom edge of each of the front and back panels with an outwardly opening end hook similar to the hook 36 on side 16. These hooks on the front and back panels cooperate with hooks 30 along the front and back edges of the base when the front and back panels are erected.

Referring now to FIGS. 2 and 6, the top panel 24 includes a body 90 similar to that of the other panels. We form a channel 92 extending along the rear edge of the top 24 with an inwardly opening side hook 94. A channel 96 extending along the top edge of the back panel 20 is provided with an outwardly opening end hook 98 which cooperates with hook 94 when the top is assembled on the sides and back. Respective gaskets 100 and 102 provide a seal at this interconnection.

Referring now to FIGS. 2 and 8, a channel 104 running along the top edge of each of the sides 16 and 18 is formed with an outwardly opening side hook 106. We provide respective channels 108 extending along the side edges of the top 24. Inwardly opening end hooks on the channels 108 cooperate with hooks 106 on the sides 16 and 18 as the top is moved into position. Gaskets 112 and 114 provide seals at this connection.

Referring now to FIGS. 2 and 9 we provide a channel 116 extending along the front edge of the top panel 22. We form the channel 116 with a downwardly extended rounded flange 118. Respective slots 120 in the front edge of the channel 116 are adapted to receive draw hooks in a manner to be described. We provide the front panel 22 with a channel 122 extending along the top edge thereof. We provide the channel with a recess 124 adapted to receive the flange 118. Our box includes respective toggle latch assemblies indicated generally by the reference character 126 adapted to hold the top panel 24 down on the front panel 22. Each assembly 126 includes a recessed base 128 carrying a pivot pin 130 which supports the latch handle 132. A pin 134 on handle 132 carries the latch draw hook 136. As will be explained more fully hereinbelow, draw hooks 136 are adapted to engage slots 120 to hold the top panel 24 in position.

We provide our cargo box with means for sounding an alarm when an unauthorized person attempts either to open the container or to gain access thereto by breaking through one of the panels. In the course of manufacturing each of the panels of the container, we distribute a conductor 138 therethrough in such a way that the continuity thereof will be broken in the event
that a person cuts away or breaks a portion of the panel. When the panels are assembled respective connectors 140 engage to provide a plurality of series connected resistors 142 formed by the conductors 138 in the respective panels. We connect one terminal of the resistor 142 in the front panel 22, for example, to the base 144 of a transistor 146. We connect an alarm device 148 of any suitable type between the emitter 150 of transistor 146 and the female connector portion of the panel 22. A battery 152 in the circuit of the collector 154 of transistor 146 with the alarm 148 provides a source of power. We connect a resistor 156 having a resistance value which is relatively high as compared with the aggregate of resistors 142 between the collector and base of transistor 146. A key-operated switch 158 is adapted to be actuated to render the alarm system operative after the box has been assembled. Normally the aggregate resistance of resistors 142 acts as a shunt to prevent sufficient voltage from being applied to base 144 to render the transistor conductive. However, if the shunt circuit is broken at any point the transistor is rendered conductive and the alarm 148 is activated. It will readily be appreciated that the intended consignee of the box 10 is provided with a key for operating switch 158 to disable the alarm system before he opens the box.

Referring now to FIGS. 10 to 13, in assembling our box, the base 12 first is laid on the skids 14. Next, the sides 16 and 18 are erected by engaging hooks 30 and 36. In the course of that operation plates 42 engage in the grooves 46 to hold the sides erected. Next, the back panel 20 is slid on its lower edge along the base 12 from the front toward the back of the box in the direction of the arrows A in FIG. 11 to cause the edges of the back to ride over the latches 62 until hooks 56 move into cooperative relationship with hooks 50 and the latches snap back into place to hold the back erected.

After the back and sides have been erected, the lower edge of the front is inserted into the container to bring the hook 36 on the lower edge of the front panel 22 into cooperative relationship with the hook 30 along the front edge of the base. Next, panel 22 is rotated in the direction of the arrow B in FIG. 12 to bring hooks 78 into engagement with hook 30 and front edges that have been done, latches 84 are turned to positions at which they prevent the front panel 22 from falling out of the box.

Finally, to assemble the top panel 24 it is slid over the top of the box by moving it from front to back thereof in the direction of the arrow C in FIG. 13 to bring the hooks 110 at the sides of the top panel into cooperative relationship with the hooks 106 at the tops of the side panels. This movement continues until the hook 94 at the rear edge of the top cooperates with hook 98 at the top edge of the rear panel. When all the panels have thus been assembled in the manner described draw hooks 136 are inserted in the slots 120 and handles 133 are operated to draw the top down onto the front panel. When the container is thus ready for shipment, switch 158 is closed to activate the alarm circuit.

If an unauthorized person opens the box, one of the couplings 140 will be disengaged and the alarm will sound. If an attempt is made to enter the box by breaking through one of the panels the conductor 138 of that panel will be broken and the alarm will sound.

Upon arrival at its intended destination, the receiver first opens switch 158 to de-activate the alarm. He next disassembles the box by reversing the procedure described above. The panels of the container can then be stacked flat as shown in FIG. 1 for storage or for shipment back to the point of origin.

It will be seen that we have accomplished the objects of our invention. We have provided a cargo box which is lightweight and strong. Our box can be smoothly and easily assembled and disassembled with a minimum of effort. It is provided with an alarm for signalling an attempt by a person either to open the box or to break through one of the panels thereof.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of our claims. It is further obvious that various changes may be made in details within the scope of our claims without departing from the spirit of our invention. It is, therefore, to be understood that our invention is not to be limited to the specific details shown and described.

Having thus described our invention, what we claim is:

1. A smooth operating cargo box including in combination a base, side panels, a back panel, a front panel and a top panel, first interengageable means running along the side edges of said base and along the bottom edges of the side panels for connecting said side panels to said base, second interengageable means along the bottom and side edges of the back panel and along the back edge of the base and back edges of the side panels, said second interengageable means comprising respective inwardly opening side hooks running along the back edges of said side panels and outwardly opening end hooks running along the side edges of the back panel, said second interengageable means being responsive to sliding movement of the back panel from the inside toward the outside of said box in a direction perpendicular to the plane of the back panel to bring said end hooks into engagement with said side hooks to connect the back panel to the base and side panels, third interengageable means along the bottom and side edges of the front panel and along the front of the base and front edges of the side panels responsive to pivotal movement of the front panel around its bottom edge in a direction from outside toward the inside of said box for connecting said front panel to said base and interengaging the front panel with the side panels, fourth interengageable means along the back and side edges of the top panel and along the top edge of the back panel and top edges of the side panels responsive to sliding movement of said top panel in the direction of the plane thereof from back to front of said box for connecting said top panel to said back and side panels.

2. A cargo box as in claim 1 in which said third interengageable means comprises outwardly opening side hooks running along the front edges of the side panels and inwardly opening end hooks running along the side edges of the front panel.

3. A cargo box as in claim 1 in which said fourth interengageable means comprises outwardly opening side hooks running along the upper edges of said side panels and inwardly opening end hooks running along the side edges of said top panel.

4. A cargo box as in claim 3 in which said fourth interengageable means comprises an inwardly opening
side hook running along the rear edge of said top panel and an outwardly opening end hook running along the top edge of the back panel.

5. A cargo box as in claim 4 including a latch for securing the front edge of the top panel to the top edge of the front panel.

6. A cargo box as in claim 1 in which said third interengageable means comprises outwardly opening side hooks running along the front edges of the side panels and inwardly opening end hooks running along the side edges of the front panel and in which said fourth interengageable means comprises outwardly opening side hooks running along the upper edges of the side panels and inwardly opening end hooks running along the side edges of said top panel.

7. A cargo box as in claim 6 in which said fourth interengageable means comprises an inwardly opening side hook running along the rear edge of said top panel and an outwardly opening end hook running along the top edge of the back panel.

8. A cargo box as in claim 7 including a latch for holding the front edge of the top panel down on the top edge of the front panel.

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