This invention relates to convertible modular furniture-luggage units having a few types of basic components which may be employed to form permanent or temporary articles of furniture and/or luggage units. The basic components of the invention comprises a substantially rectangular receptacle having a substantially square base wall, two parallel vertical side walls attached to two opposite side edges of said base wall, and a vertical back wall attached to one other edge of said base wall and normal to said vertical side walls; at least one horizontal track means provided on the inside surface of said vertical side walls; said vertical side walls including a top edge having complementary mounting means for receiving similar complementary mounting means from a second receptacle mounted thereon; and securing means provided at said vertical side walls for fixedly securing said receptacle and said second receptacle together to form a cabinet unit; drawer means slidably receivable within said cabinet unit to form a chest of drawers unit and a pair of said drawers being engageable together to form a suitcase luggage unit.

16 Claims, 45 Drawing Figures
CONVERTIBLE MODULAR FURNITURE - LUGGAGE UNITS

BACKGROUND OF THE INVENTION

This invention relates to modular furniture units and more particularly to convertible modular furniture-luggage units having a few types of basic components which may be employed in various situations to form permanent or temporary articles of furniture and/or luggage units.

Common articles of furniture usually are bulky and fixed in structure. They are difficult to be transported during moving and are not suitable for use in the present mobile society. Attempts have been made to provide articles of furniture which can be assembled and disassembled by the user. However, these kinds of furniture are complex in structure and are difficult and time consuming to be erected.

SUMMARY AND OBJECTS

A principal object of the present invention is to provide modular units of furniture having only a few but versatile components which are easily erected and are flexible for forming many essential articles of furniture in a modern household.

Another object of the present invention is to provide modular units of furniture which may be converted into luggage units for transporting articles during moving.

A further object of the present invention is to provide modular units of furniture which lend themselves to mass production.

Briefly a modular furniture unit of the present invention comprises a substantially rectangular receptacle having a substantially square base wall, two vertical side walls and a back wall, the vertical side walls including a top edge having complementary mounting means provided thereon, so that two such receptacles may be mounted together at the top edges to form a furniture unit.

Other objects, features and advantages of the invention will appear or be pointed out in the following detailed description of the specific embodiments of the invention with reference to the accompanying drawings in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view showing the front and interior structure of the basic receptacle of the present invention;

FIG. 2 is an isometric view of the bottom side of the basic receptacle of the present invention;

FIGS. 3A and 3B are isolated exploded views of the detachable hinge in the basic receptacle of the present invention;

FIG. 4 is an isometric view showing the back and bottom portion of the receptacle;

FIG. 5 is an isolated exploded view of the side recesses of the receptacle according to the present invention;

FIG. 6 is a fragmental sectional plan view of the side mounts of the receptacle taken along section line A—A in FIG. 2;

FIG. 7A is an isometric view of a chest unit formed principally by mounting two basic receptacles together according to the present invention;

FIG. 7B is an isolated plan view of the handle latch according to the present invention;

FIG. 8 is a side plan view of the chest unit according to the present invention;

FIG. 9 is an isometric view of a chest of drawers unit according to the present invention;

FIG. 10 appearing in the same sheet with FIG. 8, is a front plan view of the chest of drawers unit;

FIG. 11 appearing in the same sheet with FIG. 8, is a sectional view of the chest of drawers unit taken along section line C—C in FIG. 10 with the bottom two drawers omitted for clarity;

FIG. 12A is a plan view of the drawers according to the present invention;

FIG. 12B is an isometric view of the suitcase according to the present invention;

FIG. 12C is in sectional view of the suitcase taken along section line B—B of FIG. 12B;

FIG. 12D is a plan view of the drawer showing the structure at the back side therein;

FIG. 13A is an isometric view of an alternative embodiment of the suitcase according to the present invention;

FIG. 13B is a sectional view of the suitcase of FIG. 13A taken along section line D—D therein;

FIG. 14 appearing on the same sheet with FIGS. 5 and 6 is an isometric view of yet another alternative embodiment of the suitcase;

FIG. 15A through 15D are plan views of various furniture and luggage units formed according to the present invention;

FIGS. 16A through 16F show various combinations of two basic receptacles to form different articles of furniture according to the present invention;

FIG. 17 is a perspective view of a complex wall unit that can be erected by combining the basic components of the present invention;

FIG. 18A shows a plan view of a desk and chair furniture unit according to the present invention;

FIG. 18B is a fragmental sectional view of the desk and chair furniture unit of FIG. 18A;

FIG. 18C is an isolated exploded view of the mounting structure of the desk top according to the present invention;

FIG. 19A is a plan view of a bed and night-table combination which can be formed with the modular units of the present invention;

FIG. 19B is a diagrammatic plan view of the bed and night-table combination of FIG. 19A showing the relative sizes of the units;

FIG. 19C is a plan view of the bed showing the provision of drawers in the bed structure; and FIGS. 20A through 20H are plan views showing various drawer and shelf combinations in the chest according to the present invention;

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, the basic components of the present invention comprises a basic four-sided open receptacle generally shown in FIGS. 1, 2 and 3. The basic receptacle 1 comprises a square planar base wall 2, two vertical side walls 3 and 4 formed at to two opposite edges therein, and a vertical back wall 5, so that the receptacle is substantially rectangular in shape having an open top 6 and an open front 7.

A plurality of horizontal parallel channels 8 and 9 are respectively provided on the interior surface of side walls 3 and 4. The horizontal channels extend the en-
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3. Tire length of the side walls, and each channel on one side wall is complementary to a corresponding channel on the same level on the other side wall to form a pair of associated channels at that level. A pair of associated channels is usable as slide tracks for receiving for example a planar sliding board therein to form a horizontal partition for the receptacle. Only five channels are shown in the drawings for simplicity in illustration. The number of these channels may vary according to the need of the user as will be apparent from the subsequent description herein.

Vertical channels 10 and 11 are provided on the side walls 3 and 4 perpendicular to the horizontal channels 8 and 9 and the base wall 2 to form a pair of parallel vertical slide tracks. A planar board may be slidably received in the vertical slide tracks to form vertical partition in the receptacle 1. Only one pair of channels 10 and 11 is shown for simplicity of illustration, and more than one pair of such tracks may be formed therein to provide more flexibility in the receptacle’s usage. It can be appreciated that although the horizontal and vertical slide tracks are shown herein as channels formed on the side walls, there may be slide tracks mounted thereon to provide the similar function.

Hinge slots 13, 14, 15, 16, 17, 18, 19, 20, 21 and 22 are provided at the edges of the open top 6 and open front 7 in the base wall, side walls and back wall respectively as shown in FIG. 1. Each hinge slot comprises a slot 23 having a transverse pin 24 fixedly mounted therein as best shown in the isolated exploded view in FIGS. 3A and 3B. The hinge slots are engageable with hook-shaped members to form detachable hinges.

The top edges of side walls 3 and 4 include mounting pins 25, 26, 27 and 28. Similar mounting pins 29, 30, 31 and 32 are provided on the underside of the base wall as shown in FIG. 2. Retaining holes 33, 34, 35, 36, 37, 38, 39, 40, and 41, 42 are adapted in conjunction with the mounting pins and are positioned close to the mounting pins as shown in FIGS. 1 and 2. Furthermore, mounting pins 47, 48 and retaining holes 49 and 50 are provided in the back surface of the back wall as best shown in FIG. 4. The positions of the mounting pins and retaining holes alternate between each corner of the receptacle to match one another such that the distance of mounting pins 26, 27, 30, 31 and 48 from their respective nearest corners of the receptacle is equal to the distance between retaining holes 33, 36, 38, 40, 41, 43 and 49 from their respective nearest corners of the receptacle. Similarly, the distance between mounting pins 25, 28, 29, 32 and 47 and their respective nearest corners of the receptacle is equal to the distance between retaining holes 34, 35, 37, 39, 42, 44, 46 and 50 and the respective nearest corners of the receptacle. The alternate positions of the retaining holes and the mounting pins match one another to provide a proper orientation for mounting two receptacles together.

In the outside surface of side walls 3 and 4, two side recesses 51 and 52 are provided therein. A pair of side mounts 53, 54 and 55, 56 are formed in the side recesses. The side mounts comprise substantially square plates 53, 54, 55, and 56, and connecting rods 57, 58, 59 and 60 as shown in FIGS. 5 and 6. The side mounts are fixedly secured in the recesses.

The basic receptacle 1 may be conveniently fabricated as an integral unit such as by moulding high density impact polyethylene or fibre glass which materials are commonly used for making furniture and luggage units.

FIG. 7A shows a modular furniture or truck unit which may be contructed by combining two basic receptacles 1A and 1B at their top edges. When thus mounted together mounting pins 25A, 26A, 27A and 28A of receptacle 1A are received within retaining holes 35B, 36B, 33B and 34B (not shown) respectively, of receptacle 1B, and correspondingly mounting pins 25B, 26B, 27B, 28B (not shown) of receptacle 1B are received within retaining holes 35A, 36A, 33A and 34A respectively of receptacle 1A. The dimensions of the retaining holes and the mounting pins are comparable with each other such that the mounting pins are snugly received with the retaining holes to firmly hold the two receptacles together to form a substantially cubical modular chest or truck unit.

Receptacles 1A and 1B are further fastened in place by detachable handle latch units 61A and 61B formed in the two side recesses. Each detachable handle latch unit 61 comprises a semi-rigid rectangular plate 62 made of semi-rigid material such as plastics or rubber, and a U-shaped handle 63 pivotally mounted to the plate 62. The plate has centre openings 64 and 65 and slots 67 and 68 are provided therein extending from the vertical edge of the plate to the centre openings as shown in FIG. 7B. Handle latch 61A is slidably fitted under plates 56B and 53A, so that connecting rods 57A and 60B are received snugly within centre openings 65A and 64A respectively. Similarly, handle latch 61B is slidably fitted under the corresponding plates on the other side of the receptacles to fasten the receptacles in rigid aggregation. It can be appreciated that the dimension of the centre openings in the semi-rigid plate is similar to the connecting rods in the side mounts; also, the width of slots 67 and 68 are preferably slightly smaller than the diameter of the connecting rods, so that when the semi-rigid plates are slidably fitted they are locked firmly in place. Furthermore, the distance between the two centre openings 64 and 65 is equal to the distance between the connecting rods 60B and 57A when the two receptacles are in close abutment. Therefore, the handle latches secure the two receptacles in firm engagement as well as eliminate any longitudinal displacement between them, at the same time the mounting pins and the retaining holes co-operate to avoid any lateral displacement between the two receptacles. Optionally, an additional side mount may be provided in the back wall of the receptacles to assure that the receptacles are mounted firmly together.

One detachable handle latch may be normally mounted in its side recess 51 or 52 and fitted under the side mount, so that a handle latch from each receptacle is readily available when mounting two receptacles together. Since the configuration of the handle latch is similar to the recess it lies flush therein and is protected from damage. A planar board 69 is mounted over the open front of the chest or trunk unit to provide a front cover. The planar board 69 includes two hinge plates 70 and 71 pivotally mounted in one edge therein. Each hinge plate includes a slot opening 12 which may be fitted over the transverse pin 24 in the edge slot of the receptacle as shown in FIG. 7A. To facilitate turning of the front cover 69 about the hinges, the edge of the front cover and that of the receptacle are rounded as best shown in an alternative isolated view in FIG. 3B. Like-
wise, all other edges of the receptacle which have hinge slots may also be rounded in the same manner.

It is apparent that since the trunk unit is substantially cubical in shape, the front cover 69 is substantially square and equal to the dimensions of the open front of the trunk unit and the base wall of the receptacle. Therefore, the front cover 69 may be either placed over the open front to form a door or cover, or turned all the way to lie coterminously over the base wall of the receptacle 1B, so that the combined unit becomes an open front chest or cabinet.

Planar partition means of the suitable size may be slidably received in the horizontal channels 8 and 9 within the combined unit to divide the interior space into horizontal compartments as desired. Front cover 69 may also be pivotally mounted on the left or right front edges of the unit through hinge slots 19A, 20B, or 19B and 20A so that the cover opens to the sides. Alternately, the front cover may also be mounted through hinge slots 13A and 14A to provide a front cover that opens downwards. Additionally, retaining holes 72, 73, 74 and 75 are provided on the front cover 69 as shown in FIG. 7A so that another receptacle or other components may be mounted on the cover when it is lying coterminously on the top of the chest. Retaining holes (not shown) are also provided on the other side of the front cover to enable the cover to lie in abutment with the base wall of receptacle 1B. In this position, the mounting pins 29B, 30B, 31B and 32B are received within the retaining holes to maintain the front cover in proper orientation.

In the embodiment shown in FIGS. 9 and 10, a plurality of drawers 76 are provided in the cabinet to form a chest of drawers furniture unit. All drawers 76 are identical in structure. A specific drawer is shown in FIGS. 12A through 12D. Each drawer comprises a substantially square bottom panel 78, three vertical side panels 79, 80 and 81 and a front panel 82. A continuous lip portion 83, 84 and 85 is provided on half of the top rim portion of the front panel 82, the entire top rim portion of side panel 81 and half of the top rim portion of back panel 80. A U-shaped handle 86 is secured at the front surface of the front panel 82. The legs of the handle 86 are hingedly mounted within a similarly shaped and dimensioned recess 87 on the front panel. The handle 86 preferably has simple planar surfaces so that it may lie flush within the recess 87. Two ridges 88 and 89 are formed at the outside surface of the side panels 81 and 89 extending substantially the entire length of these side panels. The ridges may be an integral part of the side panels or they may be elongated slide guide tracks secured therein. The ridges or guide tracks 88 and 89 are slidably receivable in any pair of horizontal channels 8 and 9 in the cabinet. Spacers 90 in the form of rectangular blocks (shown in FIG. 12D) are provided at the back side of the back panel 80 close to the bottom corners therein.

The drawers 76 may be fabricated by moulding with high density impact polyethylene or fibre glass as commonly used for making articles of luggage. The drawers are advantageously dimensioned so that when they are fully contained within the cabinet the front panels are flush with the front edges of the front opening of the cabinet, and the front cover 69 may be closed over the front to enclose the drawers fully and snugly within the cabinet as best shown in FIG. 11. Drawers of various sizes and a partition board may be used to meet the needs of the user as shown in FIGS. 21A through 20H.

A pair of drawers 76 may be mounted together to form a suitcase as shown in FIGS. 12B and 12C. This is achieved by providing a pair of complementary pin and ring detachable hinges 91 and 92 near the top edge of the back panel 80. The lip portion of the two drawers forms a sealing edge for the suitcase thus formed. The ridges 88 and 89 act as reinforcing ribs for the sides of the suitcase to prevent the sides from breaking when hit against other objects during transport.

Each pair of spacers 90 in the two corners of each back panel becomes the floor support of the suitcase. Furthermore, since the U-shaped handles on each drawer has planar surfaces they may be positioned side by side with each other to incorporate a single compound handle unit for the suitcase. A conventional tie-belt 93 is provided within the suitcase and is detachably secured to the back and front panels for retaining the content of the suitcase from upset during transport. A locking means (not shown) may be provided to lock the suitcase in a conventional manner.

Partition board 94 is also provided with detachable pin and ring hinges and a peripheral lip, so that it may be used to combine with a drawer 76 to form a suitcase as shown in FIGS. 13A and 13B.

An alternative embodiment of the drawer is shown in FIG. 14 wherein the suitcase comprises of dissimilar drawers. Only one drawer has a continuous lip all around the top rim. Drawers of this kind are simpler in structure. However, the user must possess two dissimilar halves in order to construct a suitcase.

FIGS. 15A through 15D show various forms of furniture units and luggage units that may be constructed with the basic components of the present invention. FIG. 15A shows the combination of two basic receptacles with a planar board cover to form a storage chest suitable for example for storing toys for children. FIG. 15B shows that the same storage chest may be used as a trunk unit for transporting articles during moving. FIG. 15C shows the suitcase that is built by combining two drawers or one drawer and a partition board. FIG. 15D shows a complex furniture unit erected by combining a chest of drawers and other cabinet units according to the present invention in stacking relation and side-by-side relation. The various units are mounted together through the mounting pins and retaining holes and side mounts provided in the walls of the receptacles. FIGS. 16A through 16F show various furniture units which can be assembled by combining two basic receptacles together. In FIG. 16A the receptacles are joined at the top edges to form a cabinet suitable for use as a chest of drawers unit when provided with drawers, or as a storage chest or luggage trunk when provided with additional front cover. FIG. 16B shows that the unit of FIG. 16A may be placed in a different way to provide a form of furniture unit. FIG. 16C shows two receptacles in stacking relation mounted together to provide another from of furniture unit. FIG. 16D illustrates two receptacles mounted in a back-to-back relation to form a structure suitable for use as a chair by providing a cushion in the top receptacle therein. FIG. 16E illustrates two receptacles in a side stacking relation to form a book shelf or storage shelf. In this construction a front cover may be provided in either or both of the receptacles to form a cup board.

A planar board may be placed in the vertical channels
of each receptacle to divide the interior space into more shelving and/or compartments. FIG. 16F shows that the structure of FIG. 16D may be placed in a different way to provide another form of a furniture unit. It can be appreciated that the units formed as shown in FIGS. 16B, 16C, 16D and 16F may be used to serve as such useful household furniture as side tables, lamp tables, night tables and coffee tables. FIG. 17 shows a furniture wall system which may be easily erected by combining a number of units in various manners as shown to form various cupboards, shelves of different sizes and drawer units.

The wall system may be started off with only a few units and it may be expanded from time to time by additional units to suit the user's need and financial means.

The basic receptacle of the present invention may be of a suitable dimension such as 19 x 19 inches and 9-1/2 inches.

FIG. 18A and 18B show a desk and chair furniture unit which can be constructed with the components of the present invention. For this purpose a writing surface is provided by a planar board having four corner mounting means each including a retaining hole and a mounting pin as shown in FIG. 18C. Three receptacles are mounted together to serve as side pieces of the desk. An appropriate number of drawers of various sizes and shelves may be provided. The desk thus constructed has a height of about 28-1/2 inches which is the common height of a desk.

FIGS. 19A through 19C show the combination of eight receptacles having the overall dimensions of 38 inches by 76 inches and may be extended by the addition of four more receptacles bringing the overall dimensions to 57 inches by 76 inches. Standard size mattresses of 38 x 72 inches for single bed and 54 x 72 inches for double bed may be used respectively on the beds thus constructed. FIG. 19C shows a bed structure in which the receptacles are positioned such that the open fronts are facing the side of the bed so that drawers and shelves can be provided therein for storing linens, clothings or other household articles.

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

What I claim as new and desire to protect by Letters Patent of the United States is:

1. In a modular furniture-luggage unit having at least two four-sided receptacles removably mounted together, wherein each of said receptacles comprises a substantially square wall, two parallel side walls formed at two opposite side edges of said base wall, and a back wall formed at one side edge of said base wall, said back wall being perpendicular and integrally joined to said side walls, said side walls having top edges and front edges, a plurality of complementary mounting means formed in said top edges and front edges of said side walls and the outside surface of said base wall and back wall whereby said receptacles are selectively engageable by engaging the complementary mounting means in selected front or top edges of said side walls or selected outside surface of said base wall or back wall of one receptacle with the complementary mounting means in selected front or top edges of the side walls or the outside surface of the base wall or back wall of the other receptacle, at least one horizontal track means provided on the inside surface of said side walls, said horizontal track means being parallel to said base wall, at least one vertical track means provided on the inside surface of said side wall, said vertical track means being perpendicular to said horizontal track means, and securing means formed on the outside surface of said side walls operative for firmly securing said receptacles in a fixed engagement.

2. A modular furniture-luggage unit according to claim 1 wherein said complementary mounting means on said top edges of said side walls are located in two corner portions of said top edges, said complementary mounting means on said front edges are located in the corner portion of said front edges neighboring to said base wall, said complementary mounting means on said outside surface of said base wall are located in the four corner portions therein, and said complementary mounting means on the outside surface of said back wall are located in two corner portions therein neighboring to said base wall.

3. A modular furniture-luggage unit according to claim 2 in which each of said complementary mounting means comprises a complementary mounting pin and a complementary retaining hole.

4. A modular furniture-luggage unit according to claim 3 including a complementary retaining hole formed in a corner portion of the outside surface of one of said side walls and located neighboring the front edge wherein, a complementary mounting pin formed in the opposite corner portion of the same outside surface of said one side wall, and a complementary mounting pin formed in the corner portion of the outside surface of the other side wall and located neighboring to the front edge wherein, a complementary mounting hole formed in the opposite corner portion thereof neighboring to said base wall whereby two receptacles are engageable side by side by the outside surface of one of their side walls abutting each other.

5. A modular furniture-luggage unit according to claim 1 in which said securing means includes a pair of mounting plate members fixedly secured to the outside surface of said side walls of said receptacles through connecting rod means formed on said outside surface of said side walls and detachable handle latch means operative slidably attachable on said connecting rod means under said mounting plate members to firmly secure said receptacles in a fixed mounting relation.

6. A modular furniture-luggage unit according to claim 5 including slot means formed in the top and front edges of said side walls of said receptacles whereby when two receptacles are mounted together to form an open front cabinet unit, a pair of said slot means is located in each edge of the open front of said cabinet unit.

7. A modular furniture-luggage unit according to claim 6 including a substantially planar detachable front cover member pivotally mounted to each edge of said open front of said cabinet unit.

8. A modular furniture-luggage unit according to claim 7 in which said front cover member includes pivotally mounted hinge means operatively attachable in each pair of said slot means in each edge of said open front selectively.

9. A modular furniture-luggage unit according to claim 8 in which said front cover is operatively turnable
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to lie co-terminously in abutment on the undersurface of said base wall.

10. A modular furniture-luggage unit according to claim 9 including at least one drawer means slidably receiveable within said cabinet unit through said horizontal track means therein to form a chest of drawers furniture unit.

11. A modular furniture-luggage unit according to claim 10 wherein said drawer means comprises a substantially square open top bin member having a substantially square bottom panel, two vertical side panels, a vertical back panel and a vertical front panel; elongated rail means, complementary to said track means, formed on the outside surface of said vertical side panels and extending substantially the entire longitudinal length thereof.

12. A modular furniture-luggage unit according to claim 11 wherein said drawer means includes a continuous lip portion in the top rim portion.

13. A modular furniture-luggage unit according to claim 12 wherein said drawer means includes a handle member pivotally mounted on said front panel.

14. A modular furniture-luggage unit according to claim 13 wherein said drawer means includes disengageable hinge means whereby two drawer means are operatively attachable together through said disengageable hinge means to form a suitcase luggage unit.

15. A modular furniture-luggage unit according to claim 11 including at least one substantially rectangular planar board member operatively receivable in said horizontal track means to provide a shelving in said cabinet unit.

16. A modular furniture-luggage unit according to claim 13 wherein said planar board member includes a continuous lip portion and disengageable hinge means therein operatively attachable with said drawer means to form a suitcase luggage unit.