MODULAR STORAGE SYSTEM FOR CYLINDRICAL OBJECTS

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ABSTRACT
A base module for storing cylindrical objects is disclosed in which the same components used to construct the base module can be used to build and attach additional modules in both vertical and horizontal directions from the base module. The base module comprises (a) a pair of flat side panels that are essentially rectangular in shape, (b) a flat upper shelf, (c) a flat lower shelf and (d) a partial back wall. The upper shelf is attached to inside faces of the side panels so that the first end of the upper shelf is adjacent to the front sides of the side panels, with the first end of the upper shelf located just above an intermediate position between the top and bottom sides of the side panels. The upper shelf further slants downwardly in a direction toward the back side of the side panels sufficient that a cylindrical object will roll down the upper shelf. The lower shelf is attached to inside faces of the side panels so that the first end of the lower shelf is adjacent to the front sides of the side panels, with the first end of the lower shelf located just above the lower sides of the side panels. The lower shelf further slants upwardly in a direction toward the back side of the side panels sufficient that a cylindrical object will roll down the lower shelf. The partial back wall is attached to inside faces of the side panels so that the partial back wall abuts mutually respective back sides of the side panels. The partial back wall is further positioned so that cans that roll down the first shelf and fall from the first shelf will be directed by the back wall onto the second shelf.
MODULAR STORAGE SYSTEM FOR CYLINDRICAL OBJECTS

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The invention relates to a system for storing and dispensing cylindrical cans containing beverages or food stuffs wherein the cans traverse through the system in a serpentine manner. In particular, the present invention relates to an improved modular system that is assembled from a combination of four separate building units that are used in multiple numbers to assemble a basic storage module. The basic storage module can be expanded or adjusted outwardly from its longitudinal plane by a telescoping manner to accommodate cans of different sizes. The system can further be expanded by assembling additional storage modules both vertical and horizontal directions from the basic module wherein the additional storage units are formed from a combination of the same building units used to assemble the basic module. Each additional storage module is integrally attached or connected to or the basic module or to intervening modules that have been assembled and connect back to the basic module. Accordingly the storage system of the present invention can be formed as a basic single storage module and additional expanded modules can be added to the basic module using an additional number of the same building units used in forming the basic module so that additional modules can be added to the basic module and any intervening modules previously added to the basic module in either or both the vertical and horizontal directions. The four building items in assembling the storage modules of the present invention are preferably molded from plastic material. Because there are only four building items, only four molds are necessary to form all the building units of the storage system.


[0004] There have been many storage systems disclosed in the prior art for stacking and storing cylindrical objects such as cans of beverages and food stuffs. An early system for use in commercial marketing of canned goods is disclosed in U.S. Pat. No. 2,996,344. The system is folded in the form of a carton made of cardboard or the like. The carton is held together by tape or glue. Shelves or partitions made of the same material as the carton are arranged inside the carton and held in place by slots formed in an inner panel construction that extends along the longitudinal sides of the carton. The shelves are positioned so as to form a continuous, serpentine path that cans can roll through in traversing through the carton. The cans are stored in the carton in that serpentine path, and the bottom, leading end of the path is open through the carton so that a can at the bottom of the stack can be withdrawn. Once withdrawn, the cans in the carton roll in the serpentine path so that the next can line becomes accessible to be withdrawn. The storage system was proposed to be used in the commercial marketing of canned goods and requires the assembly of various cut and notched blanks which have to be glued or taped. The system is not expandable in any sense. It cannot be adapted for different sized cans and there is no way suggested for adding additional storage cartons integrally to the original one. The system was not designed and would not be acceptable for home storage of canned goods.

[0005] Wire rack systems, such as, for example, shown in U.S. Pat. Nos. 3,805,964 and 4,426,008, use a complex system of bent wires to create a storage system similar to the cardboard carton system of U.S. Pat. No. 2,996,344. The stored cans move in a serpentine path. There is no suggestion of being able to make the individual, serpentine paths of the systems of U.S. Pat. Nos. 3,805,964 and 4,426,008 capable of being adjusted to accept cans of different sizes. Further, there is no suggestion of being able to expand the storage units in a modular fashion by adding additional modules to the initial unit.

[0006] In U.S. Pat. No. 4,228,903 a gravity can dispenser for commercial beverage coolers is disclosed. Individual trays are molded with a shelf that slants from one end of the tray to the other. Cans are stored on the shelves, with the cans being placed on the shelf on one end of the shelf and removed from the shelf at the other end. The cans do not move in a serpentine fashion, but rather simply from the first end of a shelf to the second end. The shelves have stepped guide ways formed along their opposite, longitudinal sides so as to be able to accept three different sizes of cans, but otherwise there is no adjustment for varying the actual width of the shelves. The individual trays can be stacked one on top of the other and side-by-side, but there is no suggestion of stacking the trays in such a way that a serpentine path is provided for the cans to traverse. The tray system of U.S. Pat. No. 4,228,903 is intended for the short term storage of cooled beverage cans for commercial sales of the individual cans.

[0007] In U.S. Pat. No. 4,911,309 there is disclosed a storage rack system for cylindrical cans. The system is formed from component parts that can be assembled into a storage rack. The system comprises two rectangular side panels which have both of their major surfaces grooved with mortises. Flexible, elongate moldings have tenon portions which are inserted longitudinally in the panel mortises to form can supporting guide ways. The cans move along one guide way from the front of the rack towards the back of the rack, and at the back of the rack the cans drop from the one guide way to a second one. In the second guide way, the cans move toward the front of the rack wherein individual cans can be removed from the forward end of the guide way. The cans only make one reversal in travel. A second one reversal guide way is positioned above the first, but cans from the second guide way do not traverse downwardly in serpentine fashion into the first guide way. The cans in the second guide way must be removed at the front of the rack after making only one reversal in their travel. There is no suggestion of a module that when added vertically from the first module is capable of feeding cans in a serpentine fashion from the added module to the initial module. The two rectangular side panels are held in spaced position by stringers or pins that extend from one side panel to the other. By removing one set of stringers or pins and replacing them by another set having a different length, the rack of U.S. Pat. No. 4,911,309 can be adjusted to accommodate different sized cans, but it requires changing one set of stringers or pins with a second set, and when one set of stringers or pins are not being used, they must be kept in a secure place for use in the future. There is no suggestion of any means of varying the effective width of the rack without requiring the removal and replacement of the stringers or pins.
BRIEF DESCRIPTION OF THE INVENTION

In accordance with the present invention, an improved, novel storage system is provided for cylindrical objects such as cans of foods or beverages. The system of the present invention is based on a modular concept wherein four individual construction pieces or items are used to form an individual module of the storage system. The module can be used alone or additional modules can be added to the initial module, with the additional modules being formed from the same individual construction pieces used to form the initial module. Each individual module also includes means for telescopic expansion in the direction of the width of the module so that the module can be quickly and easily adjusted to accept any size can without requiring dismantling of the module, reconstruction of the module or of exchanging any component of the module.

The individual construction pieces of the module are preferably molded from a plastic material, and inasmuch as there are only four such pieces, only four molds are necessary. Three of the four pieces used in forming a module of the present invention are essentially planar, while the fourth component has an essentially flat base portion with essentially flat end sections extending from the opposite ends of the base portion at similar acute angles and away from the same broad, flat surface of the base portion so that the fourth component has the general longitudinal cross-sectional shape of a shallow trough. These four pieces or components can be packaged in a relatively flat package or in a relatively flat plastic bag, which facilitates shipping and handling of the product. The ultimate user quickly assembles the pieces into the modules of the present invention. When assembled, the module is strong and sturdy and forms an attractive and extremely useful system for storing and dispensing cans of food and beverage.

A pair of the first of the four pieces or components of the module construction of the present invention are used to form opposite, broad, flat, side walls of the module. A pair of the second of the four pieces or components of the module construction of the present invention are used to form a lowermost shelf of the module. The second pieces are essentially flat, elongate members that have a length of between about eight-tenths to nine-tenths the longitudinal length of the first pieces, i.e., the pieces that form the opposite side walls of the module.

The opposite ends of the second pieces are curved upwardly for purposes which will be explained hereinafter. A plurality of flat extensions extend from one of the longitudinal side edges of each of the second pieces. These flat extensions are spaced apart from each other such that when two of the second pieces are arranged with the flat extensions facing each other, the flat extensions of the second pieces are received snugly between respective flat extensions on the other of the second pieces so that the flat extensions can be received in telescopic fashion whereby the two facing pieces can be moved toward and away from each other, with the flat extensions forming a flat surface whose width can be adjusted by moving the second pieces toward or away from each other.

The side edges of the second pieces opposite from which the flat extensions extend are provided with a plurality of lug elements. A like series of openings are arranged in the first pieces, i.e., the sidewalls of the module. These openings are adapted to receive corresponding lugs on the second pieces such that the second pieces can be securely attached to the pair of first pieces. The flat surface formed by the side-by-side, telescopically received flat extensions of the pair of second pieces forms the lowermost shelf of the module. The openings in the first pieces are arranged in a slanting, straight line such that the flat surface forming the lowermost shelf of the module slants downwardly in a direction from the back end of the module toward the front end of the module.

A pair of the third of the four pieces or components of the module construction of the present invention are used to form an upper shelf of the module. The third pieces are essentially flat, elongate members that have a length of between about six-tenths to seven-tenths the longitudinal length of the first pieces, i.e., the pieces that form the opposite side walls of the module.

A plurality of flat extensions extend from one of the longitudinal side edges of each of the third pieces. These flat extensions are spaced apart from each other such that when two of the third pieces are arranged with the flat extensions facing each other, the flat extensions of the pair of third pieces are received snugly between respective flat extensions on the other of the third pieces so that the flat extensions can be received in telescopic fashion whereby the two facing third pieces can be moved toward and away from each other, with the flat extensions forming a flat surface whose width can be adjusted by moving the third pieces toward or away from each other.

The side edges of the third pieces opposite from which the flat extensions extend are provided with a plurality of lug elements. A like series of openings are arranged in the first pieces, i.e., the sidewalls of the module. These openings are adapted to receive corresponding lugs on the second pieces such that the second pieces can be securely attached to the pair of first pieces. The flat surface formed by the side-by-side, telescopically received flat extensions of the pair of second pieces forms the lowermost shelf of the module. The openings in the first pieces are arranged in a slanting, straight line such that the flat surface forming the lowermost shelf of the module slants downwardly in a direction from the back end of the module toward the front end of the module.

A pair of the fourth of the four pieces or components of the module construction of the present invention are used to form a partial end wall of the module that directs cans rolling down an upper shelf in the module to drop smoothly to a lower shelf in the module when the cans come to the end of the upper shelf. The fourth components or pieces are essentially flat, elongate members that have a length of between about three-tenths to thirty-five hundredths the longitudinal height of the first pieces, i.e., the pieces that form the opposite side walls of the module.

A pair of flat side extensions extend from one of the longitudinal side edges of each of the fourth pieces. These flat side extensions are spaced apart from each other such that when two of the fourth pieces are arranged with the flat side extensions facing each other, the flat side extensions of the pair of fourth pieces are received snugly between respective flat side extensions on the other of the fourth pieces so that the flat side extensions can be received in telescopic fashion whereby the two facing fourth pieces can be moved toward and away from each other, with the flat side exten-
sions forming a flat surface whose width can be adjusted by moving the third pieces toward or away from each other.

[0018] Each of the fourth pieces further have a flat end extension extending from each of the opposite longitudinal ends of the fourth piece. The flat end extensions make similar acute angles away from the same broad, flat surface of their respective fourth pieces so that the extensions slant inwardly of the module when the respective fourth piece is assembled as a component of the module. The flat end extensions direct cans in their reversal of direction as the cans drop from an upper shelf in the module to a lower shelf.

[0019] Each of the side edges of the flat end extensions on the fourth pieces that are adjacent to and abut the sides of the respective fourth pieces that are in turn opposite from which the flat side extensions extend are provided with a pair of lug elements. A like pair of openings are arranged in the first pieces, i.e., the sidewalls of the module. These openings are adapted to receive corresponding lugs on the fourth pieces such that the fourth pieces can be securely attached to the pair of first pieces. The flat surface formed by the side-by-side, telescopically received flat extensions of the pair of third pieces forms a partial end side of the module. The pair of openings in the first pieces are arranged such that the flat surface forming of the mutually engaged fourth pieces forms a partial end panel for the module which prevents cans from falling out of the module as the cans fall from an upper shelf to a lower shelf in the module.

[0020] Additional features of the invention will become apparent from the following detailed description taken together with the accompanying drawings.

DRAWINGS

[0021] FIG. 1 is a pictorial view of an individual module of the storage system of the present invention;

[0022] FIG. 2 is a side view of the module of FIG. 1 taken from the left side of FIG. 1 and showing the left side panel of the module removed so as to illustrate the positioning of the shelves and end reversal member within the interior of the module;

[0023] FIG. 3 is an elevation view of a side panel of the module;

[0024] FIG. 4 is a cross section taken along line 4-4 of FIG. 3;

[0025] FIG. 5 is a pictorial view of two of the pieces that form a lower shelf of the module;

[0026] FIG. 6 is a cross section taken along line 6-6 of FIG. 5;

[0027] FIG. 7 is a pictorial view of two of the pieces that form an upper shelf of the module;

[0028] FIG. 8 is a cross section taken along line 8-8 of FIG. 7;

[0029] FIG. 9 is a pictorial view of two of the pieces that form a partial end wall and can travel reversing member of the module;

[0030] FIG. 10 is a cross section taken along line 10-10 of FIG. 9; and

[0031] FIG. 11 is a view similar to that of FIG. 2 that shows two modules stacked one on top of the other with the side panels of the module removed so as to illustrate the positioning of the shelves and end reversal members within the interiors of the modules.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0032] In accordance with the present invention, an improved, modular system is provided for storage of cylindrical objects such as cans of food and beverage. A pictorial view of the improved module of the present invention is shown in FIG. 1, and a side view of the module, with the facing side panel removed to show detail of the inside of the module, is shown in FIG. 2. FIGS. 1 and 2 will be used to give a general description and identification of the present invention. Additional detail of the components and operation will be more fully described with reference to FIGS. 3-11.

[0033] Referring now to FIGS. 1 and 2, the basic module of the present invention comprises a pair of upstanding side walls 15 that are spaced apart from each other in substantially parallel configuration by a combination of a lower shelf 16, an upper shelf 17 and a partial back wall 18. The side walls 15, shelves 16 and 17, and the partial back wall 18 are attached to the opposite side walls 15 by projections on these members and corresponding engagement receptacles as will be more fully described hereinafter.

[0034] In operation, cans of food or beverages are placed on the upper shelf 17. As shown in FIG. 2, the upper shelf 17 slants downwardly sufficiently that when a cylindrical object is placed thereon, the object will roll down the shelf towards the lower end thereof. The upper shelf 17 is shorter than the distance between the front end of the module and the back end of the module, such that when a can rolls to the back end of the shelf 17, the can will drop off that shelf 17 and fall downwardly. As the can falls downwardly from the upper shelf 17 it is guided by the partial back wall 18 onto the back end of the shelf 16. The shelf 16, as shown in FIG. 2, slants downwardly from the back of the module towards the front of the module so that when a can falls on the shelf 16, it will roll downwardly to the front end of the module. Upturned wings are provided at both ends of the lower shelf 16. The upturned wing at the back side of the module aids in guiding the can onto the shelf 16 as the can falls from the upper shelf 17 to the lower shelf 16. The upturned wing at the front side of the module stops the can from rolling off the shelf at the front of the module. A user lifts the can over the upturned wing at the front of the module when the can is to be removed from the module.

[0035] Referring now to FIG. 3 an elevation view of one of the side panels 15 of the module is shown. One of the advantages, as mentioned previously, is the minimum number of components that are used in assembling the module and storage system of the present invention. The two opposite side panels 15 of the module are identical in their construction and when formed by molding a plastic material, one mold is all that is necessary because the side wall 15 can be used on either side of the module. The side panel 15 is essentially rectangular in shape, with the longitudinal length of panel 15 being at least about 10 inches and preferably between about 11 and 15 inches. The height of the panel 15 is at least about 7 inches and preferably between about 8 and 9 inches.
[0036] A plurality of a first series of spaced apart openings 21 are formed in a straight line extending from the front of the panel 15 toward the back end of the panel 15. The openings 21 are essentially rectangular in shape and are designed to accept projections extending from longitudinal side edges of an upper shelf 17 for holding the upper shelf 17 to the side walls 15 of the storage module. The interaction of the openings 21 and the projections from the side edges of the upper shelf 17 will be described in more detail hereinafter. There are a plurality of the openings 21, and, as mentioned above, they are oriented in a straight line. The line of openings 21 extend from adjacent the front end of the panel 15. The line of openings 21 slant slightly downwardly in a direction toward the back end of the panel 15. The line of openings 21 have a length of between about six-tenths and seven-tenths the longitudinal length of the panel 15 itself. The line of openings 21 slant downwardly toward the back end of the panel. The slant is to provide a sufficient slope to the shelf 17 which will be attached via way of the openings 21 such that a cylindrical can will roll down such a shelf.

[0037] A plurality of a second series of spaced apart openings 22 are formed in a straight line extending from the front of the panel 15 to the back end of the panel 15. The openings 22 are preferably rectangular or square in shape and are designed to accept projections extending from longitudinal side edges of an lower shelf 16 for holding the lower shelf 16 to the side walls 15 of the storage module. The interaction of the openings 22 and the projections from the side edges of the lower shelf 16 are identical to that of the openings 21 and the projections from the side edges of the upper shelf 16, and as mentioned above this interaction will be described in more detail hereinafter. There is a plurality of the openings 22, and, as mentioned, they are oriented in a straight line. The line of openings 22 extend from adjacent the front end of the panel 15. The line of openings 22 slant slightly upwardly in a direction from the front end of the panel 15 forward the back end of the panel. The line of openings 22 extend essentially along the entire longitudinal length of panel 15 itself. The slant of the openings 22 is of course also downwardly from the rear end of the panel 15 toward the front end of the panel 15. The slant is to provide a sufficient slope to the shelf 16 which will be attached via way of the openings 22 such that a cylindrical can will roll down such a shelf 16 toward its lower end at the front end of the module.

[0038] The panel 15 also includes four pair of openings 23, 24, 25 and 26. Each of the openings in these pairs of openings are preferably similar in shape and size to the openings 21 and 22. One pair of openings 23 is positioned near the front edge of the panel 15 at a distance roughly near the midpoint between the end of the center lines running through the openings 21 and 22 at the front end of the panel 15. The pair of openings 23 are oriented so that one of the openings is positioned above the other, and the forward most edge of one opening, that is the lower opening of the pair of openings 23 is between about 0.094 inch and 0.5 inch from the forward or front edge of the panel 15. The uppermost edge of the one opening, that is the upper opening of the pair of openings 23 is located approximately halfway between the center lines of the lines of openings 21 and 22 at the front end of the module. The other opening, that is the upper opening of the pair of openings 23 is located so that a line which is parallel to the bottom edge of the panel 15 and intersects the lowermost edge of the upper opening is generally between about 0.05 and 0.15 inches above a line which is parallel to the bottom edge of the panel 15 and intersects the uppermost edge of the lower opening in the pair of openings 23. The other opening, that is the upper opening of the pair of openings 23 is further located so that a line which is parallel to the front edge of the panel 15 and intersects the forward most edge of the upper opening is generally between about 0.05 and 0.15 inches in a direction toward the back edge of the panel 15 from a line which is parallel to the forward edge of the panel 15 and intersects the backward most edge of the lower opening in the pair of openings 23.

[0039] A second pair of openings 24 is positioned near the front edge of the panel 15 at a distance roughly near the midpoint between the end of the center line running through openings 21 at the front end of the panel 15 and the top edge of the panel 15. This pair of openings 24 are oriented in a manner similar to the first pair of openings 23, that is, so that one of the openings of the pair is positioned above the other, and the forward most edge of one opening, that is the lower opening of the pair of openings 24 is between about 0.094 inch and 0.5 inch from the forward or front edge of the panel 15. The uppermost edge of one opening, that is the lower opening of the pair of openings 24 is located approximately halfway between the center lines of the lines of openings 21 at the front end of the module and the upper or top edge of the panel 15. The other opening, that is the upper opening of the pair of openings 24 is located so that a line which is parallel to the bottom edge of the panel 15 and intersects the lowermost edge of the upper opening is generally between about 0.05 and 0.15 inches above a line which is parallel to the bottom edge of the panel 15 and intersects the uppermost edge of the lower opening in the pair of openings 24. The other opening, that is the upper opening of the pair of openings 24 is further located so that a line which is parallel to the front edge of the panel 15 and intersects the forward most edge of the upper opening is generally between about 0.05 and 0.15 inches in a direction toward the back edge of the panel 15 from a line which is parallel to the forward edge of the panel 15 and intersects the backward most edge of the lower opening in the pair of openings 24.

[0040] A third pair of openings 25 is positioned near the back edge of the panel 15 at a distance roughly near the midpoint between the end of the center lines running through openings 21 and 22 at the back end of the panel 15. The pair of openings 25 are oriented so that one of the openings is positioned above the other, and the rearward most edge of one opening, that is the upper opening of the pair of openings 25 is between about 0.094 inch and 0.5 inch from the rearward edge of the panel 15. The uppermost edge of the one opening, that is the upper opening of the pair of openings 25 is located approximately halfway between the center lines running through openings 21 and 22 at the rear or back end of the module. The other opening, that is the lower opening of the pair of openings 25 is located so that a line which is parallel to the bottom edge of the panel 15 and intersects the lowermost edge of the upper opening is generally between about 0.05 and 0.15 inches above a line which is parallel to the bottom edge of the panel 15 and intersects the uppermost edge of the lower opening in the pair of openings 25. The other opening, that is the lower opening of the pair of openings 25 is further located so that a line which is parallel to the rear or back edge of the panel 15 and intersects the rearward most edge of the lower
opening is generally between about 0.05 and 0.15 inches in a direction toward the front edge of the panel 15 from a line which is parallel to the forward edge of the panel 15 and intersects the forward most edge of the upper opening in the pair of openings 25.

[0041] A fourth pair of openings 26 is positioned near the rearward edge of the panel 15 at a distance roughly near the midpoint between the center line running through the openings 21 of the panel 15 and the top edge of the panel 15. This pair of openings 26 are oriented in a manner similar to the first pair of openings 23, that is, so that one of the openings of the pair is positioned above the other. The rearward most edge of one opening, that is the lower opening of the pair of openings 26 is between about 0.094 inch and 0.5 inch from the rearward or back edge of the panel 15. The uppermost edge of the one opening, that is the lower opening of the opening of openings 26 is located approximately halfway between the center line running through the openings 21 and the top edge of the panel 15. The other opening, that is the upper opening of the pair of openings 26 is located so that a line which is parallel to the bottom edge of the panel 15 and intersects the lowermost edge of the upper opening is generally between about 0.05 and 0.15 inches above a line which is parallel to the bottom edge of the panel 15 and intersects the uppermost edge of the lower opening in the pair of openings 26. The other opening, that is the upper opening of the pair of openings 26 is further located so that a line which is parallel to the rearward or back edge of the panel 15 and intersects the rearward most edge of the upper opening is generally between about 0.05 and 0.15 inches in a direction toward the front edge of the panel 15 from a line which is parallel to the forward edge of the panel 15 and intersects the forward most edge of the lower opening in the pair of openings 26.

[0042] The lower shelf 16 of the storage module of the present invention is shown in FIG. 5. The lower shelf 16 comprises two separate pieces 30 that are identical in their shape and structure. Each of the pieces 30 of the lower shelf 16 comprises a substantially flat, elongate section 31. An upwardly curved end section 32 is provided at the opposite ends of the elongate section 31. A plurality (four as shown in the drawings) of extensions 33 extend integrally from a longitudinal side edge of each of the flat sections 31. These flat extensions 33 are spaced apart from each other in such a manner that when two pieces 30 that form the lower shelf are placed with the flat extensions 33 facing each other, the flat extensions 33 of one of the pieces 30 are adapted to be received snugly between respective flat extensions 33 of the other of the pieces 30. Means are provided for sliding movement of the inter-engaged extensions 33 so that the two pieces 30 can be moved toward and away from each other. The two pieces 30, even though being identical in shape and structure are adapted to fit together and form a shelf in which the two pieces can be moved in telescopic type movement to adjust the effective width of the shelf 16.

[0043] The inter-engagement of the flat extensions 33 and the means enabling telescopic movement of the flat extensions are best shown by referring to both FIGS. 5 and 6. As shown, the portions 34 of the flat extensions 33 facing upwardly are of essentially the same length and shape. These portions 34 are equally spaced apart from each other, with the distance between each of these upwardly facing portions 34 being the same as the width of the upwardly facing portions 34. As shown, every other portion 34 starting at one end of the piece 30 has an elongate undercut slot 35 that runs along one of its sides that faces away from the one end of the piece 30. Each of the other portions 34 have an elongate lip 36 that extends along one of its sides that faces away from one end of the piece 30. When the two pieces 30 are turned toward each other so that the flat extensions 33 face each other, the elongate lip 36 of each portion 34 having an elongate slot 35 that slides smoothly within a corresponding undercut slot 35 of a mutually respective portion 34 that has an undercut slot 35. This inter-engagement of the elongate lips 36 with the elongate slots 35 and the accompanying sliding movement allowed thereby results in a substantially stable arrangement of the two pieces 30 that holds the two pieces 30 in engagement while allowing them to move toward and away from each other.

[0044] Means can be provided for limiting the outward sliding movement of the two pieces 30 so that they cannot be inadvertently pulled completely apart from each other. As illustrated best in FIG. 6, a small lug 37 is provided on the bottom side of one of the undercut slots 35 nearest the one end of the piece 30. This lug 37 is spaced by a relatively short distance from the free end of its respective extension 33. At the other end of the piece 30, an elongate, open slot way 38 (best shown in FIG. 5) is provided that extends along the elongate lip 36. The open slot way 38 terminates a relatively short distance from the free end of its respective extension 33. When two pieces 30 are arranged so that the flat extensions 33 inter-engage with each other, the lug 37 can be pushed into the slot 38 to slide therein. When the two pieces 30 are moved away from each other, the lug 37 will engage the end of the slot 38 and in effect form a stop for the further movement of the two pieces 30.

[0045] The engagement of the lower shelf 16 to the opposite side panels 15 is achieved by providing the elongate flat sides of the elongate flat section 31 of the pieces 30 with lug elements 39 that are spaced apart and extend from those elongate flat sides of the pieces 30. The lug elements 39 are spaced apart from each other by a distance equal to twice the distance between the openings 22 of the side panels 15. In addition, the lug elements 39 are oriented so that when two of the pieces 30 are engaged together to form the lower shelf 16, the lug elements 39 are staggered on opposite sides of the shelf 16 so that a lug element 39 on one side of the shelf 16 is offset from a corresponding lug element 39 on the other side of the shelf 16 by a distance equal to one-half the distance between adjacent lug elements 39 on the pieces 30 of the shelf 16. This staggering is achieved by strategic placement of the lug elements 39 along the flat sides of the pieces 30 such that when two of the pieces 30 are turned so that the extensions 33 face each other and inter-engage each other, the lug elements 39 on one side of the pair of pieces 30 are staggered with respect to the lug elements 39 on the other side of the pair of pieces 30.

[0046] The lug elements 39 are, as mentioned above, spaced from each other by a distance of twice the distance between openings 22 in the panels 15. When the pair of pieces 30 are attached to the panels 15 to form the lower shelf of the module, the lug elements 39 make tight engagement with every other opening in the line of openings 22 on the panels 15. The lug elements 39 preferably are rectangular in cross section and fit snugly within the rectangular openings 22 of the side pieces 30. In addition, to form an interlocking means between the lug elements 39 and the
openings 22, the lug elements 39 are preferably provided with wing extensions 40 extending from distal side edges of the lug elements 39. As best shown in FIG. 4, which is a horizontal cross section through five adjacent openings 22 taken on a line through the centers of the openings 22, the openings 22 have a width sufficient to accept the lug elements 39 and the wing extensions 40 on the sides of the lug elements. The openings 22 have a height that is twice the thickness of the lug elements 39, and the lower side of the openings 22 (being one-half of the total side) are provided with a lip 41 extending inwardly from opposite sides of the opening 22. These lips 41 are formed on alternate inside and outside faces of the openings 22. The lug elements 39 are received in the upper portion of the openings 22, and when the wing extensions 40 clear the corresponding lips 41, the lug elements 39 are moved downwardly so that the wing extensions 40 slide down along the lips 41 and lock the lug elements 39 within the openings 22.

[0047] The upper shelf 17 of the storage module of the present invention is shown in FIG. 7. The upper shelf 17 comprises two separate pieces 43 that are identical in their shape and structure. The upper shelf 17 incorporates elements that are essentially identical to the same elements of the previously described lower shelf 16. In fact, the elements of the upper shelf 17 are identical to those of the lower shelf 16 with the only difference being that the upper shelf 17 has no curved or upturned sections 32 of the lower shelf 16. Accordingly, in describing the upper shelf 17, elements that are identical to their counterparts in the lower shelf 17 will be identified by the same reference numerals as used in describing the lower shelf 16. Each of the pieces 43 of the upper shelf 17 comprises a substantially flat, elongate section 31. A plurality (four as shown in the drawings) of extensions 33 extend integrally from a longitudinal side edge of each of the flat sections 31. These flat extensions 33 are spaced apart from each other in such a manner that when two pieces 43 that form the upper shelf 17 are placed with the flat extensions 33 facing each other, the flat extensions 33 of one of the pieces 43 are adapted to be received snugly between respective flat extensions 33 of the other of the pieces 43. Means are provided for sliding movement of the inter-engaged extensions 33 so that the two pieces 43 can be moved toward and away from each other.

[0048] The two pieces 43, even though being identical in shape and structure, are adapted to fit together and form a shelf in which the two pieces can be moved in telescopic type movement to adjust the effective width of the shelf 17. The inter-engagement of the flat extensions 33 and the means enabling telescopic movement of the flat extensions are best shown by referring to both FIGS. 7 and 8. As shown, the portions 34 of the flat extensions 33 facing upwardly are of essentially the same width and shape. These portions 34 are equally spaced apart from each other, with the distance between each of these upwardly facing portions 34 being the same as the width of the upwardly facing portions 34. As shown, every other portion 34 starting at one end of the piece 43 has an elongate undercut slot 35 that runs along one of its sides that faces away from the one end of the piece 43. Each of the other portions 34 have an elongate lip 36 that extends along one of its sides that faces the away from one end of the piece 43. When the two pieces 43 are turned toward each other so that the flat extensions 33 face each other, the elongate lip 36 of each portion 34 having an elongate lip 36 slides smoothly within a corresponding undercut slot 35 of a mutually respective portion 34 that has an undercut slot 35. This inter-engagement engagement of the elongate lips 36 with the elongate slots 35 and the accompanying sliding movement allowed thereby results in a substantially stable arrangement of the two pieces 43 that holds the two pieces 43 in engagement while allowing them to move toward and away from each other.

[0049] Means can be provided for limiting the outward sliding movement of the two pieces 43 so that they cannot be inadvertently pulled completely apart from each other. As illustrated best in FIG. 8, a small lug 37 is provided on the bottom side of one of the undercut slots 35 nearest the one end of the piece 43. This lug 37 is spaced by a relatively short distance from the free end of its respective extension 33. At the other end of the piece 43, an elongate, open slot way 38 is provided that extends along the elongate lip 36. The open slot way 38 terminates at a region that extends along the undercut slot 35. The lug 37 can be received in this undercut slot 35 in FIG. 4. The openings 21 also have the same arrangement of lips 41 as shown for the openings 22 in FIG. 6 of the lower
shelf. The openings 21 and 22 are in fact identical in their shape, and the spacing between openings 21 is identical to the spacing between openings 21. The lips 41 are formed on alternate inside and outside faces of the openings 21. The lug elements 39 are received in the upper portion of the openings 21, and when the wing extensions 40 clear the corresponding lips 41, the lug elements 39 are moved downwardly so that the wing extensions 40 slide down along the lips 41 and lock the lug elements 39 within the openings 21.

[0052] The partial back wall 18 will now be described in detail with reference to FIGS. 9 and 10. The partial back wall 18 is formed from two separate pieces 50 that are identical in their shape and size. Each piece 50 comprises an elongate, flat section 51 that has an elongate length of between about three-fourths of an inch and a half inch and a quarter, preferably about one inch. A pair of wings 52 having a length of from about an inch and a quarter to an inch and a half extend from the opposite ends of the flat section 51. The wings 52 extend outwardly at the same acute angle from the same face of the flat section 51. The angle between the face of the flat section 51 and each of the wings 52 is about 135 degrees.

[0053] Two extensions 53 extend integrally from a longitudinal side edge of each of the flat sections 51. These flat extensions 53 are spaced apart from each other in such a manner that when two pieces 50 that form the back wall 18 are placed with the flat extensions 53 facing each other, the flat extensions 53 of one of the pieces 50 are adapted to be received snugly between respective flat extensions 53 of the other of the pieces 50. Means are provided for sliding movement of the inter-engaged extensions 53 so that the two pieces 50 can be moved toward and away from each other. The two pieces 50, even though being identical in shape and structure are adapted to fit together and form a partial back wall section 18 in which the two pieces 50 can be moved in telescopic type movement to adjust the effective width of the back wall 18.

[0054] The inter-engagement of the flat extensions 53 and the means enabling telescopic movement of the flat extensions are best shown by referring to both FIGS. 9 and 10. As shown, the portions 54 of the flat extensions 53 facing upwardly are of essentially the same width and shape. These portions 54 are equally spaced apart from each other, with the distance between each of these upwardly facing portions 54 being the same as the width of the upwardly facing portions 54. As shown, one of the portions 54 has an elongate undercut slot 55 that runs along one of its sides that faces away from the end of the piece 50. The other portion 54 has an elongate lip 56 that extends along one of its sides that faces away from one end of the piece 50. When the two pieces 50 are turned toward each other so that the flat extensions 53 face each other, the elongate lips 56 of the portions 54 have an elongate lip 56 slides smoothly within a corresponding undercut slot 55 of a mutually respective portion 54 that has an undercut slot 55. This inter-engagement of the elongate lips 56 with the elongate slots 55 and the accompanying sliding movement allowed thereby results in a substantially stable arrangement of the two pieces 50 that holds the two pieces 50 in engagement while allowing them to move toward and away from each other.

[0055] The engagement of the back shelf 18 to the opposite side panels 15 is achieved by providing the extensions 53 with lug elements 59 that project from one side of the extensions 53. The lug elements 59 are positioned so that one is placed at the end of one of the extensions 53 and the other is placed midway along the side of the other extension 53.

[0056] When the pair of pieces 50 are attached to the panels 15 to form the back wall 18 of the module, the lug elements 59 make tight engagement with one of the mutually corresponding openings 23, 24, 25 or 26 on the panels 15. The lug elements 59 preferably are rectangular in cross section and fit snugly within the rectangular openings 23, 24, 25 and 26 of the side pieces 30. The lug elements 59 are basically the same as the lug elements 39 on the lower and upper shelves, and the openings 23, 24, 25 and 26 are the same as the openings 21 and 22 of the side pieces 30. The lug elements 59 form an interlocking means with the openings 23, 24, 25 and 26 in the same manner that lug elements 39 of the upper and lower shelves interlock with the openings 21 and 22 in the side piece 30. The openings 23, 24, 25 and 26 all have a width sufficient to accept the lug elements 59 and the wing extensions 60 which are similar to the wing extensions 40 on the lug elements 39 of the upper and lower shelves are provided on the sides of the lug elements 59. The openings 23, 24, 25 and 26 have a height that is twice the thickness of the lug elements 59, and the lower side of the openings 23, 24, 25 and 26 (being one-half of the total side) are provided with a lip 61 (see FIG. 3) extending inwardly from opposite sides of each of the openings 23, 24, 25 and 26. The lug elements 59 are received in the upper portion of the mutually respective openings 23, 24, 25 and 26, and when the wing extensions 60 clear the corresponding lips 61, the lug elements 59 are moved downwardly so that the wing extensions 60 slide down along the lips 56 and lock the lug elements 59 within the mutually respective openings 23, 24, 25 and 26.

[0057] The modules of the present invention can be added to in both the horizontal and vertical directions. In FIG. 11, there is shown two modules, one formed on top of the other. FIG. 11 is a side view of the two modules with the rear side panels being removed to show positioning of the shelves within the stacked pair of modules. As illustrated, the bottom module is identical to the single module shown in FIG. 2. In the stacked modules shown in FIG. 11, a second module is placed on top of the first. The only modifications being that the lower shelf 77 of the top module is a shelf that is identical to the upper shelf 17 of the lower module. It should be noted that the shorter shelf 77 engages the openings 22 from the back end of the upper module. This shelf 77 is shorter than a conventional bottom shelf 16 of the basic module. Thus, there are a plurality of openings 22 near the front of the upper module that are not used.

[0058] The added upper module has the same back wall portion 18 as do all modules of the present invention, but a second partial end wall 78 is added to the front of the modules to join the modules. In the stacked arrangement of modules, cans roll down the uppermost shelf 17 in the upper module. The cans then drop to the lower shelf 77 of the upper module and roll down that shelf. At the end of shelf 77, the cans are directed by the partial end wall 78 to the upper shelf 17 of the lower module. The cans roll down this shelf and drop to the lower shelf 16 of the lower module as has been described previously. Additional modules can be added to the stack in the same manner that the second
module was. The cans simply move in a serpentine manner as described for all the modules in a stack.

[0059] To secure one module on top of the other module, the side pieces 15 as shown in the cut away cross sectional portion of FIG. 11 have inter-engaging elements on their respective top and bottom edges. These elements can be, as shown in FIG. 11, small cavities 90 formed in one of either the top or bottom edge, and small projections or feet 91 provided in the other edge that engage the small cavities in an adjoining upper side piece 15. When the side pieces 15 are arranged one on top of the other, the small projections or feet 91 of one of the side pieces 15 engage a mutually respective cavity 90 of the adjoining side piece 15.

[0060] The modules of the storage system of the present invention can be expanded horizontally by simply adding a module at the side of the initial module. The added module need not include a side panel 15 which is adjacent to the initial module, inasmuch as the shelves of the added module can be attached directly to the side panel 15 of the adjoining module. In other words, the joined modules share a common side wall 15. The sharing of a common side wall is accommodated by the staggered arrangement of the engagement lugs 39 and the fact that the engagement lugs 39 are spaced apart by a distance of two openings 21 and 22 in the side wall 15. This allows the added shelves of a horizontally added module to utilize the openings 21 and 22 which are bridged and not used by the shelves of the starting module, that is, the module that is being added to.

1. A base module for storing cylindrical objects such as cans, wherein said base module is capable of having additional modules added thereto in both vertical and horizontal directions, with a combination of the same components used in forming said base module being used to form any additional modules, said base module comprising

(a) a substantially flat first side panel and a substantially flat second side panel, with each said first side panel and said second side panel being essentially rectangular in shape so as to have a front side, a back side, a top side and a bottom side;

(b) a substantially flat upper shelf having a first side and a second side which is substantially parallel with said first side, each of said first side of said upper shelf and said second side of said upper shelf having a length that is between about six-tenths and seven tenths of a length between said front side and said back side of said first and second side panels;

(c) means for securely fastening said first side of said upper shelf to said first side panel and said second side of said upper shelf to said second side panel so that a first end of said upper shelf is positioned closely adjacent to said front side of said first side panel and said front side of said second side panel, with said first end of said upper shelf being located closely above an intermediate position between said top side and said bottom side of each of said side panels, and with said upper shelf slanting downwardly in a direction toward said back side of said first panel and said back side of said second panel sufficient that when said bottom of said first panel and said bottom of said second panel are oriented substantially horizontal, a cylindrical object will roll down said upper shelf away from said first end of said upper shelf;

(d) a substantially flat lower shelf having a first side and a second side which is substantially parallel with said first side, said lower shelf having an effective length that is between about one inch and two inches shorter than a length between said front side and said back side of said first and second side panels,

(e) means for securely fastening said first side of said lower shelf to said first side panel and said second side of said lower shelf to said second side panel so that a first end of said lower shelf is positioned closely adjacent to said front side of said first side panel and said front side of said second side panel, with said first end of said lower shelf being located closely above said bottom side of said first side panel and said bottom side of said second side panel, and with said lower shelf slanting upwardly in a direction toward said back side of said first panel and said back side of said second panel sufficient that when said bottom of said first panel and said bottom of said second panel are oriented substantially horizontal, a cylindrical object will roll down said lower shelf toward said first end of said lower shelf;

(f) a partial back wall having a first side and a second side which is substantially parallel with said first side, said back side having an effective length that is between about one-half and six-tenths of a length between said bottom side and said top side of said first and second side panels;

(g) means for securely fastening said first side of said back wall to said first side panel and said second side of said back wall to said second side panel so that said back wall abuts mutually respective back side of said first and second side panels so that cans rolling down said first shelf will fall from said first shelf and be directed by said back wall onto said second shelf.

2. The base module in accordance with claim 1 wherein said first end of said upper shelf is located between about one-quarter inch and one inch above said intermediate position between said top side and said bottom side of each of said side panels.