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(54) **CEILING MOUNTED TRAY STORAGE SYSTEM**

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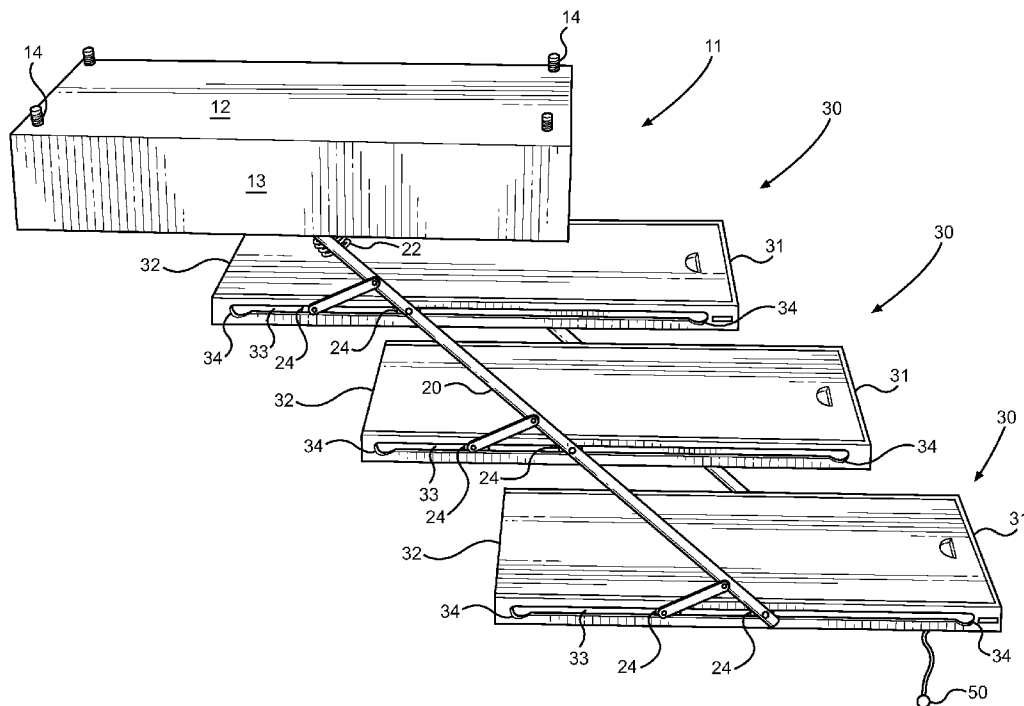
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(57) **ABSTRACT**

A ceiling mounted and extendable tray apparatus is provided, in which a plurality of trays is supported from an overhead housing and operably lowered for access to equipment stored therein. The one or more trays are horizontally supported by an elongated arm that is slidably and pivotably attached to a housing mounted to the ceiling. Each of the trays is supported from the arm via a track along each tray side, while a secondary arm extends between the track and the arm to support the tray in a horizontal condition. Each of the trays is slidable from the elongated arm when lowered, while a slidable cover is disposed over each tray. The trays are aligned in a staggered configuration when deployed, and furthermore in a stacked and condensed state when stowed within the housing. A locking mechanism secures the lowermost tray against the housing to retain the trays therein.



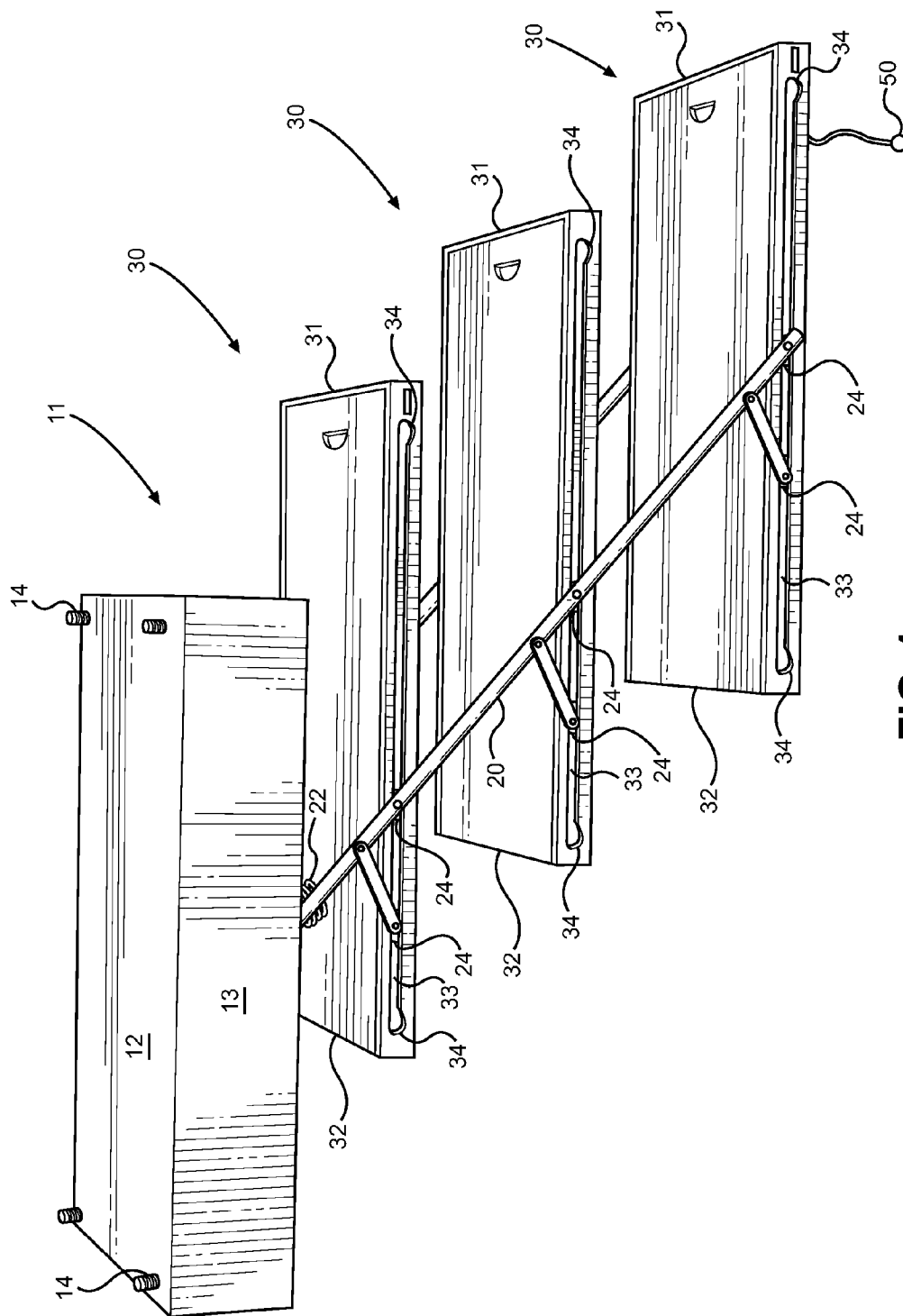


FIG. 1

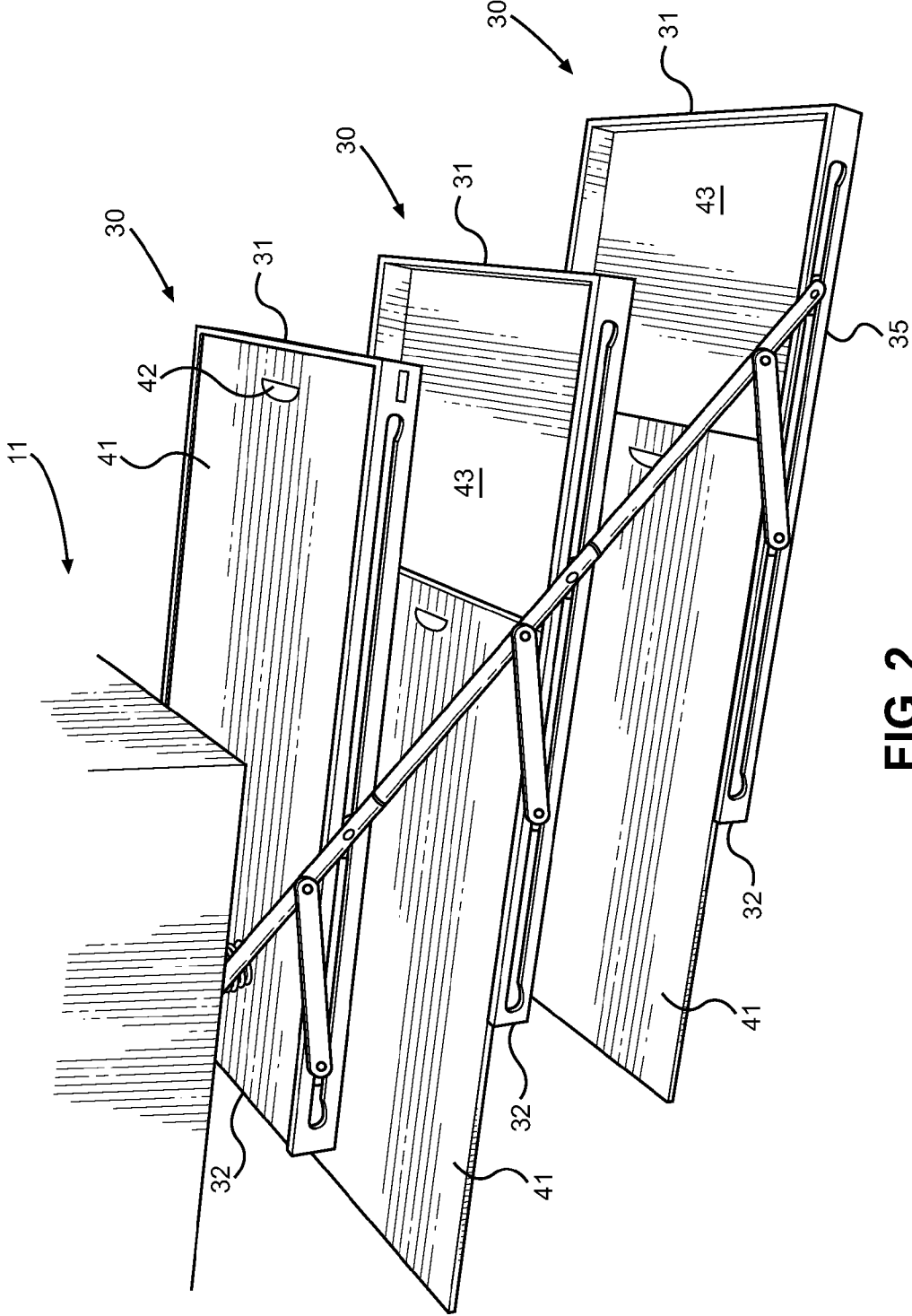


FIG. 2

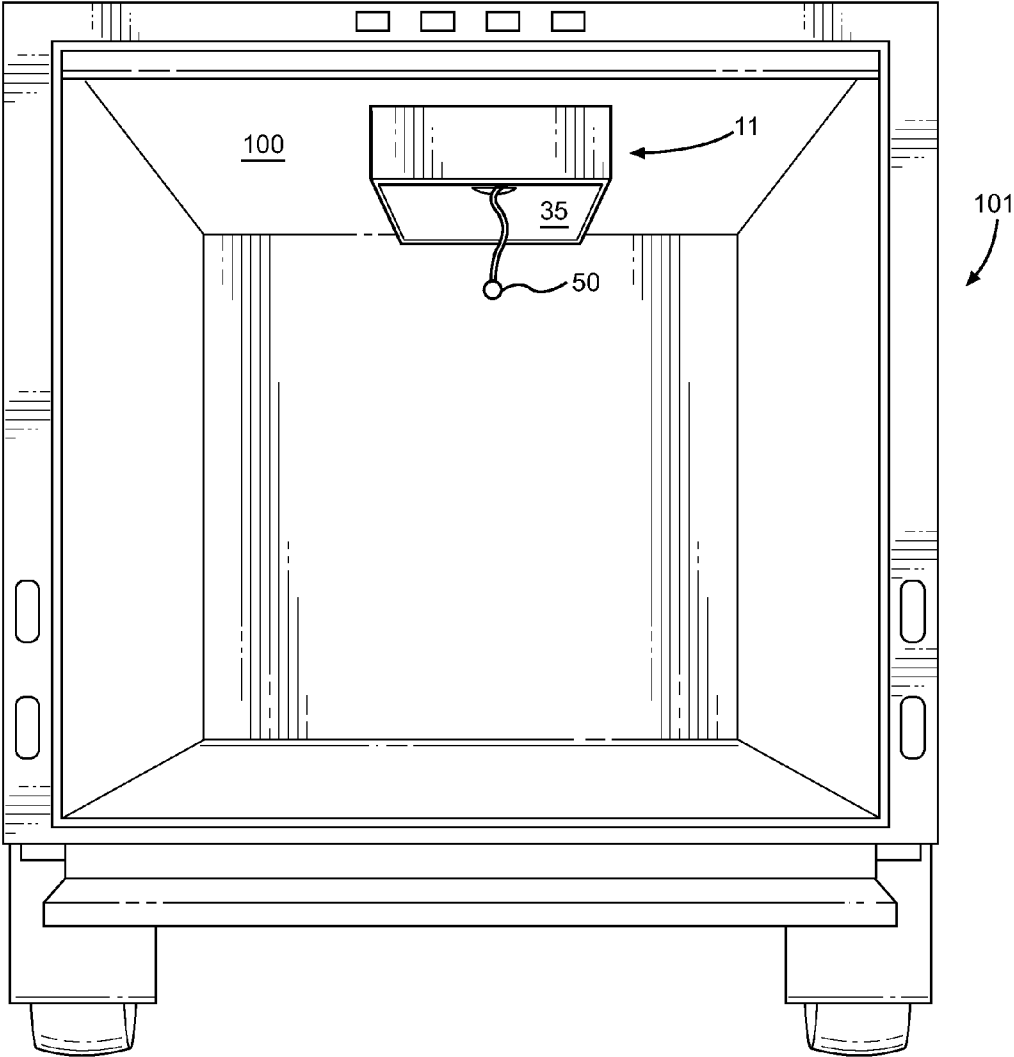


FIG. 3

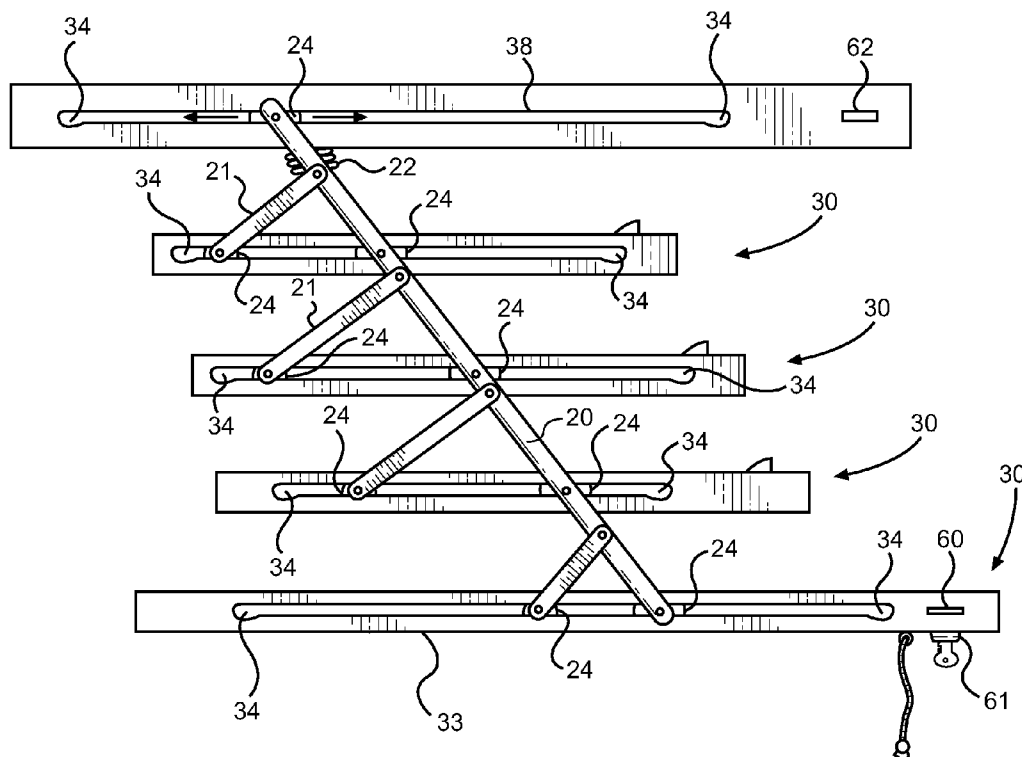


FIG. 4

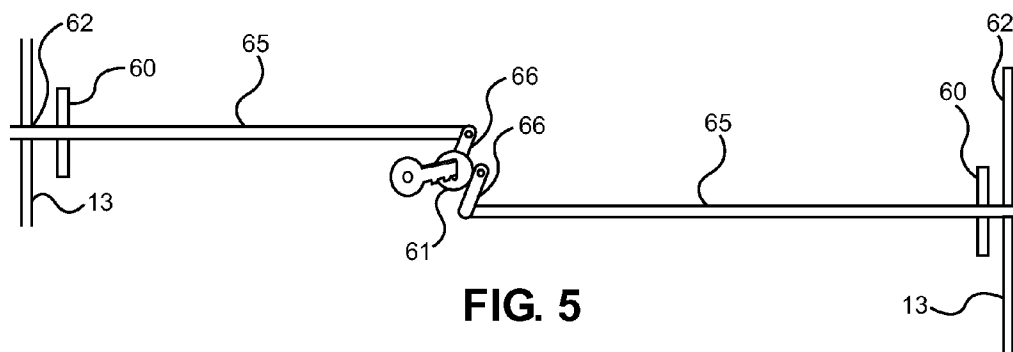


FIG. 5

## CEILING MOUNTED TRAY STORAGE SYSTEM

### CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 61/877,106 filed on Sep. 12, 2013. The above identified patent application is herein incorporated by reference in its entirety to provide continuity of disclosure.

### BACKGROUND OF THE INVENTION

#### [0002] 1. Field of the Invention

[0003] The present invention relates to toolboxes and storage units. More specifically, the present invention relates to a ceiling-mounted, pull-down storage system having a plurality of trays to support tools and equipment in a compact and expandable construction.

[0004] Toolboxes and storage units are known in art. These devices are useful storage devices for various equipment, supplies, and hand tools. The stored equipment is organized and contained in a manner that facilitates rapid retrieval and protected storage over prolonged periods. For in-home use and in commercial settings, large toolbox assemblies are commonplace and serve as receptacles for tools large and small.

[0005] While traveling or when operating as a mechanic or tradesman on the road, transporting and hauling such a large toolbox is not always appropriate or feasible, particularly for individuals and small operations. Toolboxes often take up valuable space in garages and in trailers. Their placement can exacerbate clutter, take away space that could be used for other purposes, and create a disorganized workspace. Furthermore, many toolboxes can easily spill or topple over if placed in a trailer vehicle. During transport, a toolbox needs to be tied down after each use, which can be time consuming and tedious.

[0006] The present invention relates to a ceiling mounted storage assembly. Devices are disclosed in the art that relate to ceiling mounted storage systems, however these devices generally relate to motorized systems or those that angularly deploy a tray or storage bin when accessing the same. These devices fail to provide horizontal support for items stored therein when accessing the same, and therefore are not generally well suited for supporting small tools, bits, and other equipment that would otherwise fall out of the container or shuffle when tilted in a downward state.

[0007] The present invention solves these known issues in the art by providing a ceiling mounted storage system comprising a plurality of horizontally-deploying trays. The trays are positioned in a staggered configuration with respect to one another when deployed, wherein a first and second pivotable arm connects the trays to a ceiling mounted housing. The arms connect to tracks within the housing, while each tray connects to the arms via slider tracks along the tray sides. Secondary arms connect the arm to the tray tracks to retain the trays in a horizontal state. The trays are each slidable when deployed and include a retractable sliding cover thereover. Overall, the present invention provides an improved storage system that is well suited for tools and equipment, and for storing items from a ceiling using horizontally supported trays.

#### [0008] 2. Description of the Prior Art

[0009] Devices have been disclosed in the prior art that relate to ceiling mounted storage devices. These include devices that have been patented and published in patent application publications. These devices generally relate to deployable structures from ceilings having various mechanisms in support of this function, including motorized input, sliders, and hinge joints. The following is a list of devices deemed most relevant to the present disclosure, which are herein described for the purposes of highlighting and differentiating the unique aspects of the present invention, and further highlighting the drawbacks existing in the prior art.

[0010] Examples of the art include U.S. Pat. No. 6,550,878 and U.S. Pat. No. 6,354,682, both to Nott, disclose an overhead storage device that includes a frame and a pivotably attached storage container that is raised and lowered from the frame using a motorized actuator. A pair of support arms supports the container as it is raised and lowered, while the arms translate along the frame as a result of the motorized input to raise and lower the container from the frame. The Nott device, while providing an overhead compartment, contemplates a motorized assembly. The present invention contemplates a plurality of equipment trays disposed along an elongated arm and within tracks that support sliding motion, whereby the arms extend from a housing supported overhead.

[0011] Similar to the Nott devices, U.S. Pat. No. 7,246,865 to Merrell, II discloses a ceiling mounted storage system that contemplates an electric motor that drives a pulley and a tether to raise and lower a storage compartment from a frame in the ceiling. A tilt mechanism is further contemplated to support the storage compartment when in a lowered condition. Similar to the above, the Merrell, II device fails to contemplate the tool tray storage system of the present invention, wherein the trays are extended using an elongated arm, a series of tracks and a locking mechanism rather than an electric motor and pulley system.

[0012] U.S. Pat. No. 6,411,525 and U.S. Pat. No. 6,088,239, both to Zeiss, disclose another overhead storage device, wherein the storage device is a hingedly attached storage bin connected to a pan portion and a reinforcing plate mounted to the ceiling. A latch is used to open and expose the interior of the bin from the ceiling when accessing the interior thereof. While the Zeiss device does not include motorized input, its structure diverges from that of the present invention in that the present invention provides a set of lowered trays and telescoping arms. The present invention is more suited for organized storage of tools and ready access thereto when drawing the trays downward from the housing mounted to the ceiling.

[0013] Furthermore, U.S. Pat. No. 8,136,897 to Mascari discloses an overhead storage system that comprises a hollow housing mounted in the ceiling that is pivotably attached to an articulating frame. The frame pivots downward from the housing and slidably supports a storage container. The storage container is connected to the frame when in a lowered condition via sliders, which allow access to the container in an angled state. While the Mascari device contemplates sliders and a frame that pivotably attaches to a housing along the ceiling, the Mascari device fails to anticipate or render obvious the present invention in several ways. The present invention comprises a series of trays that, when extended, are substantially horizontal and staggered from one another. The trays are supported from a pair of arms and a support that extends the trays to a lowered, accessible position, whereafter they can be collapsed into a stacked formation within the

housing. The Mascari device simply contemplates a hinged frame member and an extendable container from the angled frame.

**[0014]** Similar to the Mascari device is U.S. Pat. No. 6,572,168 to Radstake, which discloses a drawer assembly mountable to a ceiling in which the drawer is pivotable therefrom and can extend outward once lowered. Gas spring dampers are used to assist controlled lowering of the drawer, while a locking mechanism secures the drawer within a housing mounted to the ceiling. By contrast, the present invention contemplates lowered trays that extend downward and forward from a ceiling mounted housing, wherein the trays extend in a horizontal and staggered configuration.

**[0015]** The present invention contemplates a storage system that supports horizontal trays from an overhead housing. The trays are slidable from a supporting set of arms, while the arms themselves are slidable within the overhead housing. The present invention is well suited for mobile applications, such as enclosed trailers and box trucks, as well as for use in static structures such as dwellings and sheds.

**[0016]** It is submitted that the present invention solves several known drawbacks in the art of ceiling mounted storage systems, and that furthermore the present invention substantially diverges in elements from the prior art. Consequently it is clear that there is a need in the art for an improvement to existing ceiling mounted storage systems. In this regard the instant invention substantially fulfills these needs.

#### SUMMARY OF THE INVENTION

**[0017]** In view of the foregoing disadvantages inherent in the known types of ceiling mounted storage systems now present in the prior art, the present invention provides a new assembly in which the same can be utilized for supporting equipment and supplies in horizontally disposed trays from a ceiling mounted housing.

**[0018]** It is therefore an object of the present invention to provide a new and improved ceiling mounted storage system that has all of the advantages of the prior art and none of the disadvantages.

**[0019]** It is another object of the present invention to provide a ceiling mounted storage system that can stow and deploy a plurality of storage trays that are disposed horizontally when deployed.

**[0020]** Another object of the present invention is to provide a ceiling mounted storage system that utilizes a ceiling mounted housing to support deployable storage trays.

**[0021]** Yet another object of the present invention is to provide a ceiling mounted storage system that facilitates sliding motion of each tray, including slidable covers thereover for covered storage of items between access periods.

**[0022]** Another object of the present invention is to provide a ceiling mounted storage system that supports the trays using a pair of pivoting arms, wherein the arms are supported along a pair of tracks within the housing such that the arms can slide fore and aft within the housing once deployed.

**[0023]** Another object of the present invention is to provide a ceiling mounted storage system that includes a locking mechanism that secures the lowermost tray against the housing to retain the trays therein and in a stacked, stowed state.

**[0024]** A final object of the present invention is to provide a ceiling mounted storage system that may be readily fabricated from materials that permit relative economy and are commensurate with durability.

**[0025]** Other objects, features and advantages of the present invention will become apparent from the following detailed description taken in conjunction with the accompanying drawings.

#### BRIEF DESCRIPTIONS OF THE DRAWINGS

**[0026]** Although the characteristic features of this invention will be particularly pointed out in the claims, the invention itself and manner in which it may be made and used may be better understood after a review of the following description, taken in connection with the accompanying drawings wherein like numeral annotations are provided throughout.

**[0027]** FIG. 1 shows a side perspective view of the ceiling mounted storage system of the present invention.

**[0028]** FIG. 2 shows another perspective view of the ceiling mounted storage system, wherein the slidable covers over the trays are shown in an open and a closed state.

**[0029]** FIG. 3 shows an illustrative example of the ceiling mounted storage system installed along the ceiling of a vehicle.

**[0030]** FIG. 4 shows a side view of the tracks and sliders of each tray and the pivoting arms of the storage system.

**[0031]** FIG. 5 shows an overhead view of an embodiment of the locking mechanism that secures the lowermost tray to the housing.

#### DETAILED DESCRIPTION OF THE INVENTION

**[0032]** Reference is made herein to the attached drawings. Like reference numerals are used throughout the drawings to depict like or similar elements of the ceiling mounted storage system of the present invention. For the purposes of presenting a brief and clear description of the present invention, the preferred embodiment will be discussed as used for deploying a set of horizontal trays and for stowing the same in a ceiling mounted housing. The figures are intended for representative purposes only and should not be considered to be limiting in any respect.

**[0033]** Referring now to FIG. 1, there is shown a perspective view of the ceiling mounted storage system of the present invention. The assembly comprises a housing 11 that is adapted to be mounted to the ceiling of a dwelling or a vehicle, and sized to support a plurality of trays 30 within the housing interior when the trays 30 are positioned therein. The housing 11 comprises a plurality of sidewalls 13, an open lower surface, an interior volume, and an upper surface 12. The housing 11 is configured to be mounted to a flat ceiling via fasteners 14, or alternatively between ceiling joists through the sidewalls 13 thereof. The attachment method for which the present invention is mounted to the ceiling is not limited to those described herein, and it is contemplated that several attachment schemes may be employed by one skilled in the art for a given application.

**[0034]** Supported by the sidewalls 13 of the housing 11 is a first and second elongated arm 20, which is pivotably and slidably mounted to a pair of tracks mounted within the housing. The arms 20 are slidably attached to the tracks via sliders, which include bearing elements and/or rollers to facilitate sliding of the upper end of the arms 20 along each track and along the length of the housing sidewalls 13. The connection between the upper end of the arms 20 and the housing tracks allows the arms 20 to pivot downward from a substantially horizontal state to a defined angular state (as shown).

[0035] One or more trays 30 are secured along the length of the arms 20 and therebetween. The trays 30 comprise elongated members having a forward edge 31, a rear edge 32, sides, lower surfaces and an interior volume. The upper surface is open and includes a slidable cover thereover. The trays 30 include an extended length between the forward 31 and rear 32 edge, which is considerably greater than the height of the trays between the lower surface and the open upper. The trays 30 are design to support equipment, tools, and supplies therein and remain covered while stowed. Each of the trays 30 is preferably dimensioned with the same planform area (footprint) such that they can be stacked easily within the housing interior and the lowermost tray 30 substantially consumes the entire open lower of the housing 11 when the trays are positioned therein. A spring 22 may be provided along the arms 20 to assist with lifting the trays 30 and arms 20 into the housing interior and offset the weight of carried equipment.

[0036] The trays include tracks along both sides thereof, wherein the tracks 33 support bearing elements or rollers connected to the elongated arm 20 such that the trays 30 can articulate fore and aft in a horizontal plane when extended. To retain the trays 30 in a horizontal state, a secondary arm 21 secures along the tracks 33 and pivotably secures to the arm 20 above the arm-tray connection. Therefore, the secondary arm 21, the elongated arm 20, and the tray form a triangular shape that places the tray 30 in a horizontal state when the arm 20 is deployed and lowered from the housing 11. The lowermost angular extent of the arm 20 will dictate the length of the secondary arms 21 so the trays 30 remain level when the assembly is opened for access to the trays 30. The connection between the arm 20 and the tray sides, as well as the connection between the secondary arms 21 and the tray sides, is a slidable connection such that the tray can slide in a horizontal plane when completely extended. The ends of the tracks 33 include wheel locks 34, which are depressions in the track 33 that can be used to stabilize the trays 30 in a completely extended or retracted state.

[0037] Referring now to FIG. 2, there is shown a second perspective view of the ceiling mounted storage system of the present invention in an extended state. Each of the trays 30 is slidable with respect to the elongated arms and the secondary arms such that each tray 30 slides in a substantially horizontal plane for improved access thereto. A user can grasp the forward edge 31 of a tray and pull or push the same, moving the tray and repositioning the tray such that the arms slide between the forward edge 31 and the rear edge 32 along the tracks.

[0038] A slidable cover 41 is disposed over the otherwise open upper surface of each tray 30, securing over the open interior volume 43 thereof and retaining equipment stored therein when closed. The cover 41 is positioned within slots in the trays or otherwise supported along its outer edges, whereby a hardware article 42 or impression is used to slide the cover 41 from an open state to a closed state and vice versa. When the trays 30 are stowed, the covers 41 are in a closed state and the lower surface 35 of the lowermost tray 30 fills the substantial area of the otherwise open housing lower surface.

[0039] Referring now to FIG. 3, there is shown an illustrative example of the present invention in an installed position along the ceiling of a vehicle and in a stowed state. In the configuration as shown, the housing 11 is secured to the ceiling surface 100 of a vehicle 101. The assembly is in a stowed state, whereby the trays are condensed together an

in a stacked configuration within the housing interior. When stowed and locked in the housing 11, the lowermost tray consumes the open lower surface of the housing 11 such that the lower surface 35 of the tray is exposed. A drawstring 50 or similar deployment element may be provided to release the trays, while furthermore a locking mechanism may secure the trays within the housing 11.

[0040] Referring now to FIG. 4, there is shown a side view of the ceiling mounted assembly in an expanded state. As shown, the elongated arms 20 extend downward from the housing track 38 via a hinged joint that is preferably detented or limited in range. This ensures the elongated arms 20 extend downward a defined angle with respect to the track 38. The connection between the arms 20 and the track is furthermore slidable, wherein a slider element 24 such as a ball bearing assembly or track wheel is supported within the housing track 38. The arm 20 pivotably connects to each of the trays 30 via individual hinge or pin joints, wherein this connection is furthermore a sliding joint. A ball bearing element or track roller slider element 24 is provided between the arm 20 and each tray 30. The slider element 24 slides within the tracks 38 disposed along the sides of each tray.

[0041] To position the trays horizontally, the secondary arms 21 extend between the arm 20 and the track 38 of each tray 30, rearward of the primary connection. A slider element 24 at this location, wherein the lower end of the secondary arms 21 are slidably and rotatably connected to the tracks 38, while the upper end is rotatably connected to the arm 20 above the given tray 30. The slider elements 24 in the tray tracks 38 and the housing track 38 can slide between two outer extents 34. These outer extents 34 are wheel locks, which comprise depressions or similar structures to partially retain the slider elements 24 at those locations when the two are engaged. This allows the assembly to expand and moved from one end of the each track to the other, and substantially locked when one of the extents is reached.

[0042] When the assembly is stowed, the elongated arm 20 is moved to the rear extent of the housing track 34 and the arm is rotated upwards therefrom with assistance of the spring 22. The housing comprises a volume and height sufficient to store the trays when stacked above one another. The trays collapse against one another in a stacked configuration, as the secondary arms 21 fold into a substantially parallel condition with respect to the elongated arms 20, which are moved from an lowered state to a substantially horizontal state within the housing. The lowermost tray is secured to the housing using a locking mechanism as shown in FIG. 5, wherein a pair of locking members extends outward from the sides of the tray, through slots therealong 60, and through complimentary slots 62 in the sidewalls of the housing. This is possible when the slots are aligned and when the lowermost tray is positioned within the housing.

[0043] Referring specifically to FIG. 5, a contemplated locking mechanism is illustrated. It is submitted that several locking structures or arrangements may be used to secure the lowermost tray to the housing. The illustrated example is but one contemplated embodiment. As shown, a latch member 61 is used to rotate a set of short, intermediate locking members, which connect to a set of elongated locking members 65 extending outward through the tray slots 60 and through the housing slots 62 when extended. The housing slots 62 may be disposed along or through the sidewalls 13 of the housing. The latch member 61 may be keyed tumbler or a hang-turnable latch assembly. The locking members 65 therefore sup-



port the lowermost tray and the trays thereabove in a stacked configuration within the housing, and prevent the same from deploying downward while in a stowed state and until unlocked by the user.

[0044] Overall, the present invention enables individuals to store tools and other equipment in a ceiling mounted fashion, thereby freeing up space along the floor or within a vehicle for other purposes. The device furthermore provides an organized, attractive way to store tools that facilitates access and stowage. The device is purely mechanical and requires not motors or electrical power, and maintains items in a substantially horizontal state when stowed and when deployed.

[0045] It is submitted that the instant invention has been shown and described in what is considered to be the most practical and preferred embodiments. It is recognized, however, that departures may be made within the scope of the invention and that obvious modifications will occur to a person skilled in the art. With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

[0046] Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

I claim:

- 1. A storage system, comprising:
  - a housing having an interior volume, a plurality of sidewalls, and an open lower surface;
  - a pair of housing tracks along opposing sidewalls of said housing;
  - at least one elongated arm having an upper end, a length, and a lower end;
  - said upper end of each elongated arm slidably and rotatably connected to one of said housing tracks;
  - one or more trays having a forward edge, a rear edge, a lower surface and sidewalls;
  - tray tracks disposed along opposing sidewalls of each tray; each elongated arm being slidably and rotatably connected to said tray tracks of each tray;
  - a secondary arm between each tray track and each elongated arm, said secondary arm having an upper end rotatably connected to an elongated arm, and a lower end slidably and rotatably connected to a tray track;

- said one or more trays having a stowed state wherein each elongated arm and said one or more trays is positioned within said interior volume of said housing;
- said one or more trays having a deployed state wherein each elongated arm is disposed at a downward angle and said one or more trays is positioned outside of said interior volume of said housing.
- 2. The storage system of claim 1, wherein:
  - said upper end of said at least one elongated arm rotates via a detented pin joint that allows rotation between a substantially horizontal and said downward angle.
- 3. The storage system of claim 1, wherein:
  - each connected secondary arm, elongated arm, and tray form a triangle such that each tray is substantially horizontal.
- 4. The storage system of claim 1, wherein a slider element is disposed along each housing track and connects said upper end of each elongated arm to said housing track.
- 5. The storage system of claim 1, wherein a slider element is disposed along each tray track and connects each elongated arm to said tray track.
- 6. The storage system of claim 1, wherein a slider element is disposed along each tray track and connects each secondary arm to said tray track.
- 7. The storage system of claim 1, wherein said at least one elongated arm further comprises a first and second elongated arm, wherein said one or more trays are disposed between said first and second elongated arm.
- 8. The storage system of claim 1, wherein each of said one or more trays further comprises a slidable cover.
- 9. The storage system of claim 1, wherein:
  - a slider element is disposed along each housing track and connects said upper end of each elongated arm to said housing track;
  - each of said housing tracks further comprising a first and second outer extent;
  - said first and second outer extent further comprising wheel locks to retain said slider element.
- 10. The storage system of claim 1, wherein:
  - a forward slider element is disposed along each tray track and connects each elongated arm to said tray track;
  - a rear slider element is disposed along each tray track and connects each secondary arm to said tray track
  - each of said tray tracks further comprising a first and second outer extent;
  - said first and second outer extent further comprising wheel locks to retain said forward slider element and said rear slider element.
- 11. The storage system of claim 1, further comprising a spring element along at least of said elongated arms.
- 12. The storage system of claim 1, further comprising a locking mechanism between a lowermost tray and said housing sidewalls.

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