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Ergonomic ESD cart

ABSTRACT

An ergonomic cart is described that provides protection from electrostatic discharge (ESD) events. The cart enables a user to transport relatively heavy equipment and includes mechanisms to easily raise or lower equipment. The cart includes moveable and fixed shelves, columns, and ESD swivel casters. Exposed corners of the shelves of the cart are protected by a rubber bumper. Extension and retraction of the columns and the top shelf is performed by two linear actuators powered by a battery. An integrated sensor is provided that allows for an immediate stop to motion of the columns upon detection of resistance.

KEYWORDS

- Utility cart
- Tool cart
- Electrostatic discharge
- Audio visual cart
- AV cart
- Rubber bumper
- Linear actuator

BACKGROUND

Various types of carts, e.g., audio visual (AV) carts, are commonly used on shop floors, factories, assembly lines, data centers, etc. to transport electrical and electronic equipment. In some cases, heavy equipment may have to be lifted (for example, loading a piece of equipment onto a top shelf of a rack) by a user. Adequate care is also needed to prevent electrostatic discharge (ESD) events that can damage equipment being stored or transported on the cart. An

ergonomically designed AV cart with protection from electrical discharge events can enhance user and occupational safety.

DESCRIPTION

This disclosure describes an ergonomic ESD protected cart. The cart enables a user to transport relatively heavy equipment and includes mechanisms to easily raise or lower equipment. The cart also provides protection from electrostatic discharge events.

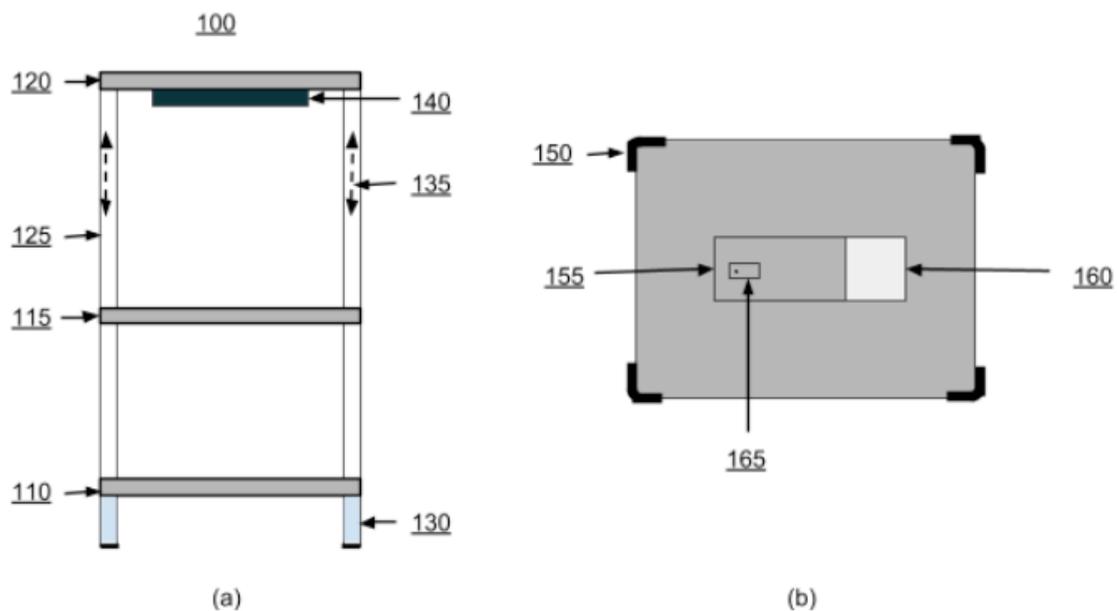


Fig. 1: (a) schematic (side) view of cart; (b) top view of top shelf of cart

Fig. 1(a) illustrates a side view of the cart (100). In the illustrated example, the cart includes three shelves (110, 115, and 120), is supported by columns (125), and uses ESD swivel casters (130). The two ESD casters at the rear of the AC cart include a locking mechanism. Dimensions of the cart and the number and size of shelves can be chosen by a manufacturer appropriate to the particular user context.

A non-locking slide out removable drawer (140) is located under the top shelf. The drawer is mounted on ball bearing slides and extends out from the cart.

The bottom shelf (110) and the middle shelf (115) are fixed (non-moveable), while the top shelf (120) is retractable (moveable) to adjust (135) a height of the cart. An ESD rubber mat (not shown) is placed on each of the shelves. Each shelf includes a conductive ground plate that is wired to a common ground that is wired individually from each locking caster.

Extension and retraction of the columns and the top shelf utilizes two linear actuators that provide a thrust, e.g., a thrust of up to 700 N per column. The actuators are powered by a battery, e.g., a lithium battery, on the cart (not shown). Cabling and controls for the actuators are located in the top shelf. The columns are equipped with an integrated sensor that allows for an immediate stop to motion of the columns upon detection of resistance. This helps minimize the risk of material damage during motion and prevents injuries.

Fig. 1(b) depicts a top view of the top shelf of the AV cart. Exposed corners of the shelf (including shelves other than the top shelf) are protected by a rubber bumper (150). To mitigate risk of injury, the bumpers are mounted to the shelves using blunt nosed screws. A handle (for example, an oval shaped aluminum handle) is mounted to one end of the top shelf. The extend-retract controls are located on the top shelf, next to the handle.

The battery can be accessed via a battery access cover (155). A battery status monitor (165) is provided that includes a button and an illuminated battery status indicator. An audible alarm serves as an indicator of low battery status, e.g., providing an alert when battery life drops below a threshold such as 25% of the battery capacity. A non-removable galvanized cover (160) serves as an ESD contact cover for the rubber mat.

The disclosed cart fits many requirements with just one size. The cart can be adjusted to the user's discretion fitting different ergonomic needs for different processes at the touch of a button. The inclusion of a battery enables the cart to be recharged effortlessly. The cart can also be manufactured at different lengths to fit different processes.

CONCLUSION

An ergonomic cart is described that provides protection from electrostatic discharge (ESD) events. The cart enables a user to transport relatively heavy equipment and includes mechanisms to easily raise or lower equipment. The cart includes moveable and fixed shelves, columns, and ESD swivel casters. Exposed corners of the shelves of the cart are protected by a rubber bumper. Extension and retraction of the columns and the top shelf is performed by two linear actuators powered by a battery. An integrated sensor is provided that allows for an immediate stop to motion of the columns upon detection of resistance.