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ADJUSTABLE FIXTURE FOR DROP TESTING

Filed May 9, 1962

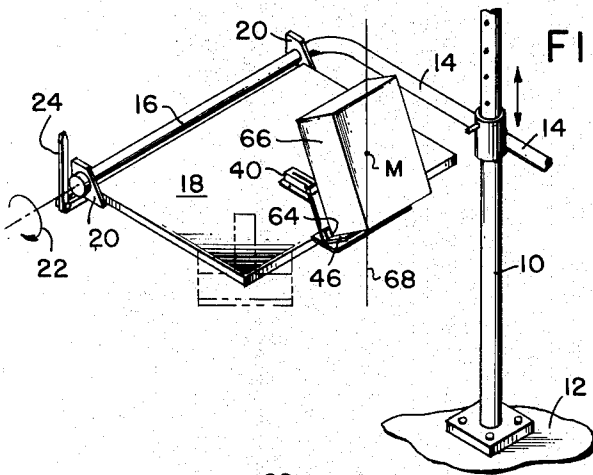


FIG. 1.

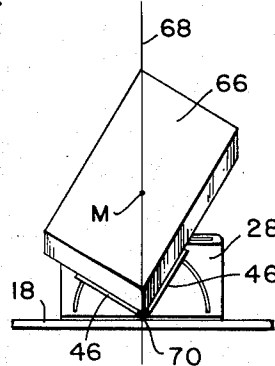


FIG. 4.

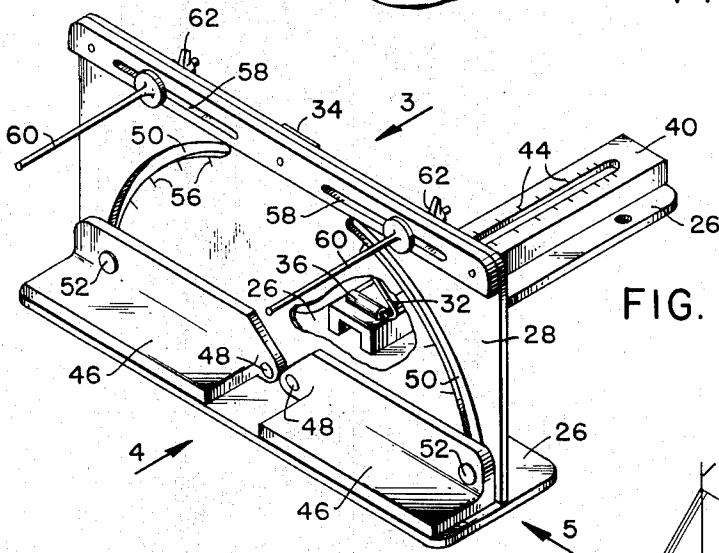


FIG. 2.

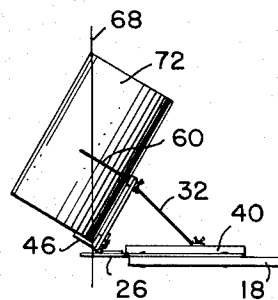


FIG. 5.

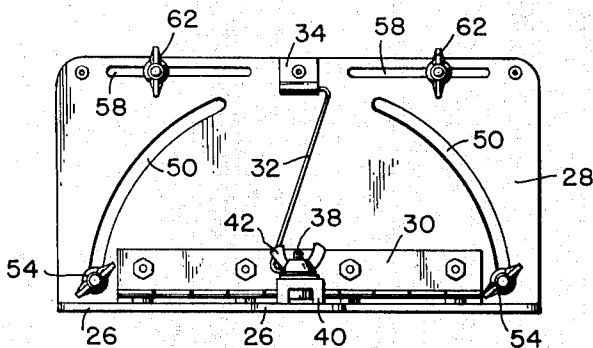


FIG. 3.

INVENTORS.

BERNARD W. FORD
WILLIAM J. SWITZENBERG, JR.

BY

J. C. Muller
ATTORNEY.

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ADJUSTABLE FIXTURE FOR DROP TESTING
Bernard W. Ford, 430 Wilson Road, Ridgecrest, Calif.,
and William J. Switzenberg, Jr., 48A Rowe, China Lake, Calif.

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7 Claims. (Cl. 73-12)

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The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to apparatus for drop testing containers and more particularly to apparatus for facilitating drop tests on their edges and corners.

It is conventional practice to drop a container from a desired height onto a rigid abutment to determine the resistance of the container or its contents to impact. One form of drop table apparatus employed for this purpose comprises a pair of pivoted horizontal spring loaded leaves on which the container is placed which, upon release of a suitable latch, permits the leaves, by action of gravity and aided by the spring loading, to rapidly move downwardly, permitting the container to freely fall in space and impact the abutment. This apparatus is adequate where a flat side of the container is supported by the table and rests on it in equilibrium but when it is desired to drop the container on one of its edges or a corner it must be carefully balanced by hand on the edge or corner. The hand balancing operation presents a hazard to the operator since the container may impact a foot or other member of his body; also, due to the difficulty of maintaining a precise balance of the container, drop tests are not reproducible within desired tolerances.

One of the objects of the invention is to provide a supporting fixture for use with a conventional drop tester which obviates manual balancing of a container, and, after being adjusted for a particular container, permits precise reproduction of the drop test for other containers having like configuration and distribution of mass.

Another object is to provide the fixture with suitable supports and adjustments to render it useable with containers of different shapes, such as rectangular parallelepiped and cylindrical or prismatic containers.

Another object is to provide a supporting fixture which may be optionally attached to a conventional drop tester as an accessory.

Other objects are to provide a fixture which is simple in construction, economical of manufacture and effective in reproducibility of results.

Still further objects, advantages and salient features will become more apparent from a consideration of the description to follow, the appended claims, and the accompanying drawing, in which:

FIG. 1 is an isometric view of a portion of a conventional drop tester with the subject of the invention applied to same;

FIG. 2 is an isometric view of the invention, portions being broken away;

FIG. 3 is a rear elevation as viewed in the direction of arrow 3, FIG. 2;

FIG. 4 is a front elevation as viewed in the direction of arrow 4, FIG. 2; and

FIG. 5 is a side elevation as viewed in the direction of arrow 5, FIG. 2.

Referring now to the drawing, and particularly FIG. 1, the conventional drop tester previously referred to comprises a suitable column 10 resting or affixed to a base or floor 12, the column supporting a U-shaped arm 14 (only a portion of which is shown) which may be adjusted vertically along the column. One of the legs 16 of the

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arm forms a support for leaf 18 which is pivotally secured to the leg by apertured brackets 20 affixed to the leaf. A torsion or other suitable spring (not shown) urges the leaf for rotation in the direction of arrow 22 and the leaf is retained in the horizontal position by a latch (not shown) which may be released by a lever 24. As will be understood in the art, when the latch is released by the lever, the leaf rapidly rotates downward in the direction of arrow 22 to a vertical position, allowing a container disposed on the leaf to freely fall and impact abutment or floor 12 which is preferably rigid so that substantially all of the energy of impact is absorbed by the container. As will also be apparent, if a flat side of the container rests on the leaf it will require no manual balancing and will fall along a vertical line passing through the center of mass of the container. It will be further apparent, however, that if it is desired to drop the container so that one of its edges or a corner impacts floor 12, the container must in some way be balanced on the leaf. As previously referred to, this balancing operation was heretofore performed manually, moving the container about with the operator's hands, until an approximate position of balance was found.

The attachment support, which obviates the manual balancing, comprises a base 26 which may be fastened to the leaf, by screws, clamps, or any other suitable fastening devices. A backing plate 28 is pivotally secured to the base by a hinge 30 and may be angularly adjusted about the hinge axis and secured in a desired position by strut 32, one end of which pivotally engages an apertured bracket 34 on the backing plate and the other end of which pivotally engages a similar bracket 36 which is slideable along the base and may be affixed in a desired position by a screw 38, the head of which slides in a T-slot 40, and which is provided with a wing nut 42 engaging bracket 36. Suitable graduations 44 may be provided on the base, registerable with an index on bracket 36 to indicate the angle of inclination, away from vertical, of the plane of plate 28. Backing plate 28 is provided with a pair of angle members 46, each pivotally connected to plate 28 by a pivot pin 28 and angularly adjustable to any desired fixed positions by a quadrant slot 50 through which passes a bolt 52 having a wing nut 54 which engages the rear face of plate 28. Suitable graduations 56 are provided on plate 28 to indicate the angle of inclination of each of members 46, which, as will be apparent, are individually adjustable.

For performing edge drops, particularly on cylindrical containers, plate 28 is provided with a pair of slots 58, each of which receives a shouldered pin 60 which may be adjusted along a slot and secured by a wing nut 62.

In the operation of the device it will first be assumed that an edge drop on a rectangular parallelepiped container is desired. As best shown in FIG. 1, members 46 are disposed in their lowered level position engaging lower edge 64 of container 66, and plate 28 is adjusted to an angular position such that the container is balanced on the lower edge. A vertical plane 68 then intersects the lower edge, the opposite upper edge and passes through the center of mass M of the container. When leaf 18 is released, the container will fall in plane 68.

Assuming next that a corner drop on a rectangular parallelepiped container is desired, plate 28 is adjusted as before but members 46, as best shown in FIG. 4, are now angularly adjusted so that plane 68 passes through lower corner 70, the opposite upper corner and the center of mass M. With the container balanced on the lower corner it will retain its orientation in space, without rotating, and drop in plane 68, impacting the lower corner.

If a cylinder is to be edge dropped, pins 60 are employed as illustrated in FIG. 5. Members 46 are lowered to their horizontal positions, engaging a portion of the

lower edge of cylindrical container 72. A vertical plane again passes through the lower edge, the opposite upper edge, and the center of mass of the container. Unlike the conditions of balance described in connection with the parallelepiped supported along its lower edge, there may be a slight tendency for the cylinder to roll laterally along its lower corner. To obviate such rolling, pins 60 may be adjusted to engage portions of its cylindrical surface.

The device may be affixed to a leaf of the drop tester in any desired position; however, the full line position shown in FIG. 1 is preferred for edge drops of parallelepiped containers while the dotted line position, at a corner of the leaf, is preferred for corner drops.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. Test apparatus for dropping a container of the type having intersecting surfaces forming edges or corners, onto an abutment in a vertical plane passing through the center of mass of the container and a lower edge or corner, whereby the container will fall in said plane without rotating in any direction, comprising; a pivoted normally horizontal drop table leaf, and a support affixed to said leaf adjustable about a first horizontal axis adapted to engage portions of said container and balance same in the position defined by said plane.

2. Apparatus in accordance with claim 1 wherein said support includes a pair of members having surfaces which are individually angularly adjustable about second horizontal axes perpendicular to said first horizontal axis to form either a single surface or intersecting surfaces, said members, when forming a single surface, adapted to engage a container adjacent its lowermost edge, and when forming intersecting surfaces, adapted to engage surfaces of a container adjacent its lowermost corner, whereby said members serve as supports for either edge or corner drops of a container, respectively.

3. Apparatus in accordance with claim 2 including indicia for indicating the angular positions of said support and each of said members.

4. Test apparatus for use with a pivoted normally horizontal drop leaf table for dropping a container having intersecting surfaces forming edges or corners, onto an abutment, in a vertical plane passing through the center of mass of the container and a lower edge or corner, whereby the container will fall in said plane without rotating in any direction, comprising; a support, means for removably affixing said support to said leaf, said support being adjustable about a first horizontal axis and engageable with portions of the container to balance

same in the position defined by said plane, and means for positively locking said support against movement away from any desired position of adjustment.

5. A container balancing fixture for use with a normally horizontal pivoted leaf of a drop table adapted to support the container in a position such that a vertical plane passes through its center of mass and a lower edge or corner, comprising; a support adapted to be removably affixed to said leaf and adjustable about a first horizontal axis adapted to engage portions of the container and balance same in said position, said support including a pair of members having surfaces which are individually angularly adjustable about second horizontal axes perpendicular to said first horizontal axis to form either a single surface or intersecting surfaces, said members, when forming a single surface, adapted to engage a container adjacent its lowermost edge, and when forming intersecting surfaces, adapted to engage surfaces of a container adjacent its lowermost corner, whereby said members serve as supports for either edge or corner drops of a container, respectively.

6. A fixture in accordance with claim 5 including means projecting from said support for preventing a cylindrical container from rolling along its lowermost edge when supported by said members and with said members disposed in a position to form said single surface.

7. A container balancing fixture for use with a normally horizontal leaf of a drop table adapted to support the container in a position such that a vertical plane passes through its center of mass and a lower edge or corner, comprising; a base adapted to be removably affixed to said leaf, a backing plate pivotally connected to said base for angular adjustment about a first horizontal axis, a pair of members pivotally carried by said backing plate for angular adjustment about axes perpendicular to said first horizontal axis and having surfaces which form either a single surface or intersecting surfaces, means for locking said backing plate to said base in a desired angular position of adjustment, means for individually locking each of said members to said backing plate in desired angular positions of adjustment, and indicia means for indicating the angular position of adjustment of said backing plate and said members.

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RICHARD C. QUEISSER, *Primary Examiner.*

EDWARD D. GILHOOLY, *Assistant Examiner.*