

[54] TILT INDICATOR FOR SHIPPING
CONTAINERS AND THE LIKE

2,768,602 10/1956 Eichholz 116/114 AH

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[57] ABSTRACT

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[58] Field of Search 116/114 AH;
33/391-402

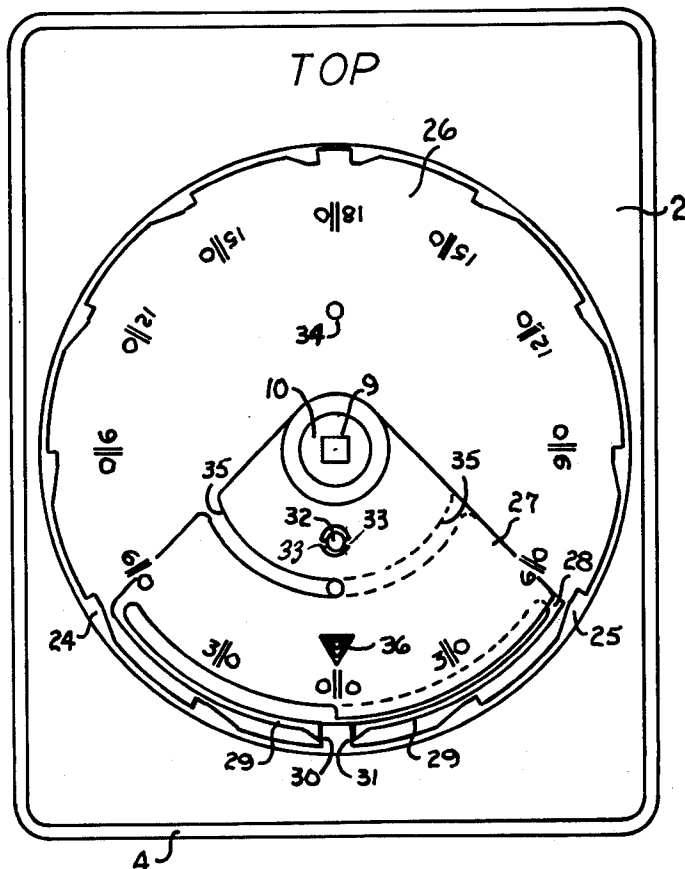
A tilt indicator having two pendulums pivoted on a body whose tilt is to be indicated and limited by ratchet means to rotation in opposite directions and prevented from return rotation so the angular position of each pendulum is an indication of the maximum tilt of the body in its permitted direction of rotation.

[56] References Cited

UNITED STATES PATENTS

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8 Claims, 3 Drawing Figures



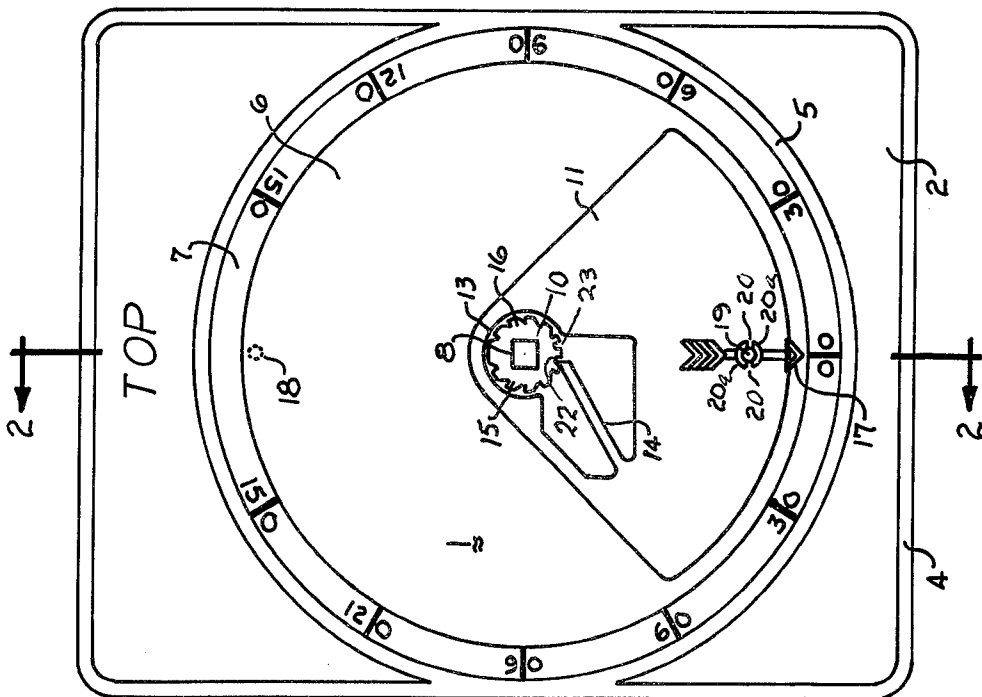


FIG. 1

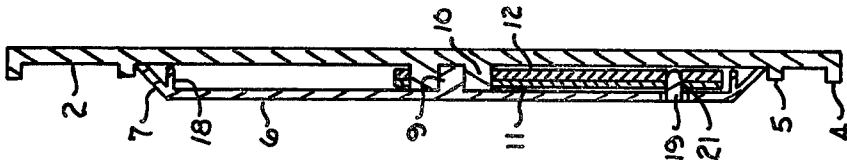


FIG. 2

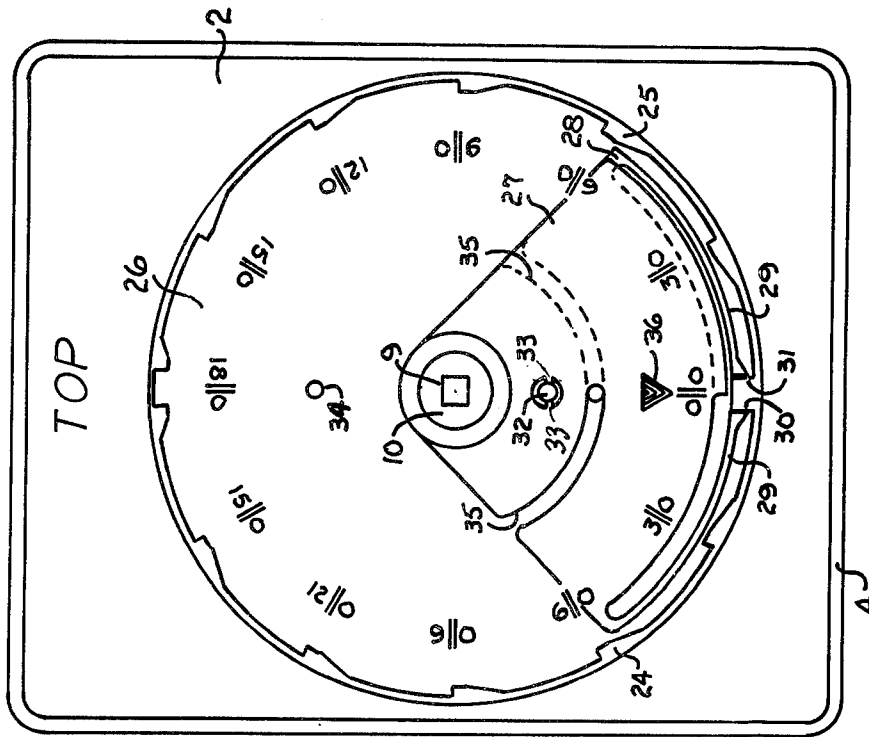


FIG. 3

TILT INDICATOR FOR SHIPPING CONTAINERS AND THE LIKE

This invention is a tell-tale tilt indicator for objects which should not be tilted or inverted. One use is for shipping where two indicators are mounted in vertical planes at right angles to each other in fixed relation to the object being shipped to provide positive indication that the object has been tilted or inverted during its shipment.

In the drawing,

FIG. 1 is a front elevation of a preferred form of tilt indicator;

FIG. 2 is a section on line 2—2 of FIG. 1; and

FIG. 3 is a front elevation of a modification.

The indicator has a generally planar body consisting of a circular front panel 1 and a rectangular back panel 2 of clear or transparent thermoplastic such as polystyrene. The back panel 2 is a flat sheet with an outstanding peripheral rib 4 and an outstanding circular rib 5 at its center for receiving the edge of the circular front panel 1. The front panel has a raised or dished center section 6 surrounded by a bevel edge 7 which is telescoped within rib 5 and suitably secured or bonded to the back panel. The rectangular shape of the back panel is not required. It could be circular, in which case the rib 4 would be omitted. At the center of the panel is an integral non-circular hub 8 which is telescoped within a complementary socket 9 in an annular hub 10 integral with the back panel. When the hub is telescoped into the socket, the front and back panels are positively aligned.

Two pendulums 11, 12 have upper ends pivoted on the hub 10. The pendulums 11, 12 are identical parts, the pendulum 12 being pendulum 11 inverted. Each pendulum has a hub 13 journaled on the hub 10 and each pendulum has a spring pawl 14 which engages ratchet teeth 15 or 16 in the outer surface of the hub 10. The ratchet teeth 15 and 16 face in opposite directions. The pendulum 11 can rotate freely up to 180° in a clockwise direction from the position shown and the pendulum 12 can rotate up to 180° in the counterclockwise direction. The 180° limit of rotation of the pendulums is obtained by a projection 17 on each pendulum which engages a stop pin 18 integral with the front panel 1. The projection 17 also serves as a pointer cooperating with the degree scale in the bevel 7 of the front panel to indicate the degree of tilt. The spring pawls 14 each cooperate with the ratchet teeth to prevent reverse rotation. Each pendulum is biased by gravity toward the zero position shown. Until the indicator is to be used, the pendulums are held in the zero position by a removable stop pin 19 integral with the front panel 1 and removable by breaking frangible sections 20 which are accessible through arcuate slots 20a.

All of the parts are adapted to low cost injection molding of thermoplastics such as polystyrene. The pendulums 11, 12 are flat plates with hubs 13 at the upper end and the indicator 17 and holes 21 for the stop pins 19 at the lower end. The spring pawl 14 is a thin plastic section. The parts may be conveniently assembled by first mounting the pendulums 11, 12 on the hub 10 with the spring pawls 14 in the zero position notches 22, 23. Then, by inserting the square hub 8 in the socket 9, the front and back plates are aligned and the stop pin 19 is received in the holes 21 to lock the pendulums in the zero position.

In use, the indicator is mounted on the shipping container or on the object to be shipped or on some surface of the packing which undergoes the same tilting as the object. It can be located on one of the inner surfaces of the container. Since each indicator indicates tilt in a single plane, two indicators mounted in planes at right angles to each other are necessary to provide complete indication. The indicators are conveniently attached to the surfaces by double stick adhesive tape, one surface of which adheres to the back plate of the indicator and the other surface adheres to the surface on which the indicator is to be mounted. After mounting, the stop pin 19 is removed by breaking sections 20 freeing the pendulums for rotation. If the container is tilted in a counterclockwise direction from the position shown, the pendulum 11 will pivot about the hub 10 so that it can remain in an upright position and its spring pawl 14 will ratchet over the teeth 15. The other pendulum 12 which is directly beneath the pendulum 11 will not pivot but will remain in the zero position by engagement of its spring pawl 14 with notch 23. Upon return of the container to the upright position the pendulum 11 will not return to the upright position but will remain as an indication of the angle through which the container has been tilted. In the particular indicator shown the notches 15, 16 are approximately 30° apart so that the tilt indication is in 30° steps. If the object is tilted through an angle of more than 30° but less than 60°, the pendulum will indicate 30°. A larger number of teeth would provide indication in smaller steps. Stop pin 18 limits indication to a maximum of 180° tilt. If the container is upended more than once, plural indications will not be given.

The indicator shown in FIG. 3 differs in two respects from the FIG. 1 and FIG. 2 indicator. First, the ratchet teeth 24, 25 which respectively correspond to the ratchet teeth 15, 16 are on and disposed around the outer periphery of the front plate 26 and second, the pendulums 27, 28 and the stop pin and locking pins are structurally modified to accommodate the change in position of the ratchet teeth.

As in FIGS. 1 and 2, the ratchet teeth 24, 25 face in opposite directions and cooperate with spring pawls 29 integral with the pendulums, which limit rotation of the pendulums to a single direction and positively prevent reverse rotation. The pendulums 27, 28 are identical, the pendulum 28 being the pendulum 27 inverted. In the zero position, the spring pawls 29 rest against stops 30, 31. Prior to use, the pendulums are held in the zero position by locking pin 32 of the same construction as the locking pin 19. In order to use the indicator, the locking pin must be removed by breaking frangible sections 33. The front panel 26 has a stop pin 34 corresponding to the stop pin 18 which limits the rotation of the pendulums 27, 28 to 180°. This stop pin cooperates with slots 35 in the pendulums. The pendulums have pointers 36 cooperating with degree scale molded into the front plate 26.

Except for these changes, the construction of the FIG. 3 indicator is substantially identical with the FIGS. 1 and 2 indicator.

In the use of the FIG. 3 indicator, the back panel 2 is mounted in a vertical plane and the locking pin 32 removed by breaking frangible sections 33. The indicator is now ready for use to measure the degree of tilt in the same manner as the FIG. 1 and FIG. 2 indicator.

Both indicators are tamper proof. There are no openings through which a tool can be inserted to release the spring pawl 14, 29 so as to reset the pendulums to zero. The sealed plastic housing cannot be opened without showing evidence of tampering.

Another advantage is that both indicators are insensitive to bouncing such as encountered during shipment. These forces are in a vertical direction and do not rotate the pendulums to give a false indication.

What is claimed is:

1. An indicator for providing a positive indication that an object has been tilted comprising a body for attachment in a vertical plane in fixed relation to said object, a pendulum pivoted on said body for rotation in said plane, a unidirectional means for said pendulum permitting rotation of said pendulum in a single direction and preventing reverse rotation of said pendulum whereby said pendulum indicates the maximum tilt of said object in said plane and the direction it is permitted to rotate, and stop means for said pendulum limiting its rotation to substantially one half revolution.

2. An indicator providing a positive indication that an object has been tilted comprising a body for attachment in a vertical plane in fixed relation to said object, said body comprising two plates peripherally secured together, one of which is dished to provide an enclosed space, a hub on one of said plates projecting into said space, a pendulum pivoted on said body for rotation in

said plane, a unidirectional means for said pendulum permitting rotation of said pendulum in a single direction and preventing reverse rotation of said pendulum whereby said pendulum indicates the maximum tilt of said object in said plane and the direction it is permitted to rotate, said pendulum having an upper end journaled on said hub, and a lower end visible through one of said plates to indicate the maximum tilt.

3. The indicator of claim 1 in which the unidirectional means comprises pawl and ratchet means.

4. The tilt indicator of claim 3 in which said pendulum has a spring pawl cooperating with said ratchet means for preventing reverse rotation and said pendulum and pawl constitute a single piece of molded plastic.

5. The tilt indicator of claim 2 in which said hub has ratchet teeth as part of pawl and ratchet means for preventing reverse rotation.

6. The tilt indicator of claim 2 in which one of said plates has ratchet teeth as part of pawl and ratchet means for preventing reverse rotation.

7. The tilt indicator of claim 2 in which there are two like pendulums journaled on said hub respectively limited to rotation in opposite directions.

8. The tilt indicator of claim 7 in which the pendulums are identical, one pendulum being inverted before mounting on said hub.

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