Nov. 2, 1965 J. O. SKUNDBERG 3,214,838

BULGE TESTING APPARATUS

Filed Oct. 17, 1962

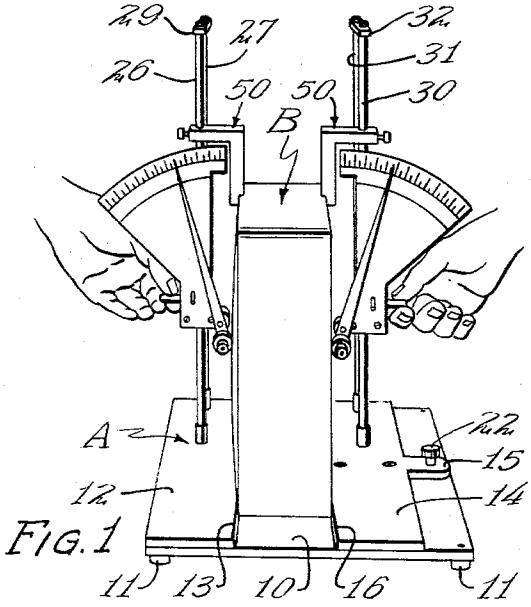

FIG. 1

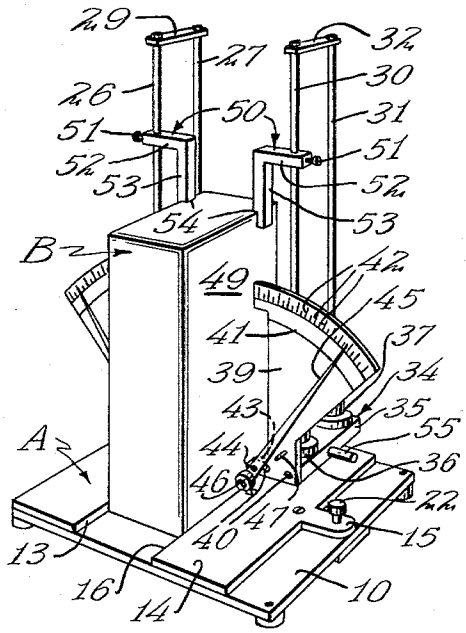

FIG. 2

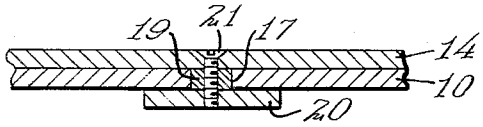

FIG. 5

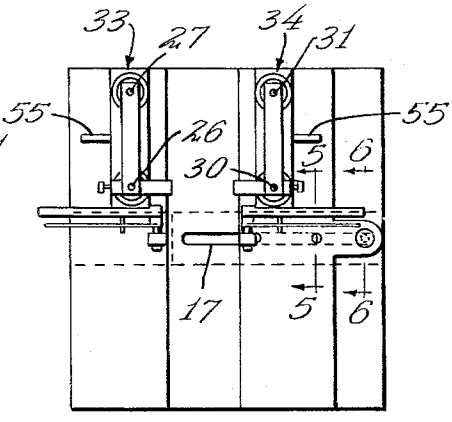

FIG. 4

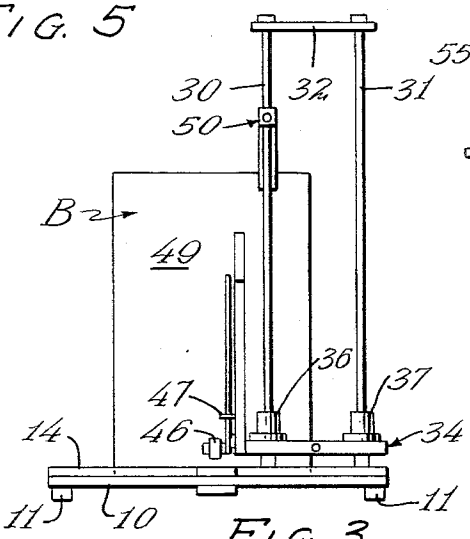

FIG. 3

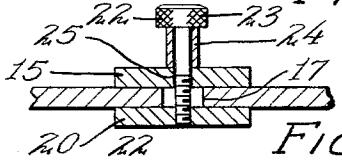

FIG. 6

INVENTOR

JAMES O. SKUNDBERG

BY Robert M. Dunning

ATTORNEY

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BULGE TESTING APPARATUS

James O. Skundberg, Bloomington, Minn., assignor to Waldorf Paper Products Company, St. Paul, Minn., a corporation of Minnesota

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This invention relates to an improvement in Bulge Testing Apparatus and deals particularly with a simple instrument for measuring the bulge of carton panels.

When paperboard cartons are filled with a powdering or flowable substance such as flour, the two opposed larger panels or face panels of the cartons have a tendency to bulge outwardly to a considerable extent. This bulge is dependent upon numerous factors such as the weight of the paperboard used in the formation of the carton, the stiffness of this particular board, the direction of grain in the board if there is such a grain, and other such variables. This bulge is usually not particularly noticeable at the time the cartons are filled, as the extent of the bulge is not readily detected. However, the bulge is particularly disadvantageous when the cartons of product are placed in a shipping container and shipped to the store or to the consumer. When the containers are opened, it is usually found that the product has compacted or compressed due to the forces to which the container has been subjected during shipment, and in some instances the cartons bulge to the extent that they are very difficult to remove from the container. This causes the surfaces of the panels to rub together, often defacing the main panels of the carton and causing the cartons to look shopworn by the time they are placed upon the shelf for display.

In general, the only common way of testing the cartons for bulge is by observing the bulge in the cartons both before and after shipment. Thus usually the difficulty which is caused by the bulging of the cartons is not apparent until the cartons are ready for use. As a result, many manufacturers have found after large shipments of the goods have been made, that the paperboard which they are using in the cartons is not thick enough or not stiff enough to properly carry the product. It is an object of the present invention to provide a simple and effective apparatus for measuring the bulge in the cartons so that the bulge produced by cartons of various thicknesses of board and various degrees of stiffness can be readily determined.

A feature of the present invention resides in the provision of a device of the type described which includes a platform and a means of locating a carton in a generally upright position on the platform. Vertical guides are provided, preferably on both sides of the carton and vertically slidable gauges are mounted upon these guides to travel in a vertical position. Each of the slides supports a pointer which is pivotal on a horizontal axis and which is provided at its lower end with a roller which is engageable with the surface of the carton, preferably near the transverse center of the main panels. When the slide is in lowered position, this pointer will indicate a zero position on a scale forming a part of the slide gauges. However, as the slides are raised, the roller will travel along the surface of the main panel, preferably to the point of greatest bulge, and will remain

in this position during the remainder of travel. By calibrating the gauge, the pointer may be arranged to indicate the actual amount of bulge in the carton walls.

A feature of the present invention resides in the provision of a device of the type described including a platform, a plate overlying the platform and forming one side of a channel to accommodate the carton, a movably supported plate on the platform, movable toward and away from the first fixed plate to accommodate cartons of different widths, and slide guides mounted upon the two plates and adjustable therewith. As a result, the slidable gauges are separated simultaneously with the plates forming the carton accommodating channel so as to remain always in proper relation to the carton contained in the channel.

These and other objects and novel features of the present invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of the specification:

FIGURE 1 is a front perspective view of the bulge tester showing the general arrangement of parts therein.

FIGURE 2 is another perspective view of the bulge tester showing the slidable gauges in starting position.

FIGURE 3 is a side elevational view of the apparatus in readiness for operation.

FIGURE 4 is a top plan view of the apparatus with the carton removed.

FIGURE 5 is a sectional view through a portion of the movable plate and platform, the position of the section being indicated by the line 5—5 of FIGURE 4.

FIGURE 6 is a sectional view through another portion of the slidable plate and platform, the position of the section being indicated by the line 6—6 of FIGURE 4.

In general, the bulge testing apparatus includes a generally rectangular platform **10** having legs **11** projecting downwardly from the corners thereof so that the platform may better adjust itself to a supporting surface. A fixed rectangular plate is secured in face contact with the platform **10** along one side edge thereof, the plate **12** defining a shoulder or abutment **13** designed to engage against a face wall of the carton B to be tested. The bulge tester is indicated in general by the letter A.

The platform **10** also supports a generally rectangular plate **14** generally similar to the plate **12**, but having a laterally extending projection **15** thereupon. The plate **14** lies in face contact with the platform **10** and presents a shallow abutment **16** which is parallel to the abutment **13**, the abutment walls **13** and **16** and the upper surface of the platform **10** forming a channel to receive the carton B.

As indicated in FIGURES 5 and 6 of the drawings, the platform **10** is provided with a slot **17** extending therethrough which is at right angles to the shoulders or abutments **13** and **16**. A bar **19** fits snugly within the groove **17** and is slidable therein to permit the plates **12** and **14** to move toward and away from one another within desired limits. An anchoring plate **20** underlies the platform **10** to hold the plate **14** in engagement with the platform **10**. The bar **19** is preferably slightly thicker than the plate **10** so that the plates **14** and **20** may slide freely without undue play. Bolts **21** extend through the plate **14** and bar **19** and are threaded into the retaining plate **20** to hold the strucutre assembled.

The plate **14** is held in an adjusted position by a clamping screw **22** having an enlarged head **23** which

bears against the upper end of a spacing sleeve 24. The clamping screw 22 passes through an opening 25 in the laterally extending projection 15 on the plate 14 and is threaded into the retaining bar or plate 20. By tightening the thumb screw 22, the platform 10 may be clamped between the projection 15 and the plate 20 to hold the plate 14 in an adjusted position.

A slide guide in the form of a pair of parallel rods 26 and 27 are anchored to the plate 12 to extend upwardly therefrom in spaced parallel relation. The rods are held in parallel relation at their upper ends by a cross connecting member 29. A similar slide guide including a pair of parallel vertical rods 30 and 31 are anchored to the slidable plate 14 to extend upwardly therefrom. The rods 30, 31 are connected at their upper ends for support by a cross member 32. A slide or crosshead indicated in general by the numeral 33 is slidably supported on the rods 26 and 27, and a crosshead 34 is slidably supported on the rods 30, 31. As the two crossheads are identical except for being reversed, they will be provided with similar identifying numerals.

Each of the crossheads 33 and 34 includes a base plate 35 supporting a pair of bearings 36 and 37 which accommodate the vertical rods of the corresponding slide guide. A gauge plate 39 is secured to the forward end of the base plate 35 by bolts 40 or other suitable means. The gauge plates 39 are provided with sector shape upper ends 41 which is provided with a series of angularly spaced gauge marks 42 forming a scale. The scale may be arbitrarily spaced, or may be spaced to provide an actual measurement in thousandths of an inch or other suitable distances.

Each of the gauge plates 39 is provided near its lower end with a lateral extension 43 which supports a horizontal pivot 44 having its axis parallel the abutments 13 and 16 locating the carton B. A pointer 45 is pivotally supported by the pivot 44, and a roller 46 is pivotally supported at the lower end of the pointer also on an axis parallel to the axis of the pivot 44. A pair of angle brackets on each of the gauge plates 39 is provided with a stop pin 47 against which the pointer 45 may rest when the pointer 45 is at zero. In the position shown in FIGURE 2 of the drawings, the pointers normally would be at zero or very near the zero mark due to the fact that the cartons will normally bulge to the greatest extent near or slightly below the vertical center of the carton, and at the lateral center of the face panel such as 49. The pointer 45 to the right side is shown pivoted away from the stop pin 47 for the purpose of simplifying the illustration.

A pair of angle brackets 50 are slidably supported on the rods 26 and 30, and are held in an adjusted position by means of thumb screws 51 which engage against the rods 26 and 30. The angle brackets 50 extend horizontal portions 52 through which the rods 26 and 30 extend, and vertical portions 53 which extend downwardly in parallel relation to each other and to the supporting rods. The inner opposed surfaces of the vertical portions 53 are notched as indicated at 54 at their lower ends to accommodate a portion of the juncture between the top of the carton and the face panels 49. The guides 50 are so proportioned that the vertical planes of the notches 54 coincide with the planes of the vertical abutments 13 and 16 so that the cartons B are held in vertical relation and centered between the slide guides.

The operation of the apparatus is extremely simple. The thumb screws 22 are loosened, the carton B is placed on the platform 10 between the parallel abutments 13 and 16, and the plate 14 is moved into engagement with the carton to clamp the lower end of the carton between the plates 12 and 14. The angle brackets 50 are then adjusted in height and positioned so that the notches 54 engage the upper portion of the carton, the notches holding the carton from lateral movement and from vertical movement. The crossheads 33 and 34 may then be raised

either singly or simultaneously, the crossheads being provided with laterally projecting pins 55 by means of which they may be grasped. With the pointer 45 swung towards its zero position which is at the outer end of the scale 42, the rollers 46 will be in engagement with the carton face walls 49 near the center point thereof. The crossheads are then raised slowly, this action causing the rollers 46 to roll along the surfaces of the panels 49.

The extent to which the pointers 45 will pivot will thus depend upon the amount of bulge. In preferred form, the pivots 44 support the pointers with sufficient friction so that they will stay in the position of maximum bulge, the pointers 45 preferably remaining in this position so that the amount of bulge on each side of the carton may be readily noted. The total bulge on opposite sides of the carton may be quickly and easily determined. In usual practice, a series of cartons of a predetermined size containing a certain weight of a given material are produced of paperboard of various weights, stiffnesses, and the like. The relative stiffness of the board is readily detected by the degree of bulge of the carton walls. Thus the various cartons may be compared, and a determination may be made of the proper type of board to be used for carrying a predetermined product. If desired, the tests may be made to cartons after a test shipment has been made, or after the cartons have been subjected to vibration or other movement to simulate the conditions of a shipment.

In accordance with the patent statutes, I have described the principles of construction and operation of my improvement in Bulge Testing Apparatus, and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A carton bulge testing device including:
a pair of spaced vertical slide guides,
means engageable with a carton between said spaced guides to hold the carton centered,
a pair of slides vertically slideable on said guides,
a base supporting said slide guides in parallel relation,
a pointer pivotally connected to each said slide on a horizontal axis and pivotal in a substantially common vertical plane, and
means on said pointers engageable with opposite sides of a carton between said slide guides to pivot said pointers in accordance with the thickness of the carton.

2. A carton bulge testing device including,
a platform,
a fixed abutment on said platform against which one side wall of a carton resting upon said platform may engage,
a movable abutment slidably supported on said platform parallel to said fixed abutment and movable toward and away from said fixed abutment,
a pair of parallel slide guides extending normal to the surface of said platform and spaced outwardly of said abutments and in equally spaced relation thereto,
one of said slide guides being fixed adjacent said fixed abutment and the other being movable in unison with said movable abutment, said slide guides being at a predetermined distance from their respective abutments,
a slide vertically slidable on each said slide guide,
a pointer pivotally supported intermediate its ends to each said slide for pivotal movement in a plane at right angles to said abutments,
means on one end of each said pointer engageable with a wall of a carton positioned between, and engaging, said abutments
whereby upon movement of said slides longitudinally of said guides, the pointers will be pivoted by an in-

crease in thickness between the walls engaged by said means on one end of the pointers.

3. The structure of claim 2 and including an arcuate scale on each slide cooperable with the other end of each pointer.

4. The structure of claim 2 and including means on each slide guide holding the end of the carton most remote from the end thereof engaging said platform centered between said slide guides.

5. The structure of claim 2 and in which said means on each said pointer includes a roller pivotal on an axis parallel the pointer axis.

References Cited by the Examiner

UNITED STATES PATENTS

910,706	1/09	Montan	33—172
2,391,075	12/45	Steibel et al.	33—172 X
2,680,300	6/54	Ruggles	33—172 X
2,854,756	10/58	Aller	33—174

FOREIGN PATENTS

865,954	3/41	France.
133,432	10/51	Sweden.

ISAAC LISANN, *Primary Examiner.*