J. W. WEBB.

DEVICE FOR TESTING CORRUGATED PAPER BOARD AND CORRUGATED PAPER BOARD BOXES.

APPLICATION FILED OCT. 10, 1918.

1,328,349.

Patented Jan. 20, 1920.

Fig. 1.

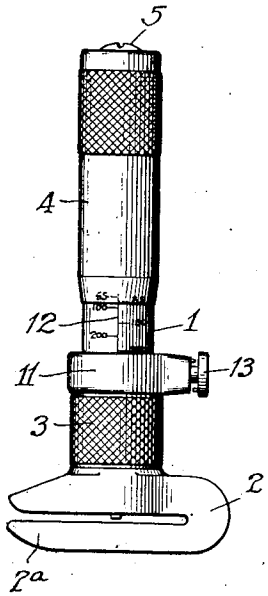


Fig. 2.

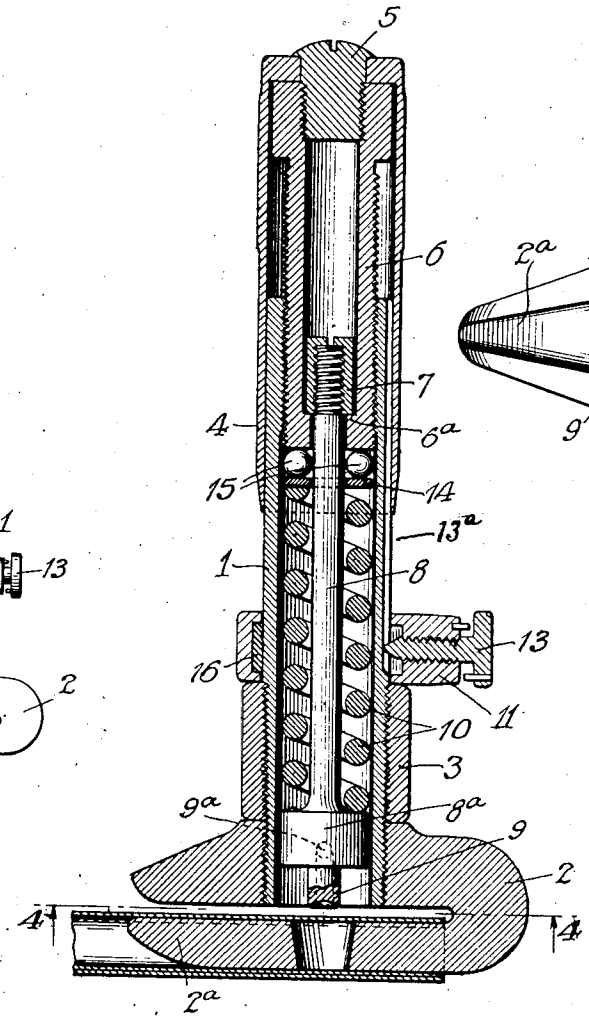


Fig. 3.

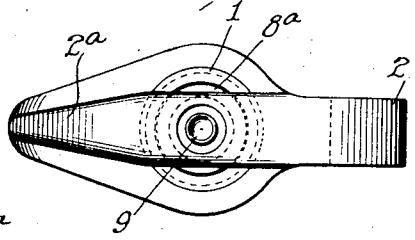


Fig. 5.

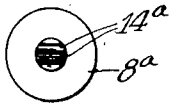


Fig. 6.

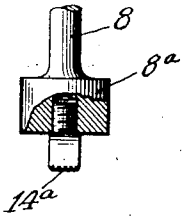


Fig. 7.

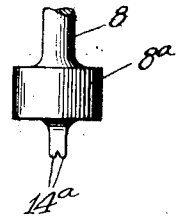
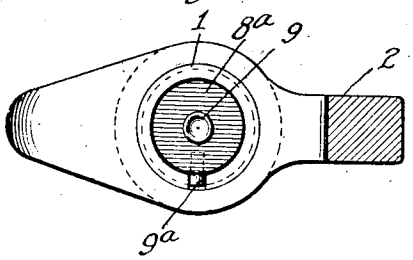


Fig. 4.



Inventor

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His Attys.

UNITED STATES PATENT OFFICE.

JOHN W. WEBB, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WEBB TESTER INCORPORATED, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE.

DEVICE FOR TESTING CORRUGATED PAPER-BOARD AND CORRUGATED-PAPER-BOARD BOXES.

1,328,349. Specification of Letters Patent. Patented Jan. 20, 1920.

Application filed October 10, 1918. Serial No. 257,563.

To all whom it may concern:

Be it known that I, JOHN W. WEBB, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Devices for Testing Corrugated Paper-Board and Corrugated-Paper-Board Boxes, of which the following is a specification.

The corrugated paper board and corrugated paper board box testing device which constitutes my present invention is intended and designed to provide a simple, compact and reliable pocket instrument by means of which the facings of corrugated paper articles may be tested to ascertain whether such facings meet specified requirements as to their strength. In recent years what is commercially termed double-faced corrugated straw board (the corrugated member usually being made of straw paper) has come into extensive use for the manufacture of various sorts of cartons and packing boxes designed for the shipment of articles by railway and other transportation companies, and certain rules and regulations have been established relating to such packages, among which are specified requirements as to the minimum bursting strength separately of the outer and inner facing sheets of the corrugated straw board of which they are made. My device is a small portable easily manipulated tool which may be carried without injury in the pocket and is intended for the use of shipping clerks, receiving clerks, inspectors and other employees of shippers and transportation companies for the ready determination of the strength of corrugated paper containers. With the above conditions and requirements in view, and with the object of providing a suitable and efficient instrument for the purposes in view, I have invented and designed the device hereinafter more particularly described, the essential elements of my invention being more particularly pointed out in the appended claims.

Figure 1 of the drawing is a side elevation of my novel testing device; Fig. 2 a central longitudinal section of the same on a larger scale than Fig. 1; Fig. 3 is a bottom plan view; Fig. 4 is a section on the line 4—4 of Fig. 2; and Figs. 5, 6 and 7 are details showing respectively a bottom plan view, a side elevation (partly in section) and a second side elevation at right angles to the first mentioned side elevation, of a modified form of plunger tip.

The same reference characters indicate the same parts in all the figures of the drawing.

The specific construction of the device as illustrated in the drawing will now be described. To the lower end of the tubular barrel forming the shank of the tester is secured (in the present instance by means of a screw-threaded engagement) a slotted finger block 2, the lower or outer part of the block consisting of a finger 2^a having a flat upper face and a rounded lower face shaped to enter and fit the space between the upper facing of a piece of corrugated paper board and a valley of the corrugated inner member thereof. This finger is orificed in alinement with the axis of the barrel 1. Above the base of the block 2 is arranged a knurled lock nut 3 screwed tightly down upon the block so that both the block and nut are immovably secured to the barrel. Slidably and rotatably engaging the upper end of the barrel is arranged a knurled operating sleeve 4, within which is rigidly secured, in the present instance by means of the connecting screw 5, a depending tubular screw 6 engaging the internally threaded upper portion of the barrel 1. The lower end of the screw 6 is formed with an internal annular shoulder 6^a arranged to coöperate with a nut 7 carried by the screw-threaded upper end of the stem 8 of the plunger member. The plunger stem has a loose sliding fit within the annular shoulder 6^a, and the nut 7 fits loosely within the bore of the screw 6. The lower end of the plunger member consists of a head 8^a slidably engaging the bore of the barrel of the tool and equipped with a plunger point 9, which in the present instance, as shown, is made removable and is secured to the plunger head by means of a set screw 9^a the head of which slidably engages a slot in the barrel, whereby rotation of the plunger member is prevented. Between the plunger head 8^a and a bearing face at the lower shouldered end of the screw 6, and surrounding the plunger stem

8 within the barrel of the tool, is arranged a helical spring 10, an anti-friction bearing consisting of a washer 14 and a set of balls 15 being provided intermediate the top of the spring and the bearing face of the screw for the purpose of practically eliminating friction at that point. An adjustable stop ring 11 is provided which may be set at any desired indication of a graduated scale 12 formed on the barrel 1, and seated within an internal annular groove in such ring is arranged a C-shaped friction ring 16 which coöperates with the barrel to yieldingly maintain the stop ring in any position in which it may stand. The stop ring may be secured in any adjusted position by means of a set screw 13, the pointed end of which travels in a longitudinal slot 13ª formed in the barrel 1.

The tension of the spring bears such relation to the size of the plunger and the graduations of the scale as to give indications corresponding to those afforded by testing machines already well known in the art and nominally (though not in all cases accurately) indicating in pounds per square inch the pressure required to puncture or burst through a sheet of paper. It will be understood that the usual and recognized method of making a bursting test is to apply pressure gradually to a restricted area (through an elastic diaphragm expanding through an opening, or by means of a plunger) until the paper reaches the limit of its strength and suddenly ruptures, this strength being indicated upon a scale—nominally indicating the stress upon the paper in pounds per square inch.

With the construction and arrangement of parts described it is obvious that the finger 2ª of the tool being inserted in a piece of corrugated board between the top facing and corrugated member, and the knurled sleeve 4 being rotated to screw the connected screw 6 down against the spring 10, the plunger point will be carried down until it bears upon the top facing of the board and then subjected to increasing stress of the spring until the paper bursts, unless downward movement of the sleeve is interrupted by its lower end bringing up against the stop ring 11 before a rupture occurs. The downward movement of the connected sleeve and screw, and consequently the compression of the spring, is indicated by the movement of the lower edge of the sleeve 4 over the graduated scale 12. The stop ring may therefore be set to the graduation indicating the minimum strength required of the particular facing, and unless the paper bursts before contacting the stop it of course meets the requirement satisfactorily. The outer and inner facings may be thus tested separately to determine whether they satisfy any required specification of strength.

If it be desired to ascertain the exact bursting strength of the facings, instead of whether they pass a test of required minimum strength, the ring 11 should be shifted upwardly into contact with the lower edge of the sleeve and the sleeve rotated slowly until a break occurs, the ring being forced downwardly by the sleeve. The sleeve being now rotated in the reverse direction to enable the device to be disengaged, the stop ring will be retained through the action of the friction ring 11 at the point at which it was left when the break occurred, and the bursting strength will be indicated upon the scale 12. The two facings may be thus tested separately, and their combined values will be the total or combined bursting strength of the board. It is obvious that if desired the stop ring can be shifted to extreme downward position, and by rotating the operating sleeve slowly until a break occurs, stopping the movement immediately at this point, the edge of the sleeve will indicate upon the scale the bursting strength of the paper.

While in Figs. 1 to 4 inclusive I have illustrated a form of plunger tool having a circular face slightly cupped at the center and with a rounded edge, this form being well adapted to give the general or average value of a facing sheet, yet for the purpose of providing for more accurate tests of the relative strength of paper measured with the grain,—that is, "machine-ways" of the paper, and across the grain, I have provided the form of plunger point shown in Figs. 5, 6 and 7 in which the working face consists of parallel blunt ridges 14ª. With this tool or point arranged so that its ridges lie with the grain in the general direction of most of the fibers (in case of paper having a pronounced grain) the ridges will divide and separate groups of longitudinal fibers without initially breaking them, and the stress will be borne by the transverse fibers which will break initiating a burst of the plunger through the paper and giving an indication of the strength of the paper across the grain. When the plunger point is arranged so that the ridges lie transversely of the grain the longitudinal fibers will sustain the stress and at the point of rupture the strength of the paper with the grain will be indicated. The faces of the round plunger point shown in Figs. 1 to 4 and that of the form last described are such that they will give the same indications upon perfectly matted or felted paper having no appreciable grain, and it has been found that upon papers having a marked grain the indications of the round faced plunger is intermediate that of indications taken with ridged plunger with and across the grain. The last mentioned form of plunger may also be made to give an average or interme-

diate indication by setting it to position approximately half way between those above described.

From the description above given it is obvious that my novel device may be conveniently used to test boxes made up and packed for shipment, either at a point where an exposed edge of the material is presented or by making a small incision (not injuring the package materially) to enable the finger of the tool to be applied. It is also manifest that the specific construction above described may be modified in many ways without departing from the substance of my invention or the scope of the appended claims. I therefore intend my claims to include all equivalent means for accomplishing the functions of the structure therein recited.

I claim:

1. A testing device of the character described and comprising a shank, an orificed finger secured to said shank adjacent one end thereof and arranged at right angles thereto, a plunger member slidingly mounted in said shank and equipped with a plunger point in alinement with the orifice in said finger, a coiled spring arranged to bear at one end against said plunger member, and a manually operable member arranged to coöperate with the other end of said spring to yieldingly force said plunger member toward said finger, said shank and said manually operable member being one or the other marked with a graduated scale to indicate their relative movement.

2. A testing device of the character described and comprising a hollow shank, an orificed finger secured to said shank adjacent one end thereof and arranged at right angles thereto, a plunger member slidingly mounted within said shank and equipped with a plunger point in alinement with the orifice in said finger, a coiled spring arranged to bear at one end against said plunger member, and a longitudinally movable sleeve surrounding said shank and arranged to coöperate with the other end of said spring to yieldingly press said plunger member toward said finger, said shank and sleeve being one or the other provided with a graduated scale to indicate their relative movement.

3. A testing device of the character described and comprising a tubular shank, an orificed finger secured to said shank adjacent one end thereof and arranged at right angles thereto, a plunger member having a head slidingly mounted within said shank and a stem extending axially thereof, said plunger member being equipped with a plunger point in alinement with the orifice in said finger, a coiled compression spring surrounding the stem and bearing at one end against the head of said plunger member, a longitudinally movable sleeve surrounding said shank and arranged to coöperate with the other end of the spring to yieldingly press the plunger member toward said finger, said shank and sleeve being one or the other provided with a graduated scale to indicate their relative movement.

4. A testing device according to claim 3 in which the end of the shank and the sleeve are connected by screw-threaded engagement.

5. A testing device according to claim 3 in which the end of the shank is internally threaded and said sleeve is slidable and rotatable upon the outer surface of the shank and is provided with a depending externally threaded element engaging the threaded end of the shank.

6. A testing device of the character described and comprising a tubular shank, an orificed finger secured to said shank adjacent one end thereof and arranged at right angles thereto, a plunger member slidingly mounted within said shank and equipped with a plunger point in alinement with the orifice in said finger, a sleeve connected by screw-threaded engagement with said shank, and a spring intermediate said plunger member and said sleeve, said shank being marked with a graduated scale coöperating with the end of the sleeve to indicate their relative movement.

7. A testing device of the character described and comprising a tubular shank, an orificed finger secured to said shank adjacent one end thereof and arranged at right angles thereto, a plunger member slidingly mounted within said shank and equipped with a plunger point in alinement with the orifice in said finger, a sleeve connected by screw-threaded engagement with said shank, a spring intermediate said plunger member and said sleeve, said shank being marked with a graduated scale coöperating with the end of the sleeve to indicate their relative movement, and an adjustable stop on said shank arranged to be set at any desired graduation of the scale.

8. A testing device according to claim 7 in which the stop is a sliding ring surrounding the shank and equipped with a set screw.

JOHN W. WEBB.