S. D. WELLS.

TEARING TESTER.

APPLICATION FILED DEC. 9, 1918.

1,335,307. **Patented Mar. 30, 1920.**

FIG. 1.

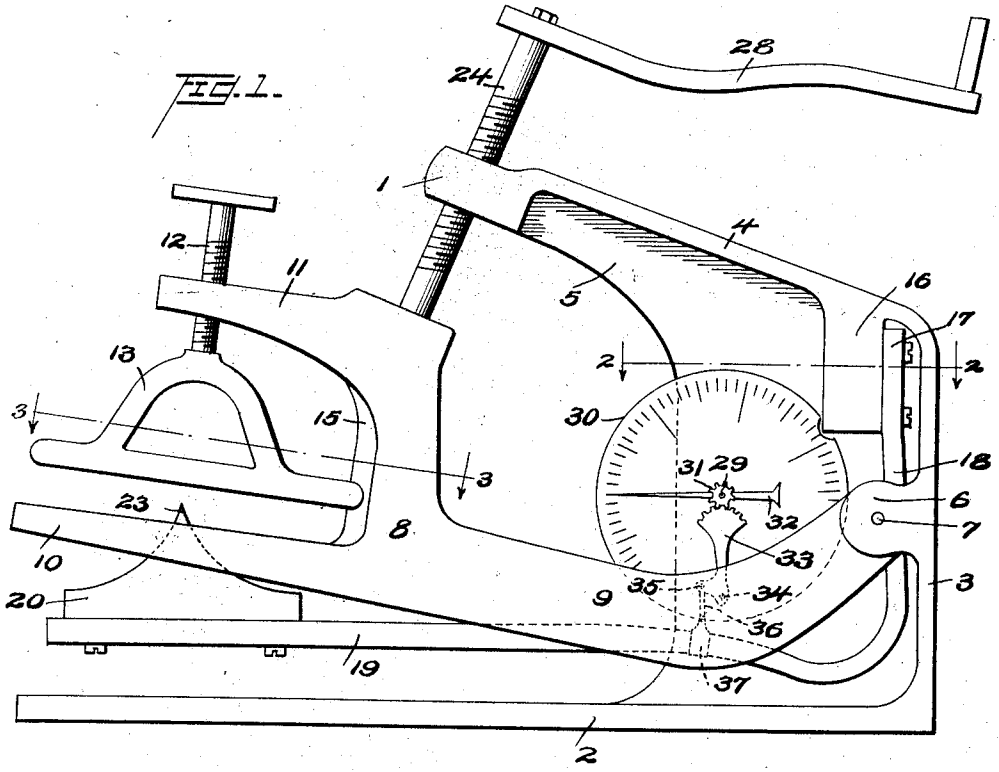


FIG. 2.

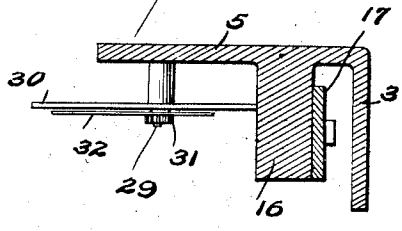


FIG. 3.

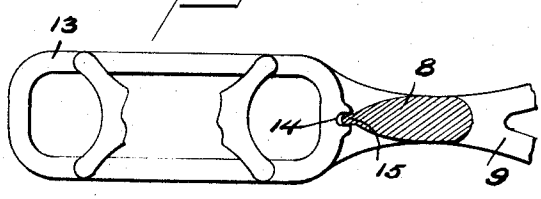


FIG. 4.

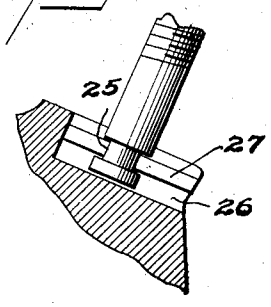


FIG. 5.

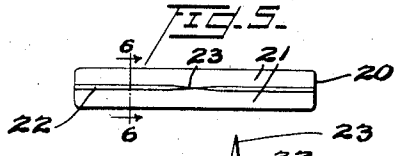
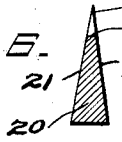


FIG. 6.



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His Att'y

UNITED STATES PATENT OFFICE.

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TEARING-TESTER.

1,335,307. Specification of Letters Patent. Patented Mar. 30, 1920.

Application filed December 9, 1918. Serial No. 265,908.

To all whom it may concern:

Be it known that I, SIDNEY D. WELLS, a citizen of the United States, residing at Madison, in the county of Dane and State of Wisconsin, have invented a certain new and useful Tearing-Tester, of which the following is a specification.

My invention relates to testing the resistance of a material to tearing and in particular comprises a machine designed and constructed to determine the resistance to tearing of paper or other similar wrapping material.

In the drawing Figure 1 represents a front elevation of my assembled machine; Fig. 2 is a section of part of the machine on the line 2—2 of Fig. 1; Fig. 3 is a section of part of the movable arm on the line 3—3 of Fig. 1; Fig. 4 is a detail of the connection between the screw and the movable arm; Fig. 5 is a detail of the tool showing it in plan; and Fig. 6 is a section of the tool on the line 6—6 of Fig. 5.

Referring to the drawing for a detailed description of my tearing tester, the tester consists of a frame 1 provided with a base 2 and an upstanding portion 3. Extending from this upstanding portion is a nearly horizontal arm 4 curved back over the base section 2. The entire frame is braced by a web 5. Extending from the forward edge of the upstanding part 3 is an ear 6 supporting, with the web 5, a pivot rod 7 on which is mounted an arm 8. This arm 8 consists of a bifurcated portion 9 by which it is mounted on a pivot 7. This arm 8 also comprises a stationary clamping member 10 of annular form and an extending arm 11. Mounted in this arm 11 is a screw 12 carrying on its lower end a movable clamping member 13 designed to coöperate with the stationary clamping member 10 and thus secure the paper or other material firmly in position. This member 13 is provided with a notch 14 engaging a ridge 15 on the arm 11 to prevent rotation of the member 13 when the screw 12 is rotated. Secured to the extending part of the frame 4 is a lug 16 on which is mounted a resilient member 17 preferably constructed of spring steel. This member 17 comprises a downwardly extending part 18 and a horizontally extending part 19. On the upper side of the latter part is mounted the tearing tool 20. This tool comprises two triangular faces 21 united at the top by a rounded or curved surface 22 except at the apex of the triangles where such rounded surface 22 disappears and the two surfaces 21 meet directly to form a pointed pyramid. Mounted in the extension 4 is a screw threaded rod 24 engaging with corresponding threads in the part 4 and shouldered at its lower end to provide a part 25 of reduced diameter. The arm 11 is recessed at a corresponding point to form a pocket 26 in which are mounted two cross pieces 27 forming between them a slot of the proper width to receive the reduced section 25 of the screw 27. By means of this construction the screw 24 may rotate freely between the parts 27 and may also move longitudinally in the pocket 26 yet axial movement of the screw 24 will move the arm 8 about its pivot 7 through the engagement of the screw with the cross-pieces 27. Mounted on the upper end of this screw 24 is a crank 28 to facilitate rotation of the screw. Secured to the web 5 is a stud 29 about which is mounted a dial 30 also secured to web 5. On this stud 29 is rotatably mounted a pinion 31 carrying a pointer 32. This pinion 31 is engaged by a segmental gear 33 pivoted at 34 and provided with a bell-crank arm 35 to which is secured a link 36 the other end of which is fastened to a clamp 37 secured to the horizontal section 19 of the resilient member 17.

In order to test a sheet of paper or other material the arm 8 is raised by means of the screw 24 until the member 10 is above the apex 23 of the tool 20. The paper is then placed across the opening in the part 10 and the coöperating member 13 moved down by means of the screw 12 to securely hold the paper in position between the members 10 and 13. The screw 24 is then rotated in the reverse direction to move the arm 8 and the paper carried thereby against the point 23. As the paper engages the point 23 the pressure of the paper will cause the point to move downward carrying with it the arm 19 and thereby rotating the pinion 31 and the pointer 32 by means of the link 36 and gear 33 and indicating by the position of the pointer 32 on the dial 30 the tension between the paper and the point 23. When the tension reaches a certain value, the point 23 will puncture the paper and the tension will then decrease. A reading of the pointer just before puncturing will indicate the

maximum tension required to produce such puncturing. Inasmuch, however, as I do not particularly desire to determine the resistance of the paper to puncturing I have made the point 23 very sharp so as to produce puncturing at a comparatively low tension. After such puncturing the arm 24 will be further rotated and the paper will come into engagement with the rounded surface 22. When the tension is sufficient the rounded surface 22 will tear the paper to further increase the opening in the paper. The arm 19 will be depressed an amount corresponding to the tension required for such tearing, and this depression will be measured as before by the position of the arm 32 on the dial 30.

While the above embodiment of my machine shows a screw 24 rotated by hand by means of a crank 28 it is obvious that it is desirable that this crank be rotated at approximately a constant speed and in order to secure this constant speed I may provide any one of the many well known devices in use for such purpose. Further while I have designed my machine to determine the tearing strength of paper it is apparent from the above description that I may determine the puncturing strength, as well, by a reading of the position of the pointer 32 at the instant of puncturing. While I have actually constructed the point 23 very sharp so as to reduce the tension necessary for initial puncturing it will be understood that this point may be made more blunt if desirable so that the measurement of the puncturing strength is facilitated. In using the machine which I have described, I select a paper which I have found suitable for the use desired and note the position of the pointer 32 when this paper is being torn. I then test other paper submitted to determine its strength in comparison with that of the satisfactory paper. I realize, however, that the dial 30 could be calibrated to indicate absolute tearing strength and the results specified in such terms. It will be obvious, of course, that my tester is suitable for materials other than paper.

While I have above described the embodiment of my device which I now prefer I consider as within the scope of my invention the modifications and changes above referred to and I also consider as within the scope of my invention all changes and modifications included in the scope of the appended claims.

I claim:

1. In a tearing tester, a clamp for holding the material to be tested, a tool adapted to tear said material and comprising a substantially triangular shaped piece with apex toward said material, said apex being pointed to pierce said material initially, and sides rounded to tear said material rather than cut it, and actuating means for causing relative movement of said clamp and tool.

2. The device as in claim 1, in combination with means for measuring the force required for such tearing.

3. In a tearing tester, a clamp for holding the material to be tested, an arm supporting said clamp, a frame supporting said arm, a tool adapted to tear said material and comprising a triangular shaped piece with apex toward said material and sides rounded to tear said material rather than cut it, actuating means for causing movement of said clamp toward said tool, a member resiliently supporting said tool, and a means secured to said member to indicate the deflection thereof.

4. The device as in claim 3, said apex being pointed to pierce said material initially.

5. In a tearing tester, a clamp for holding the material to be tested, an arm supporting said clamp, a frame supporting said arm, a tool adapted to tear said material and comprising a triangular shaped piece with apex toward said material and sides rounded to tear said material rather than cut it, a screw mounted in said frame and bearing against said arm and operable to move said clamp toward said tool and thus tear said material, a member resiliently supporting said tool, and a means secured to said member to indicate deflection thereof.

6. The device as in claim 5, said apex being pointed to pierce said material initially.

In testimony whereof I affix my signature.

SIDNEY D. WELLS.