

H. E. EDDY.  
PAPER TESTING DEVICE.  
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974,867.

Patented Nov. 8, 1910.

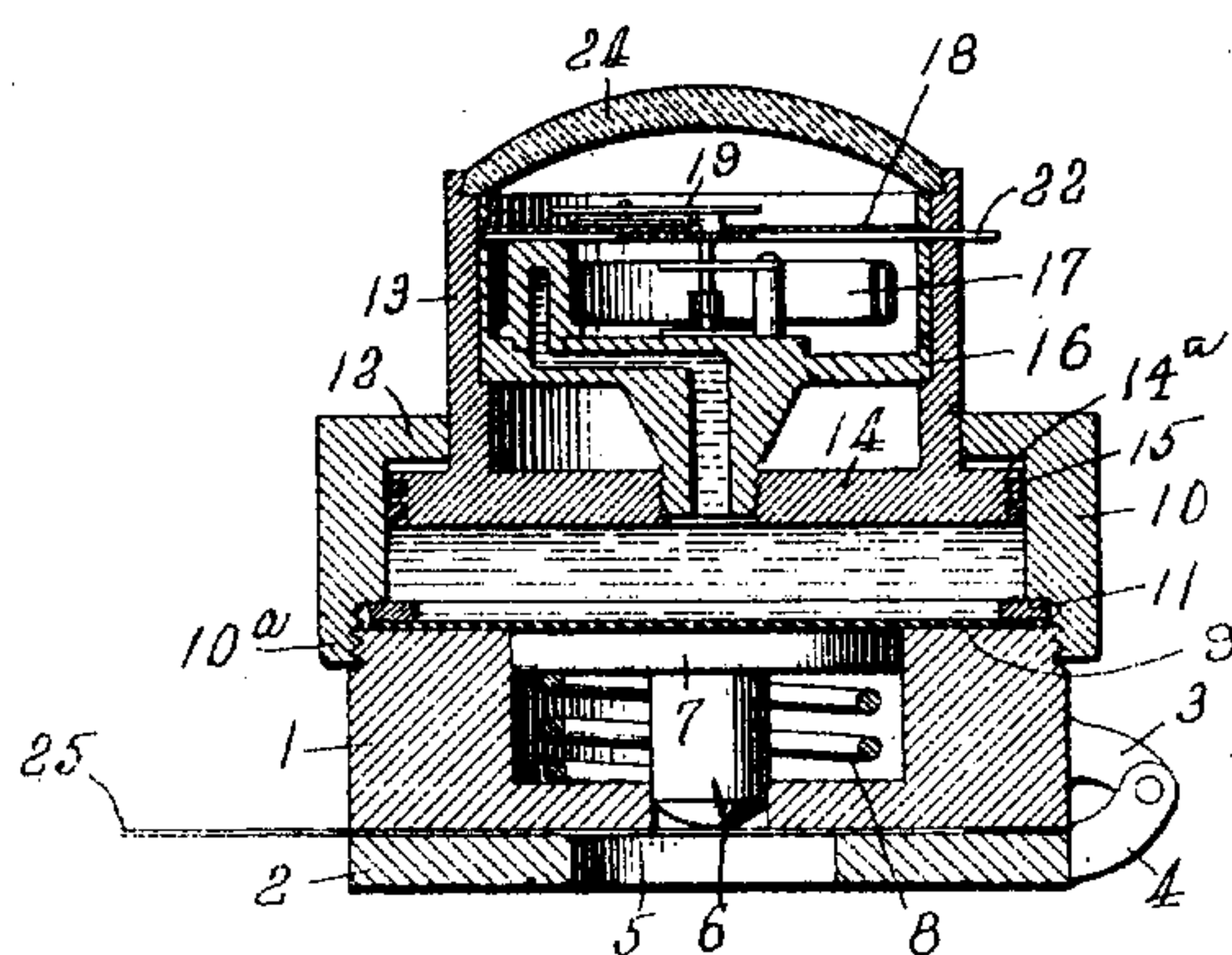


Fig 1

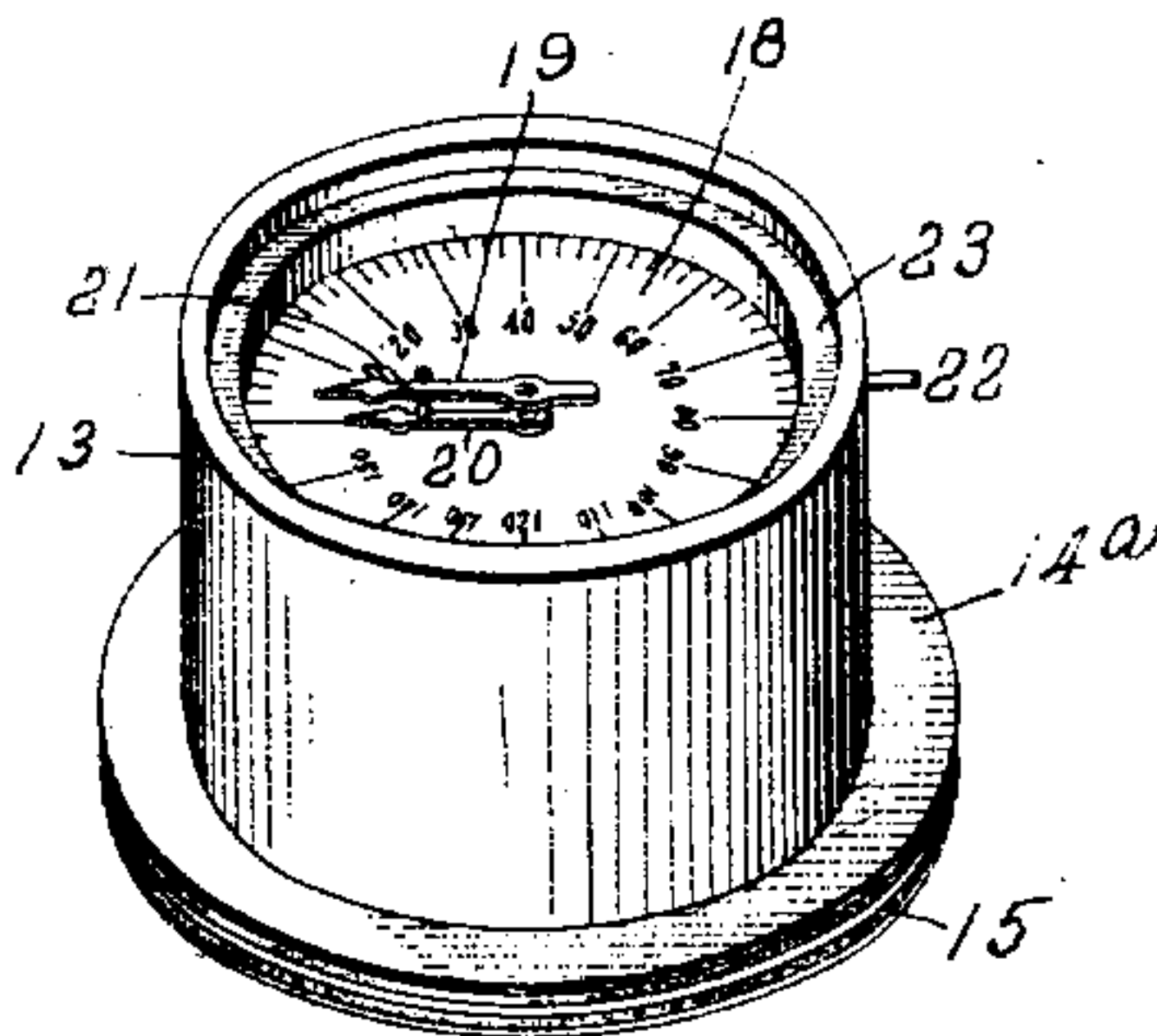


Fig 2

Inventor

Howard E. Eddy

Witnesses  
H. C. Bolmette

Newton P. Willis.

By

Watson & Boyden

Attorneys



# UNITED STATES PATENT OFFICE

HOWARD E. EDDY, OF ARLINGTON, MARYLAND.

## PAPER-TESTING DEVICE.

974,867.

Specification of Letters Patent.

Patented Nov. 8, 1910.

Application filed December 7, 1909. Serial No. 531,829.

*To all whom it may concern:*

Be it known that I, HOWARD E. EDDY, a citizen of the United States, residing at Arlington, in the county of Baltimore and State of Maryland, have invented certain new and useful Improvements in Paper-Testing Devices, of which the following is a specification.

My invention relates to strength testing devices, and more particularly to devices for testing the strength of various grades of paper, with a view to determining their quality. Testing machines for this purpose, as heretofore constructed, have been heavy, large, expensive and more or less complicated pieces of apparatus, for the most part, beyond the reach of the average consumer.

The objects of the present invention, are, therefore, to provide a device of this character which shall be simple light and compact, and which, while cheap in price, shall at the same time be reliable and efficient in operation.

To these ends my invention consists in the construction and combination of parts hereinafter described, and illustrated in the accompanying drawings, in which,—

Figure 1 is a central vertical section through the complete device; and Fig. 2 is a perspective view of the piston, showing the dial of the pressure gage.

Referring to the drawings in detail, my improved device comprises a block 1 and a paper supporting plate 2, hinged together by means of the lugs 3 and 4. The plate 2 is provided with an aperture 5, over which the paper to be tested is laid.

Mounted in the block 1 immediately above the opening 5 is a plunger 6, having a broad flat head 7. A coil spring 8 surrounds the plunger and bears under the head 7 in such a manner as to normally maintain the upper surface of such head flush with the upper surface of the block 1.

Resting on the block 1 and over-lying the head 7 of the plunger is an elastic diaphragm, preferably formed of thin sheet rubber or the like.

10 designates a cylinder, which is secured to the block 1 in such a manner that the block constitutes, in fact, the cylinder head. The method of attachment is preferably by means of screw threads as indicated at 10<sup>a</sup>. At the base of these screw threads the cylinder is provided with an interior annular

shoulder in which fits a flat ring 11. It will be obvious that by screwing the cylinder 10 down upon the head 1, the diaphragm 9 will be securely clamped between the ring 11 and the upper surface of the block 1, and thus secured in position. At its upper end the cylinder 10 is provided with an inwardly projecting annular flange 12. This forms an opening of slightly less diameter than the diameter of the cylinder, and through this opening works the piston now to be described. By reference to Fig. 2 it will be seen that this piston comprises a cylindrical body 13, adapted to snugly fit the opening formed by the flange 12. This cylindrical body is preferably hollow and is provided with a bottom 14, which is extended so as to project beyond the body 13 and form an annular flange or shoulder 14<sup>a</sup>. The diameter of this extended bottom is such that it will just fit the interior bore of the cylinder 10, and the edge of the shoulder 14<sup>a</sup> is provided with suitable packing 15, to prevent leakage. It will be seen from an inspection of Fig. 1, that when in operative position the inwardly projecting flange 12 overhangs the annular shoulder 14<sup>a</sup>, and thus limits the outward movement of the piston.

In order to render my testing device small and compact, I mount the pressure gage within the hollow piston. This pressure gage may be of the Bourdon tube, or any other suitable type. As shown in the drawing it comprises a casing 16, having a central depending neck which is screw-threaded into the bottom 14 of the piston, and in which casing is mounted the usual curved tube 17, and suitable gearing.

18 designates the dial of the gage which is set into the casing 16 near its upper edge, and is horizontally disposed.

In order to register as well as indicate the amount of pressure, I preferably employ a gage having two hands, one of which is fixed, and the other loose, on the gage shaft. As shown in the drawing, 19 designates the fixed hand and 20 the loose hand. The latter carries a pin 21 which is engaged by the hand 19, when actuated. In order to reset the loose hand at zero a pin or rod 22 is provided, which may have a rack-and-pinion or other suitable connection with said hand.

In order to prevent injury to the gage I cover it with a transparent dome 24, which is preferably constructed of thick heavy



glass, and is set into the upper edge of the body 13 of the piston. This dome serves to receive the pressure from the hand of the operator and at the same time permits of the ready reading of the gage indications.

The operation of the device will be obvious. The entire cylinder and piston is swung back on the hinge 3 and 4 so as to permit the placing in position on the plate 2 of the sample of paper 25 to be tested. The device is then swung back into the position shown in Fig. 1. The interior of the cylinder and gage tube is filled with a fluid which preferably consists of some non-freezing incompressible liquid such as glycerin. When, therefore, with the parts in the position shown in Fig. 1, the operator bears with his hand on the dome 24, the piston is forced downward, thus applying pressure to the liquid, which is exerted equally in all directions. Acting downwardly, it expands the diaphragm 9 and forces the plunger 6 down against and finally through the paper 25. Acting upwardly the pressure operates the gage causing the hand 19 to move over the scale and carry with it the loose hand 20. Immediately the paper ruptures, the plunger 6 passes downwardly through the same and the pressure is relieved. When, therefore, the operator removes his hand from the piston, the spring 8 will restore the parts to their normal position, and the hand 19 will return to zero, leaving the loose hand 20 at the maximum point to which it was moved, thus indicating and registering the pressure necessary to rupture the paper. After this reading has been observed, the hand 20 may be set back to zero by manipulating the pin 22. It will therefore be seen that my improved paper testing device is compact and self-contained, and may even be easily carried in the pocket and it is thought that the numerous advantages of my invention will be readily appreciated by those skilled in such matters.

What I claim is:

1. A paper testing device comprising a casing, a piston slidably mounted in one end of said casing and projecting therefrom, means at the other end of said casing for clamping a sheet of paper thereagainst, means for rupturing the paper so clamped, a pressure gage carried by the piston, said piston having a transparent end through which such gage may be read, said transparent end being adapted to receive direct pressure from the hand of the operator, and means for transmitting such pressure to said rupturing means.

2. In a paper testing device, a paper supporting, apertured plate, a cylinder having its head hinged to said plate and adapted to clamp the paper between itself and the plate, means carried by the cylinder for exerting a pressure on that part of the paper adjacent

the aperture in said plate, and means for measuring such pressure.

3. In a paper testing device, an apertured supporting plate, a block hinged to such plate, a plunger mounted in said block and adapted to bear on the paper being tested above the aperture in said plate, fluid pressure means for actuating said plunger, and means for measuring such pressure.

4. In a paper testing device, a plate having an opening, a cylinder disposed adjacent said plate, a plunger mounted in the head of such cylinder directly over the opening in said plate, an elastic diaphragm overlying the upper end of said plunger, means for exerting fluid pressure on said diaphragm to cause it to actuate said plunger, and means for measuring such pressure.

5. In a paper testing device, a vertically disposed cylinder having at its lower end means for exerting pressure upon the paper being tested, a piston in said cylinder projecting from the upper end thereof, fluid in said cylinder, and a pressure gage carried by said piston and provided with a dial and with a cover through which said dial may be read.

6. In a paper testing device, means for supporting the paper, and means for exerting pressure thereon and for measuring such pressure, such last mentioned means comprising a piston having a hollow body, a pressure gage inclosed therein, and a glass dome covering said gage and adapted to receive the pressure from the hand of the operator.

7. In a paper testing device, a vertical cylinder containing a fluid, means at the lower end of said cylinder for supporting the paper to be tested, means for transmitting to the paper pressure exerted on said fluid, a piston fitting said cylinder and serving to exert pressure on said fluid, a gage inclosed within said piston and in communication with said fluid, and a glass dome fitted in the upper end of said piston above said gage, so that the indications of said gage may be read therethrough, said dome serving to receive pressure from the hand of the operator when the piston is being depressed.

8. A paper testing device comprising a casing, a plunger mounted in one end thereof and adapted to bear against the paper being tested, means for supporting such paper adjacent the plunger, a piston mounted in the other end of said casing, and adapted to receive direct pressure from the hand of the operator, fluid in said casing between said plunger and piston, and means for indicating the resistance offered by the paper to said plunger.

9. A paper testing device comprising a casing, a plunger mounted in one end thereof and adapted to bear against the paper



being tested, means for supporting such paper adjacent the plunger, a piston mounted in and projecting from the other end of said casing, and adapted to receive direct  
5 pressure from the hand of the operator, fluid in said casing between said plunger and piston, and means attached directly to and forming part of said piston for indicating the resistance offered by the paper to  
10 said plunger.

10. A paper testing device comprising a casing, a piston slidably mounted in one end of said casing and projecting therefrom, said piston being adapted to receive direct  
15 pressure from the hand of the operator, a

plunger mounted in the other end of said casing and adapted to bear against the paper being tested, means for clamping the paper in position, and means carried by the casing for utilizing the pressure on the piston for  
20 both operating said plunger and for actuating said clamping means, and means for registering such pressure.

In testimony whereof I affix my signature, in presence of two witnesses.

HOWARD E. EDDY.

Witnesses:

GEORGE WARD,

ARTHUR P. MUDGE.