April 25, 1933. W. L. EGY 1,905,270

TESTING MACHINE

Filed June 4, 1930 2 Sheets-Sheet 1

Fig. 1

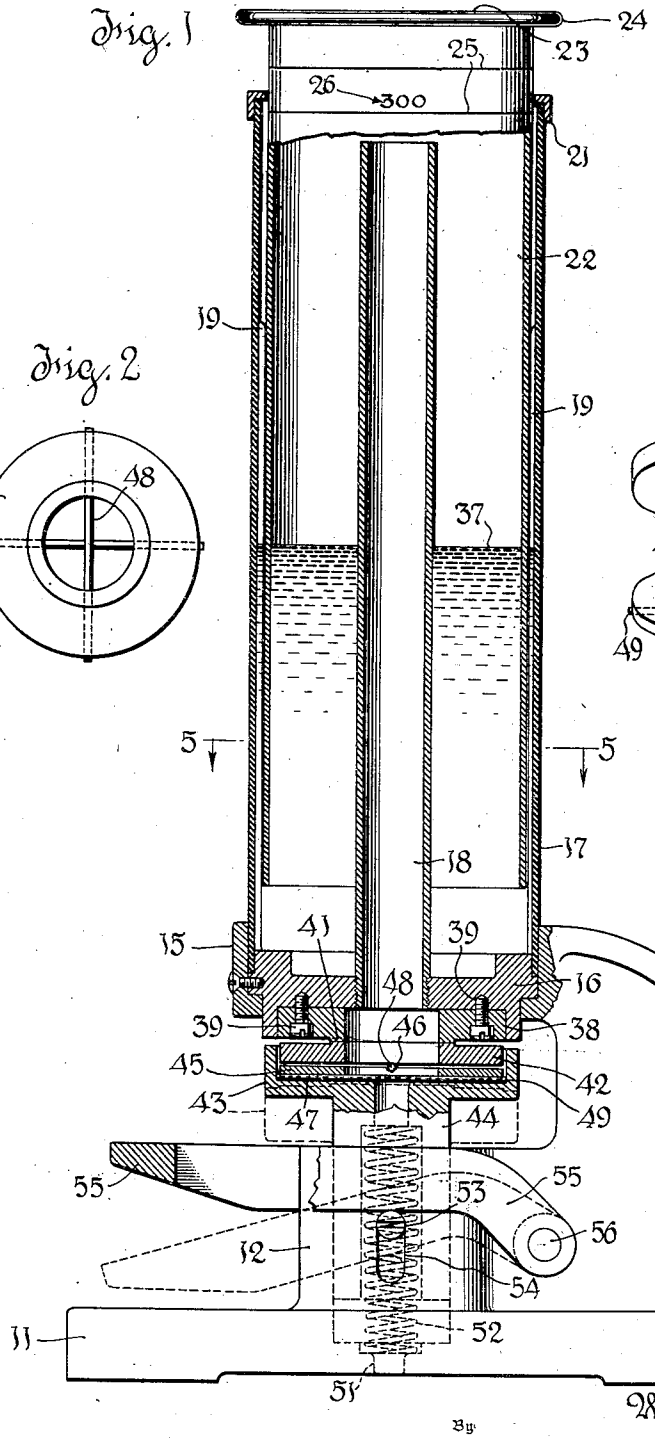
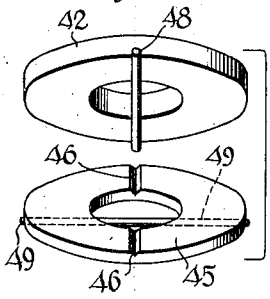


Fig. 2

Fig. 3



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Fig. 4

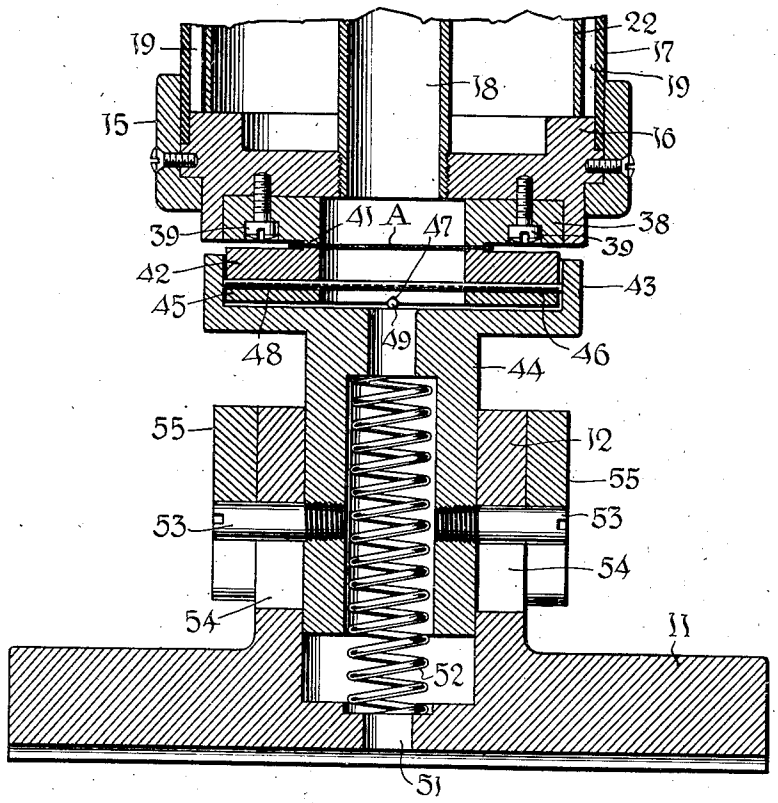
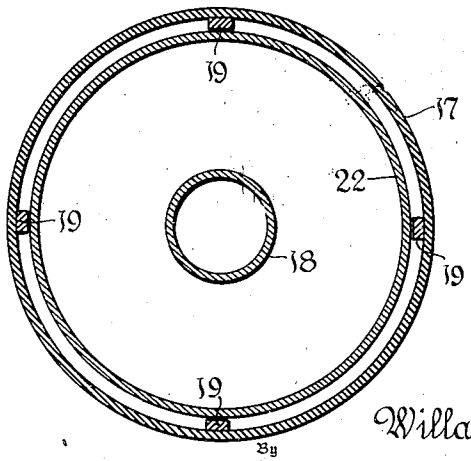


Fig. 5



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UNITED STATES PATENT OFFICE

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TESTING MACHINE

Application filed June 4, 1930. Serial No. 459,204.

This invention relates to testing devices, and particularly to devices for testing the porosity of sheets, patricularly paper sheets.

The device is in the nature of an improvement on the structure described in the patent to Gallagher et al., No. 1,538,793, issued May 19, 1925. The purpose of the invention is to secure a clamping means for the specimen which is readily manipulated and which will give a clamping pressure substantially uniform for all specimens, and which will produce a uniform pressure throughout the clamping area.

Another feature of the invention is the location of the clamping means at the base of the device, to the end that the specimen shall not be carried on the weighted bell and consequently shall not introduce a disturbing factor in the weight of the bell.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which

Figure 1 is a view largely in vertical axial section of the complete device.

Fig. 2 is a plan view of the lower clamping ring and showing the arrangement of the universal tilting mount for this ring.

Fig. 3 is a perspective view of the parts shown in Fig. 2 separated to illustrate the construction.

Fig. 4 is an enlarged vertical section through the base of the device, the plane of section being at right angles to the plane of section of Fig. 1.

Fig. 5 is a section on the line 5—5 of Fig. 1.

The device is supported as a whole by a base member having a supporting plate 11 from which rises a tubular guide member 12. At the rear of the plate 11 and connected to the guide member 12 is a web 13 reinforced by a flange 14, the web and flange serving to support a circular ring 15. This ring is concentric with the axis of the vertical guideway 12 and is counterbored to receive a tank structure which is made up of the annular bottom 16, a cylindrical shell 17 and the open ended tube 18 which is screwed into the opening at the center of the annular bottom 16. The parts 16, 17 and 18 make liquid-tight joints with each other, and the tube 18 projects upward within the shell 17 to a point near but slightly below the upper margin of the member 17.

Mounted on the inner surface of the shell 17 are vertical guide strips 19 (see Figs. 1 and 5), and the top of the member 17 is reinforced by an encircling flange ring 21. Mounted to slide vertically within the guide members 19 is an inverted cup or bell member made up of a cylindrical sleeve 22 and a head 23 which hermetically closes the upper end of the sleeve 22. The head 23 has a peripheral flange 24, and the sleeve 22 is marked with spaced circumferential graduations, some of which are shown at 25 in Fig. 1. These graduations may have numerals such as shown at 26 to indicate the volume within the bell above the liquid level in the device, as hereinafter explained. The graduations are read against the top edge of flange ring 21.

The lower end of the sleeve 22 is sealed by a liquid contained in the shell 17, the upper level of the liquid being indicated at 37.

Fig. 1 shows the bell slightly raised from its lowermost position. At the start of a test it is set at a definite position and then allowed to descend to its lowermost position. Its descent expels air from the space above the liquid level 37 downward through the tube 18. The air expelled through the tube 18 is caused to pass through the specimen undergoing test and the time required for the passage of a volume indicated by the graduation at the start of the test is a function of the porosity of the specimen.

The specimen is clamped by a clamping device mounted at the lower end of the tube 18, which will now be described. The upper clamping ring is indicated at 38 and is held in place in a recess in the lower face of the member 16 by screws 39. The member 38 has on its lower clamping face a projecting rim 41 which is opposed to a similar rim on the upper face of the lower clamping ring 42. The ring 42 is mounted in a cup-like retainer 43 formed in the upper end of

a plunger 44. This plunger is mounted in the guide member 12 already mentioned.

Interposed between the ring 42 and the bottom of the cup 43 is an equalizing plate 45 which has on its upper face a pair of aligned radial grooves 46, and on its lower face a pair of aligned radial grooves 47 at right angles thereto. The grooves 46 serve to receive and position a wire 48 and the grooves 47 position a similar wire 49 which is at right angles to the wire 48. The wire 48 bears on the flat lower face of the ring 42 and the wire 49 bears on the flat face at the bottom of the cup 43. In this way a freely movable tilting universal joint is provided to support the ring 42.

It will be observed that there is ample clearance around the rings 42 and 45 within the cup 43 and that the wires have a rolling contact with plane surfaces so that free universal action is secured. The members 38, 42 and 45 being open at their centers, free passage is offered for air arriving through the tube 18 and passing through a specimen clamped between the rings 38 and 42.

The plunger 44 is hollow and there is a vent port 51 through the bottom of the guide 12. The plunger 44 is urged upward in a clamping direction by a coil compression spring 52. This spring will exert substantially uniform pressure on all specimens of ordinary thickness, the thickness of the specimen being very slight in comparison to the total length of the spring. To permit ready depression of the plunger this is provided with two aligned lugs or studs 53 which project through slots 54 formed in the guide member 12. A U-shaped lever 55 is pivoted at 56 on the base structure and overlies the projecting ends of the studs 53. By depressing the lever 55 the plunger 44 is depressed to release the specimen and to permit the insertion of a new specimen.

With the specimen A in position, as indicated in Fig. 4, the bell is drawn upward, causing air to be drawn into the bell, such air bubbling through the sealing liquid. The bell will then be sustained by air trapped within it and will slowly descend as this air escapes through the pores in the paper specimen. By reading the volumes at the beginning and end of descent, the volume of air displaced can be determined. This volume in conjunction with the time required for descent of the bell gives a definite measure of the porosity of the specimen.

The embodiment described has been chosen for illustrative purposes. Obviously the parts are subject to considerable rearrangement and modification of form, and no limitation to the specific form illustrated is implied.

I claim:—

1. In a device for testing the porosity of sheets, the combination of a receptacle open at its top and containing a sealing liquid; an inverted cup guided for vertical motion in said receptacle and having its open lower end sealed by said liquid; a tubular member leading from the air space within said cup downward through said receptacle, and thence to a point external thereto; means for interposing a specimen sheet in the path of air discharging through said tubular member, said means comprising a pair of apertured clamping plates, a universal tilting mount for one of said plates, and yielding means urging said plates together.

2. In a device for testing the porosity of sheets, the combination of a receptacle open at its top and containing a sealing liquid; an inverted cup guided for vertical motion in said receptacle and having its open lower end sealed by said liquid; a tubular member leading from the air space within said cup downward through said receptacle, and thence to a point external thereto; means for interposing a specimen sheet in the path of air discharging through said tubular member, said means comprising a pair of apertured clamping plates, a sustaining member for one of said plates, said member having two fulcrum rib members angularly disposed to each other; and yielding means acting through said sustaining member and urging said plates together.

3. In a testing machine the combination with means for displacing air, and a conduit through which such air is displaced, of means for sustaining a specimen sheet in the path of air flowing through said conduit, said means including apertured clamping members, supporting means for said members adapted to guide one member in motion toward and from the other; yielding means for urging the movable member toward said other member; and a thrust transmitting means interposed between said movable clamping member and said yielding means and comprising a member provided with cylindrical thrust surfaces, the axes of said cylindrical surfaces being substantially at right angles with each other, one being in rolling contact with the yielding means and the other in rolling contact with the movable clamping member.

In testimony whereof I have signed my name to this specification.

WILLARD L. EGY.