Nov. 26, 1935. A. SCHOPPER 2,022,010

PAPER PULP TESTING DEVICE

Filed Dec. 26, 1929 3 Sheets-Sheet 1

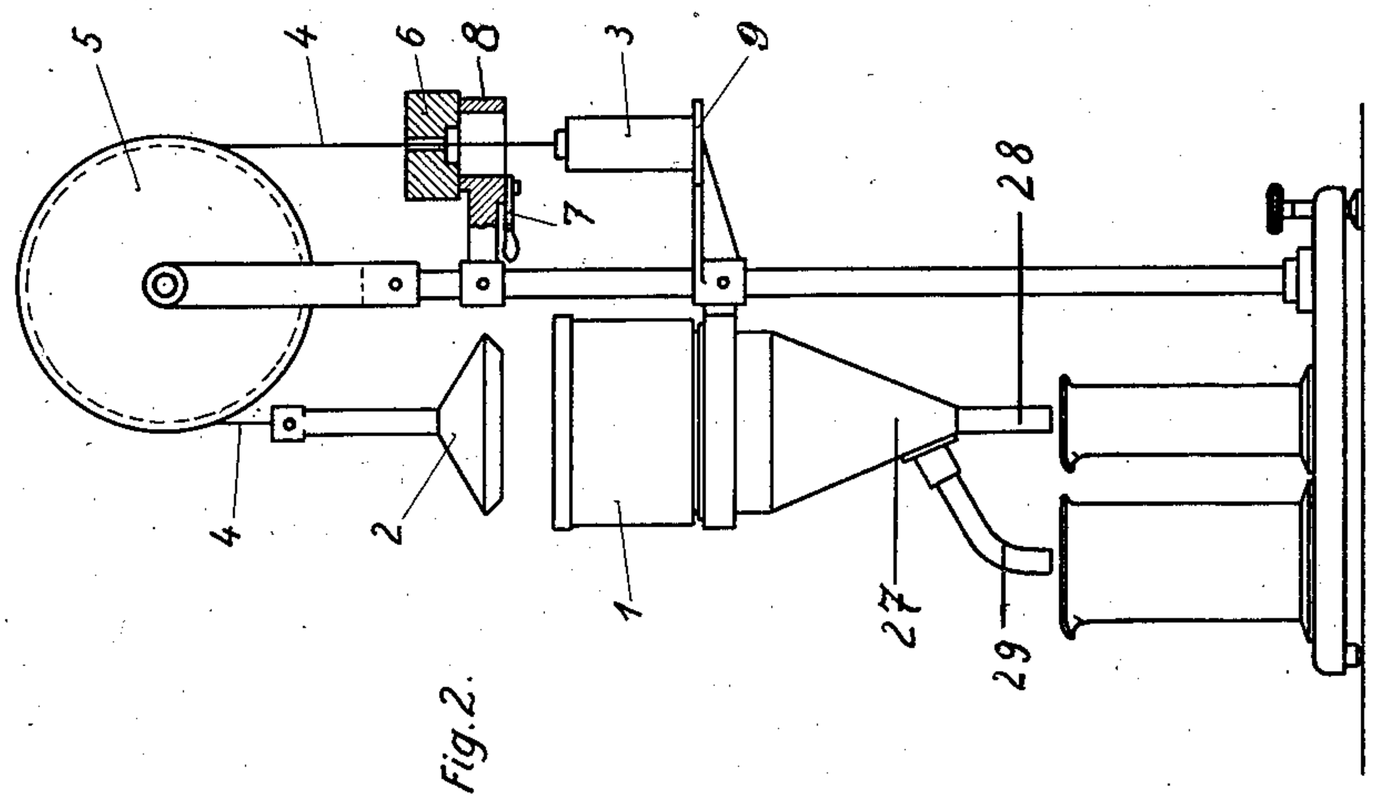

Fig. 2.

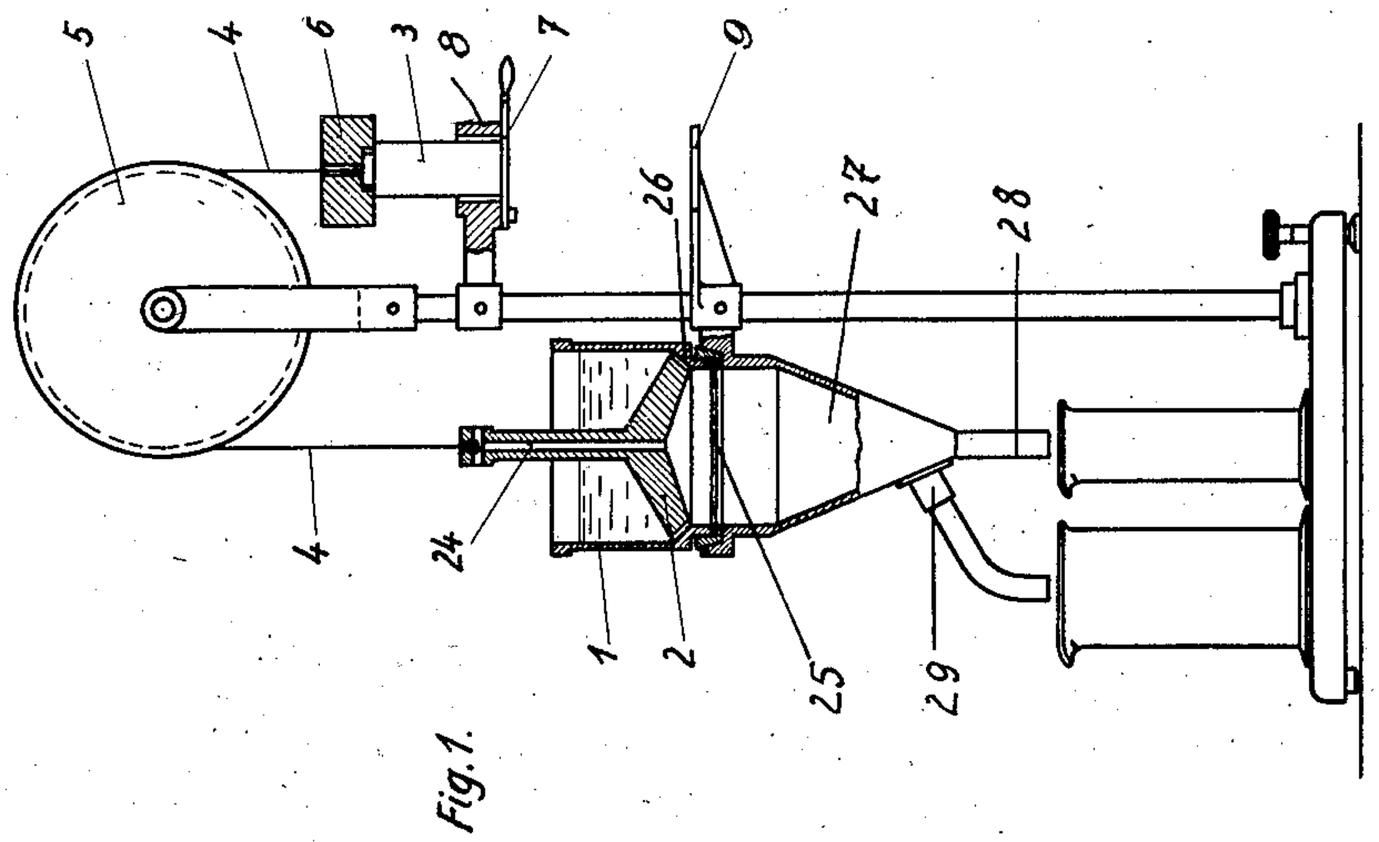

Fig. 1.

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Filed Dec. 26, 1929 3 Sheets-Sheet 2

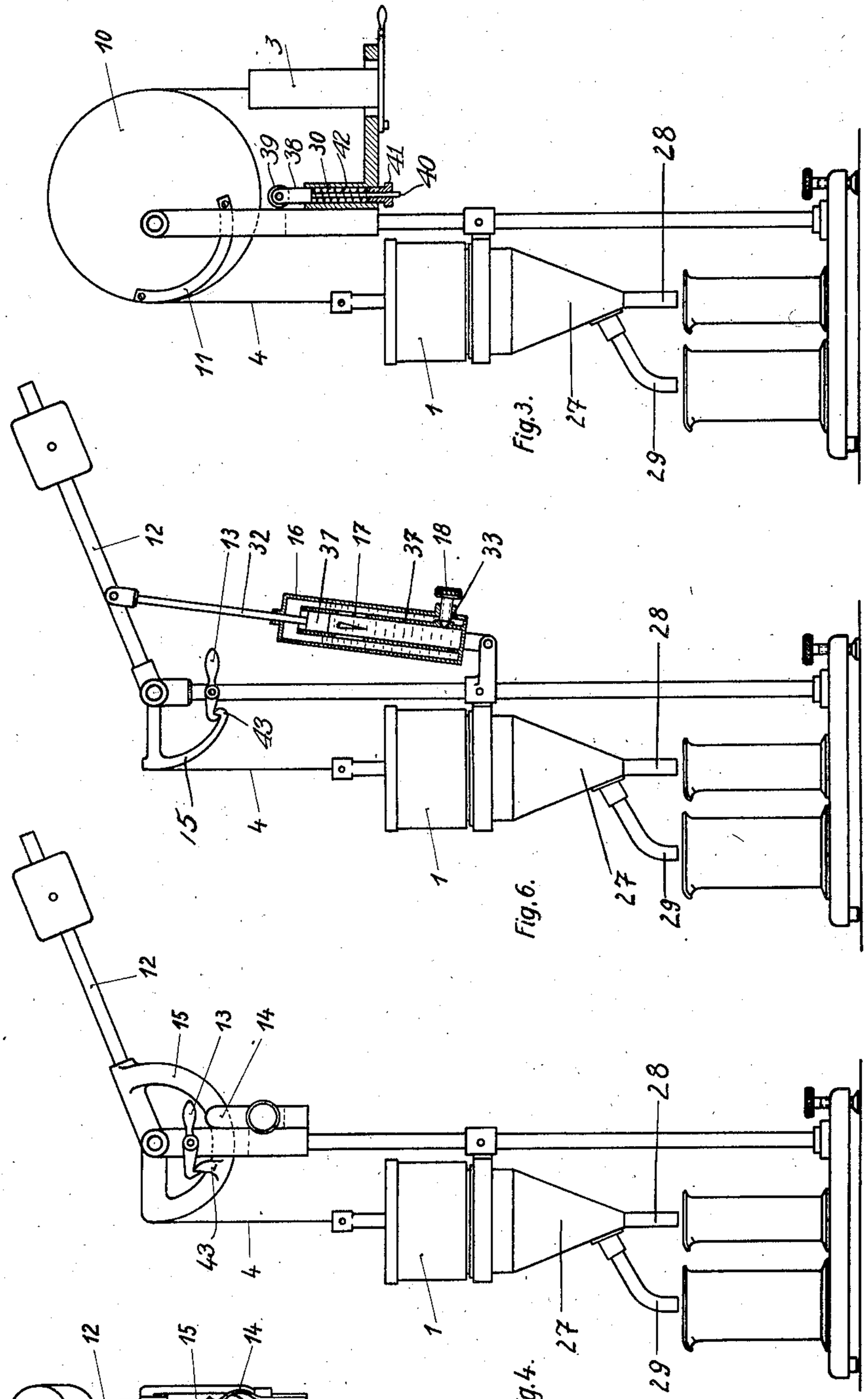

Fig.3.

Fig.6.

Fig.4.

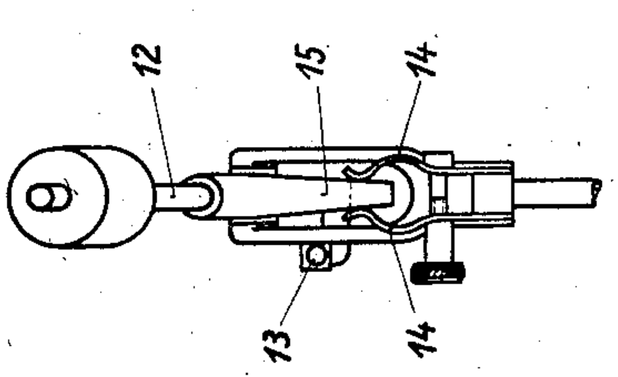

Fig.5.

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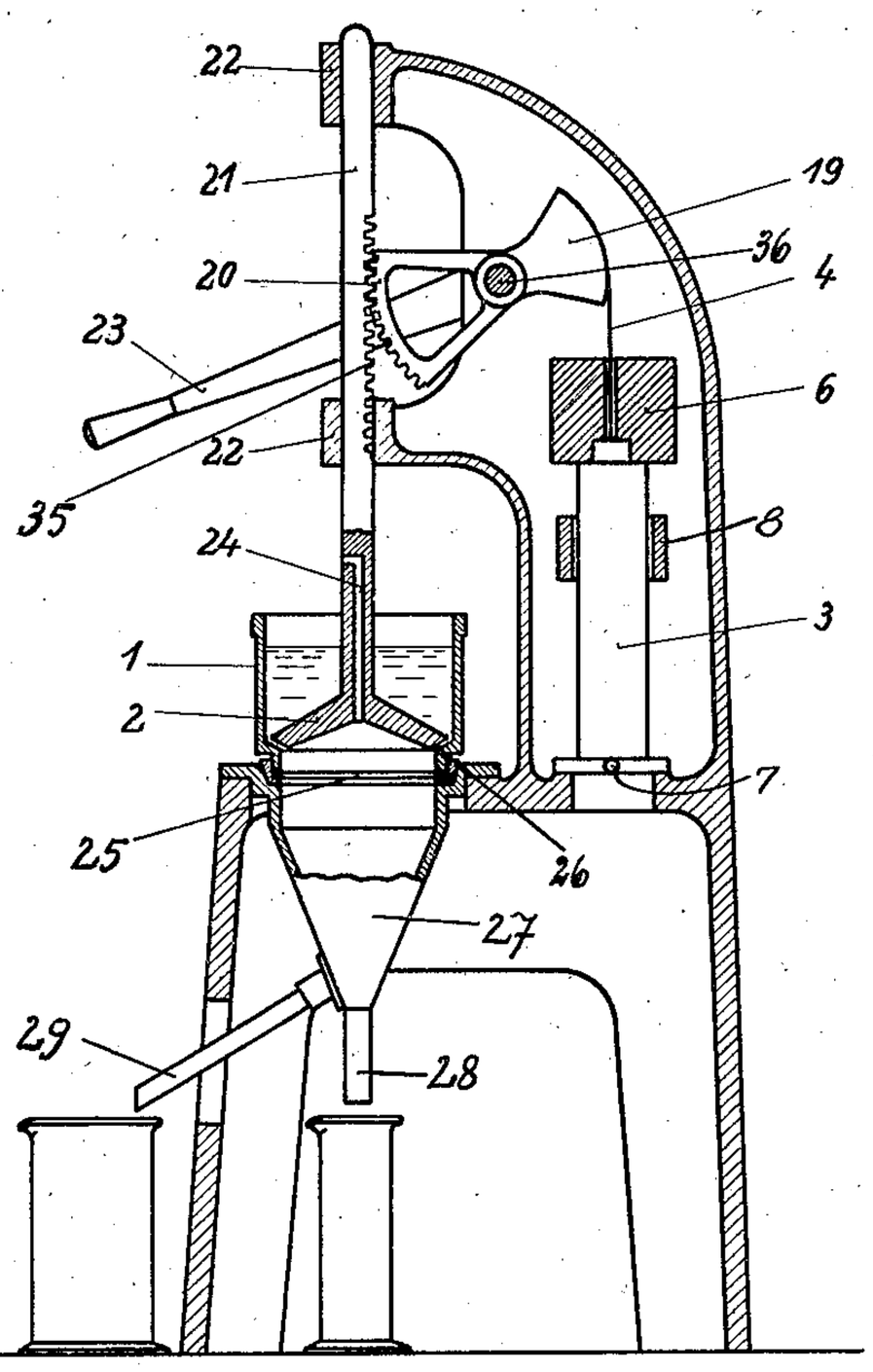
Nov. 26, 1935. A. SCHOPPER 2,022,010

PAPER PULP TESTING DEVICE

Filed Dec. 26, 1929 3 Sheets-Sheet 3

Fig. 7.



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UNITED STATES PATENT OFFICE

2,022,010

PAPER PULP TESTING DEVICE

Alfred Schopper, Leipzig, Germany

Application December 26, 1929, Serial No. 416,568
In Germany June 20, 1929

9 Claims. (Cl. 73—51)

My invention relates to testing devices and more especially to a device for testing the properties of paper pulp, in which a vessel is provided for the sample of paper pulp having a strainer bottom through which the water will pass and a valve, preferably of conical shape, covering the strainer bottom and closing the bottom part of the vessel.

In testing devices of this kind, as described in U. S. Patent No. 1,193,613, the vessel is provided with two water outlets through which the water is discharged in two streams which streams, or one of them, are collected and measured in a graduated vessel whereby the quality of the pulp stock, for instance, its beating degree of freeness, can be ascertained. In apparatus of this type the exactness of the test depends upon the way in which the valve is lifted from its seat in the vessel. If this is done by hand, the lifting may not be uniform, more especially if different persons attend to it. It has shown to be of great importance that the lifting of the valve body be effected as uniformly as possible.

Therefore, according to the present invention, the valve is connected with a lifting device which is started by any suitable means, but after it has been started is quite automatic, i. e., is controlled as to its rate of lifting only by mechanical forces to the elimination of the personal factor.

In the drawings affixed to the specification and forming part thereof, several modifications of a testing device embodying this invention are illustrated diagrammatically by way of example.

In the drawings:

Figs. 1 and 2 are elevations, partly in vertical section, of the first modification, showing the valve and lifting mechanism in different positions.

Fig. 3 is a similar view of the second modification, in which the lifting device comprises an eccentric sheave.

Fig. 4 is a similar view of the third modification in which the lifting device comprises a sector operated by a counterweight.

Fig. 5 is an end view of the lifting device proper.

Fig. 6 is a similar view of a lifting device resembling the one shown in Fig. 4, but provided with a liquid brake, and

Fig. 7 is a vertical section of another modification in which the valve is provided with a rack-shaped rod and a lifting device meshing with this rod.

Referring first to Figs. 1 and 2, 1 is the strainer vessel and 25 is the strainer bottom while 2 is the conical valve seated on a conical seat 26 provided near the bottom of the vessel. 27 is a funnel arranged below the strainer bottom and 28, 29 are the spouts arranged at different levels. The valve 2 does not make a perfectly tight fit in the vessel 1 so that the liquid gradually passes from one side of the valve to the other as the valve moves.

Lifting of the valve 2 is effected by means of a drop weight 3 suspended from a cord or steel band 4 passing over a sheave 5 and having its other end attached to the valve body 2. An additional weight 6 is seated on the drop weight 3 and embraces the cord or band 4, so that if the locking lever 7 has been turned aside and the two weights 3 and 6 have lifted the valve 2 from its seat, the additional weight 6 will soon be retained by the ring 8, while the drop weight 3 will descend further until it meets the support 9.

After the additional weight 6 has been retained by the ring 8 the drop weight 3 moves on alone and at a velocity which is substantially uniform, as demonstrated by the well-known Atwood gravity machine. After the test has come to an end the valve body 2 is returned to its seat by rotating the sheave 5 anti-clockwise and the dropping weight 3 is locked in its normal position by means of the lever 7, the additional weight 6 being carried along by it.

As shown in Fig. 3, a single weight 3 may be used and the retardating action of the removal of the additional weight may be replaced by the retardating action of an eccentric sheave 10. In order that in spite of the eccentric mounting of the sheave 10 the valve be lifted vertically, a sector 11 is mounted on the sheave concentrically to its pivot and the cord or band 4 attached to the valve is fixed to the top end of this sector and will apply itself onto its curved surface. A brake device 30 serves for braking the sheave 10. 38 is a plunger which is mounted to slide in the cylinder of the brake 30, 39 is a roller at the upper end of plunger 38, 40 is a rod, 41 is a check at the lower end of the rod 40, and 42 is a spring which is inserted between the plunger 38 and the check 41. In the position illustrated the sheave 10 rotates without being interfered with by the roller 39 but as the sheave continues to rotate its edge will engage the roller on account of the eccentricity of the sheave.

Instead of a sheave, I may provide a weighted rocking lever 12 for lifting the valve 2, as shown in Figs. 4, 5, and 6. The lever 12 is held in its uppermost position by a catch 13 engaging a tooth 43 on a sector 15 to which lever 12 is secured. The catch 13 may be provided with any

suitable means, such as a spring, not shown, for holding it engaged with the tooth 43. The sector 15 is pivoted to a standard for rotation about a horizontal axis and the cord or band 4 carrying the valve is suspended from this sector. The sector 15 has inclined side faces as shown in Fig. 5, and a pair of springs 14 are applied against these faces so as to exert a braking action on the sector as it is rocked under the action of the weighted lever 12, whereby the lifting movement of the valve is retarded as described with reference to Figs. 1 to 3.

In the testing device illustrated in Fig. 6, which is similar in all other respects to the one shown in Figs. 4 and 5, except for the fact that the sector 15 is here replaced by a one-sided arc-shaped member 15' at one end of lever 12, the brake device is constituted by a liquid brake acting on the lever 12. 16 is the outer cylinder of the liquid brake and 37 is the inner cylinder having slots 17 of varying width. 31 is a piston fixed to the bottom end of the rod 32 governing the lever 12 and 18 is a needle valve, operable from without, for closing or opening an aperture 33 near the bottom end of the inner cylinder. The operation of this braking device will be readily understood by anyone skilled in the art and need not be explained further.

In the modification illustrated in Fig. 7 the valve body 2 is suspended from a rod 21, guided vertically in bearings 22 and having a rack-shaped portion 35 meshing with a toothed sector 20 mounted for rocking motion on a horizontal axle 36. 23 is a hand lever for rocking the sector 20. 4 is the band or cord attached to the drop weight 3 at one end and to a curved extension 19 of the sector 20. 24 is a ventilating conduit formed in the valve body and the adjoining portion of the rod 21, the conduit allowing the air which is entrapped below the valve 2, to escape. The valve 2 is returned on its seat by means of the lever 23.

The operation of this device is similar to that of the devices before described.

The several devices described effect uniform lifting of the valve body, uniform flow of the pulp, and uniform formation of sheets. The uniform formation of the sheets is favored by permitting the air below the valve body 2 to escape when the water enters the valve body, this being effected by the passage 24, Figs. 1 and 7, as described.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described for obvious modifications will occur to a person skilled in the art.

In the claims affixed to this specification no selection of any modification of the invention is intended to the exclusion of other modifications thereof and the right to subsequently make claim to any modification not covered by these claims is expressly reserved.

I claim:—

1. Paper pulp testing device comprising a strainer vessel having an opening in its bottom, a valve for closing said bottom opening, a drop weight for lifting said valve and means for reducing the effect of gravity action on said weight during part of its drop.

2. Paper pulp testing device comprising a strainer vessel having an opening in its bottom, a valve for closing said bottom opening, a sheave above said valve, flexible lifting means attached by one end to said valve and passing over said sheave a drop weight attached to the other end of said flexible means and manually releasable means for preventing said weight from dropping.

3. Paper pulp testing device comprising a strainer vessel having an opening in its bottom, a valve for closing said bottom opening, a sheave above said valve, flexible lifting means attached by one end to said valve and passing over said sheave, a drop weight attached to the other end of said flexible means, an additional weight associated with said drop weight and means for retaining said additional weight after said drop weight has traveled a predetermined distance.

4. Paper pulp testing device comprising a strainer vessel having an opening in its bottom, a valve for closing said bottom opening, a curved member, a pivot above said valve about which said member is mounted to rotate, a member connecting said valve to said curved member, a weight tending to lift said valve and operatively connected to said curved member and manually releasable means for preventing said weight from dropping.

5. Paper pulp testing device, comprising a strainer vessel having an opening in its bottom, a valve for closing said bottom opening, a curved member, a pivot above said valve about which said member is mounted to rotate, a flexible member connecting said valve to said curved member, a weight tending to lift said valve and operatively connected to said curved member, and braking means for retarding the rotation of said curved member about its pivot.

6. Paper pulp testing device comprising a strainer vessel, having an opening in its bottom, a valve for closing said bottom opening, a vertically guided rack-shaped rod, connected to said valve, a toothed sector meshing with said rod and mounted for rotary motion, a counterweight acting on said sector to rotate it and to lift the valve and manually releasable means for preventing said weight from dropping.

7. Paper pulp testing device comprising a strainer vessel having an opening in its bottom, a valve for closing said bottom opening, a curved member, a pivot above said valve about which said member is mounted to rotate, a flexible member connecting said valve to said curved member, a weight tending to lift said valve and operatively connected to said curved member, and braking means including a piston operatively connected to said curved member, a slotted cylinder in which said piston is fitted to slide, a casing surrounding said cylinder, a liquid within said cylinder, and a regulating valve connecting said cylinder to said casing; for controlling the flow of liquid from said cylinder to said casing and thereby controlling the rate of rotation of said curved member about its pivot.

8. Paper pulp testing device comprising a strainer vessel having an opening in its bottom, a valve for closing said bottom opening, a rack connected with said valve, a double-armed rocking lever, a sector on one arm of said lever adapted to mesh with said rack, a weight suspended from the other arm of said lever and manually releasable means for preventing said weight from dropping.

9. Paper pulp testing device comprising a strainer vessel having an opening in its bottom, a valve for closing said bottom opening and having a passage connecting its lower face with the atmosphere, and semi-automatic means for lifting said valve.

ALFRED SCHOPPER.