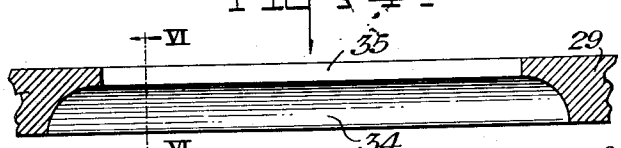
April 13, 1926. 1,580,166

D. E. REID

METHOD AND APPARATUS FOR TESTING PAPER STOCK FIBER

Filed Feb. 13, 1922

FIG. 4.



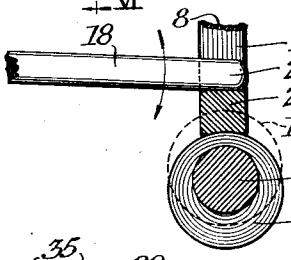


FIG. 5.

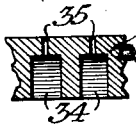


FIG. 6.

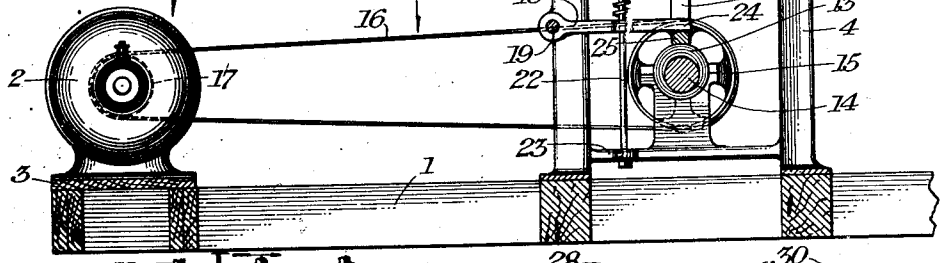
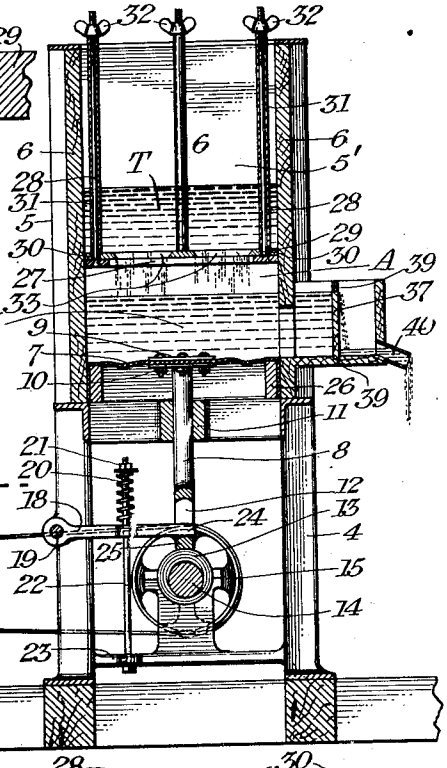


FIG. 1.



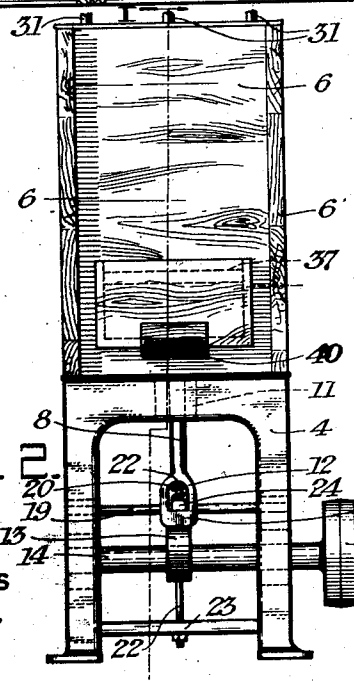


FIG. 2.

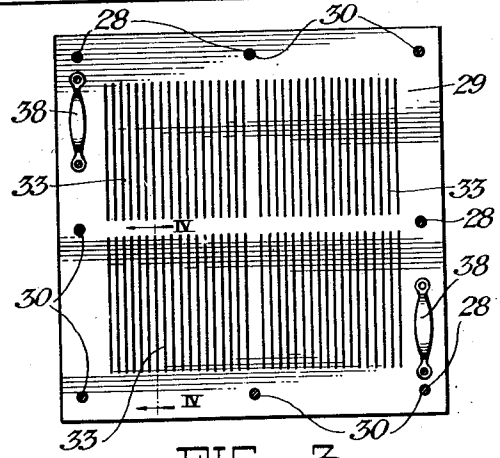


FIG. 3.

WITNESS

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UNITED STATES PATENT OFFICE.

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METHOD AND APPARATUS FOR TESTING PAPER-STOCK FIBER.

Application filed February 13, 1922. Serial No. 536,278.

To all whom it may concern:

Be it known that I, DAVID E. REID, a citizen of the United States of America, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Methods and Apparatus for Testing Paper-Stock Fiber, of which the following is a full, clear, and exact specification.

This invention relates to paper making, and more particularly to a method and apparatus for determining the degree of fineness and length of the pulp or paper stock fiber, so that paper webs of uniform quality can be produced. One object of my invention is to provide a method by which the fineness and length can be determined accurately and rapidly; another object is to provide a method by which factors can be obtained from test samples which will indicate the condition of the fibrous stock; another object is to provide a machine which will rapidly draw the test mixture through a screen; another object is to provide such a machine which will draw the mixture through the screen by a vacuum; another object is to provide such a machine in which the vacuum can be easily produced; another object is to provide means for readily changing the test screens; and other objects will appear hereinafter.

In the drawings, in which like reference characters denote like parts throughout:

Fig. 1 is a section through a machine constructed in accordance with and illustrating one form of my invention, this section being taken on line 1—1 of Fig. 2;

Fig. 2 is an end elevation of the apparatus shown in Fig. 1;

Fig. 3 is an enlarged plan of a screen used with my machine;

Fig. 4 is a still further enlarged section of a portion of the screen, as taken on line 4—4 of Fig. 3;

Fig. 5 is a detail of a portion of the machine, and

Fig. 6 is a section on line 6—6 of Fig. 4.

As shown in Fig. 1, the present embodiment of my invention is mounted on a portable frame 1. This frame carries a motor 2 upon a platform 3, at one end, and at the other forms a support for the casting 4 which carries a tank 5. This tank is used for the test material, and consists of sides 6 with a flexible bottom 7. A shaft 8, is fastened to the bottom 7 by plates 9 and 10 and passes through bearing 11, below which it terminates in a yoke 12. This yoke rests on a cam 13 carried by shaft 14 rotated through pulley 15, belt 16 and the motor pulley 17. In order to keep the yoke from jumping from the cam, a lever 18 is hinged upon rod 19 and always exerts a downward pressure upon the plunger through the action of spring 20, which can be adjustably tensioned by nut 21 on rod 22 extending up from the frame portion 23. The toe 24 of the lever rests inside of the yoke upon a bar 25. In Fig. 5 the full and dashed lines show the extent of movement of shaft 8 as it is actuated by the motor, thus raising and lowering the flexible bottom 7. I have here shown the bottom consisting of heavy sheet rubber fastened to the sides 6 by a suitable frame 26, although any suitable material can be used.

An upper chamber 5′ is provided in the tank 5 by means of a frame 27 attached to the sides 6, and from which rods 28 extend upwardly above the tank top. A screen 29 having apertures 30 to slide about the rods fits into the tank and rests upon the frame 27, being held in place by means of tubes 31 which are placed in rods 28 after the screen is in place and which are held in place by wing nuts 32 which have a threaded connection with rods 28. The screen 29 is preferably made of heavy metal and contains a series of slots 33. These slots are all of the same width, and, as shown in Figs. 4 and 6, are preferably made by grooving the plate at 34 and cutting the slots 35 through the grooved portions. This permits heavy stock to be used without sacrificing the accuracy of the slot widths, which must be uniform for best results. Handles 38 may be provided for convenience in handling when changing screens. Preferably a series of these screens are provided with the widths of the slots differing by thousandths. I

have found the following to be a useful series of slot widths: .006", .007", .008", .009", .010", .012" and .015." It is probable that other widths would be useful according to the type and quality of the completed product.

The operation of my device is as follows: Where a test is to be made a quantity of paper making stock (as for instance a measuring cup) is mixed with a definite quantity of water (as for instance a gallon) and this pulp is dumped into the upper chamber of the tank after the motor has been started. The test material or pulp is shown at T and the lower chamber usually contains pulp W, although in the first instance water is used, as the sole purpose of having the lower chamber filled with a liquid is to provide a convenient means of obtaining a vacuum. As this body W practically always contains pulp it is so described in the claims. Accordingly when the word pulp is used in the claims it should be understood to have this broad significance. The mixture W is dammed so as to rise above the exit level by a baffle plate 37 to retain an air pocket A between the two bodies of liquid. As the operation progresses the fine pulp and liquid flows over the baffle plate and out through waste pipe 40. The bottom is vibrated rapidly, thus causing a vacuum action which will rapidly draw through at least the greater portion of pulp through the screen. When a vacuum chamber is referred to in the claims or specification I am referring to the chamber between the two bodies of solution from which the air is not completely exhausted, but in which the movement of one body of solution relative to the other will cause a partial vacuum, thus creating a sucking action which draws the finer portions of the pulp through the screen. If merely allowed to drain through the screen the test would be very slow taking hours instead of minutes as when the vacuum system is used. Moreover by drawing the pulp through the screen under pressure, those fibers which can pass through the slots go through quickly, so that there is no tendency for the water to merely drain from the fiber. The coarser fibers, or those which have not been sufficiently treated in the beater will not go through the screen. This residue can be dehydrated and weighed to determine very accurately the percentage of fiber which is insufficiently prepared. I find in practice, however, that the work can be greatly shortened by measuring the residue, so that the dehydration is not necessary to secure reasonably accurate results. It is also not essential to have a variety of different sized screens, for a test can be made with a single screen using the percentage of fiber stock which passes through the screen in a fixed time as the basis for determining the degree of preparation. In this specification and in the claims, pulp is used to denote a suspension of any fibrous material in water; the milky looking fluid which, when completely prepared, is flowed on the Fourdrinier machine belt.

It should be noted that this machine is useful to test the stock at intervals during the beating of the stock, and if desired, after the stock has passed through the Jordan engine or the last refining machine before being flowed on to the Fourdrinier belt. By selecting the proper screen for the class of fiber desired and preparing a table which can be used with the screen, tests can readily be performed in a few minutes which will accurately determine the condition of the stock.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a fiber testing machine, the combination with a tank, of a screen dividing the tank horizontally into receiving and discharging chambers adapted to hold pulp, a flexible wall included in the discharging chamber, the walls of the tank being arranged to form an air pocket between the bodies of pulp in the receiving and discharging chambers, and means for flexing the flexible wall to agitate the pulp in the machine, thus creating suction tending to draw the pulp from the receiving chamber through the screen into the discharging chamber.

2. In a film testing machine, the combination with a tank, adapted to receive pulp, of a screen in the tank dividing it into a receiving and a discharging compartment, the walls of the tank being adapted to form a vacuum chamber between the receiving and discharging compartments and included between the pulp contained in the compartments, suction being created in the vacuum chamber by moving one body of pulp relative to the other, thus drawing pulp through the screen.

3. In a testing machine for fiber, the combination with a tank, of compartments in the tank adapted to hold pulp, one compartment having an exit opening, a vacuum chamber between the two compartments, and means for retaining the vacuum chamber during the time when bodies of pulp are in the chambers including a baffle plate which keeps the pulp level in one chamber higher than the exit opening and lower than the screen.

4. A fiber testing machine comprising a tank, having a flexible bottom, and means to oscillate said bottom, a screen extending across said tank and spaced above the bottom, there being an aperture above the bottom and below the screen, and means outside of the tank for retaining liquid about said

aperture at a level above the top of the aperture and below the screen.

5. The method of testing the grade of paper stock, which consists of mixing a definite quantity of stock and water, drawing the mixture thus formed through a screen and a vacuum chamber formed between two bodies of stock by suction exerted by the vacuum of the chamber, and determining the grade of fiber by the proportion which remains on the screen.

Signed at Rochester, New York, this 7th day of February 1922.

DAVID E. REID.