

No. 611,901.

Patented Oct. 4, 1898.

E. W. GOODRICK.
PAPER PULP SCREEN.

(Application filed Aug. 10, 1897.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1

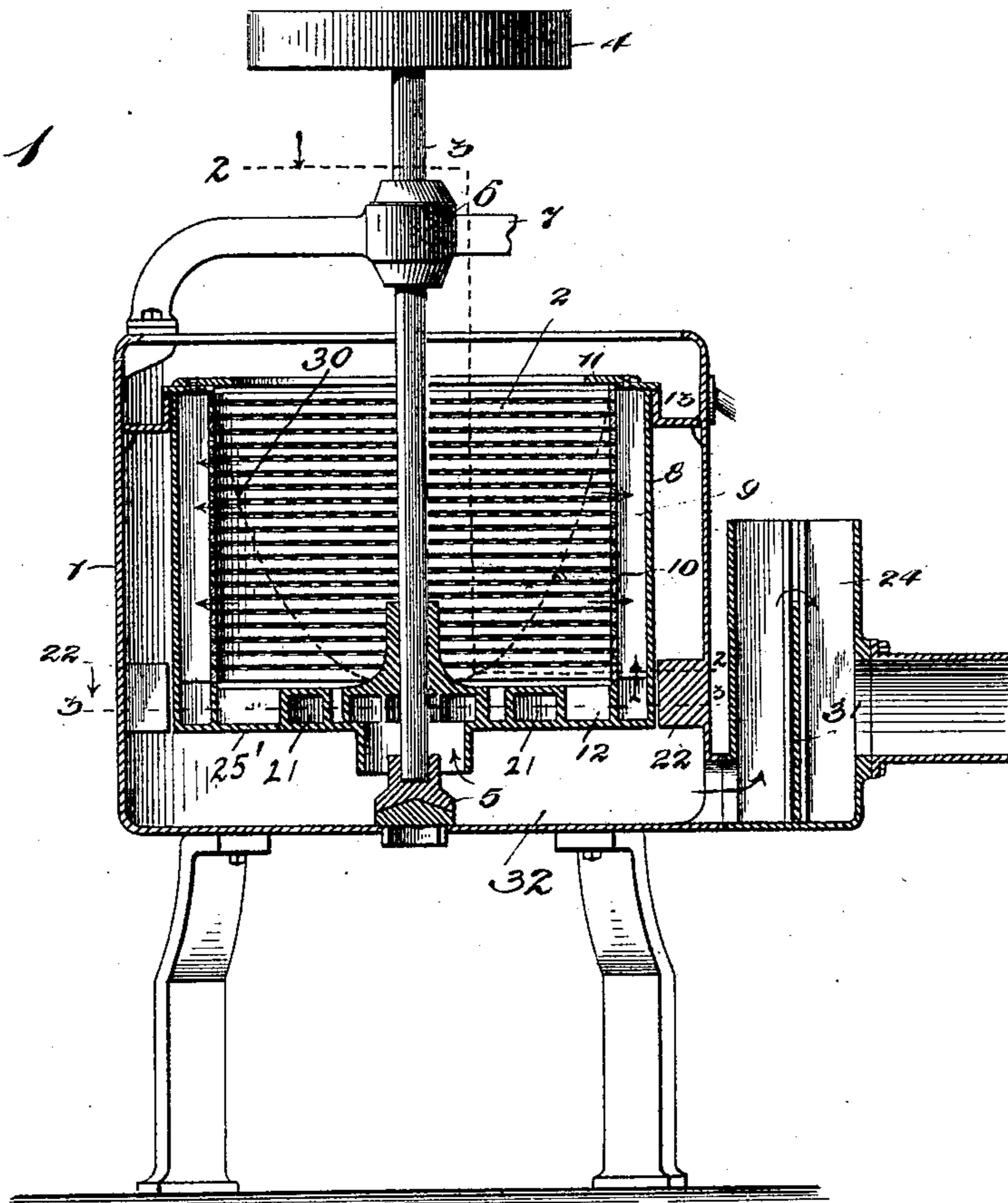
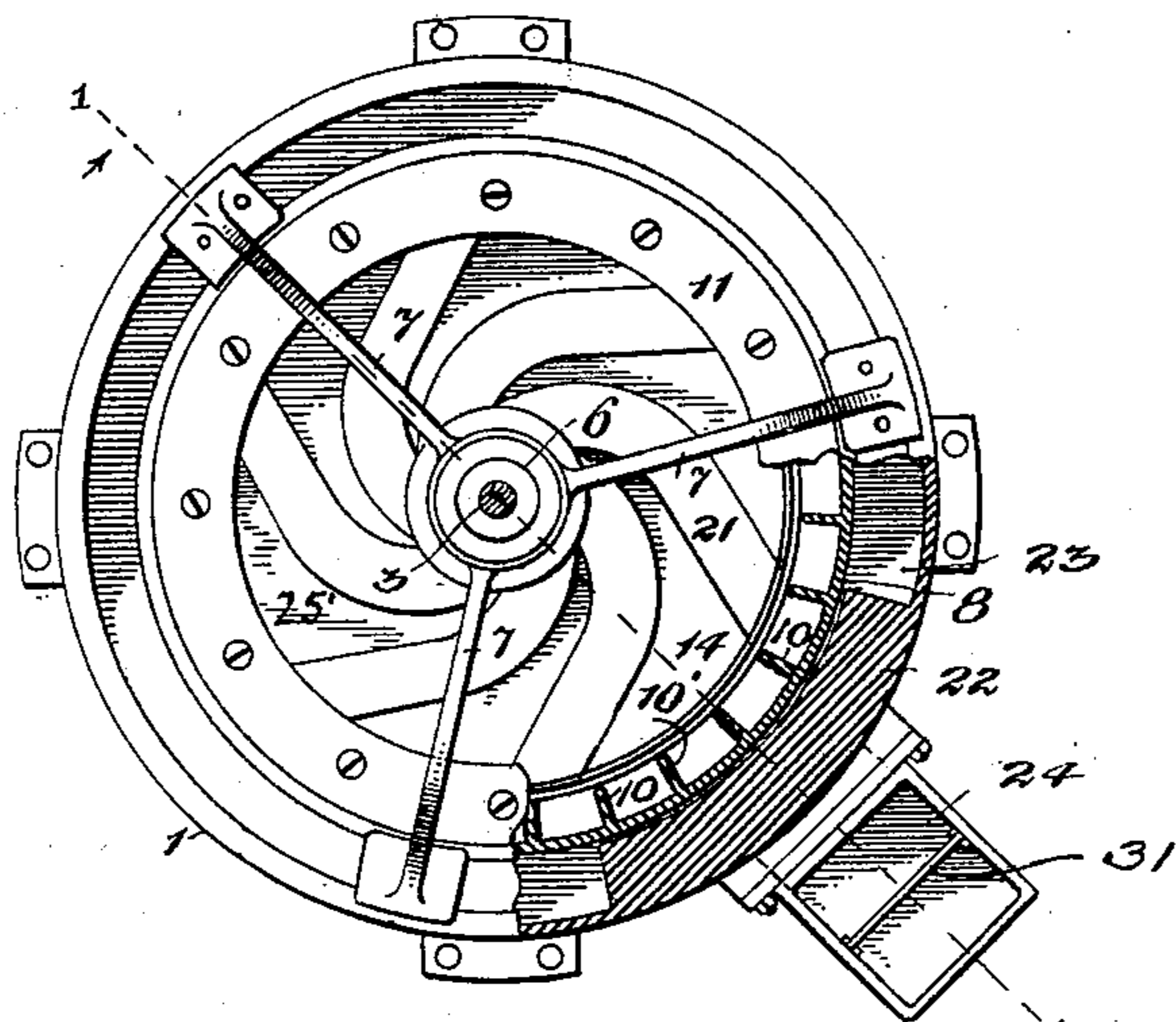


Fig. 2



Witnesses
Edmund H. Starnes.
R. A. Warfield.

Inventor
Edward W. Goodrick
per *Phelps & Dyer*
Attorney

No. 611,901.

Patented Oct. 4, 1898.

E. W. GOODRICK.
PAPER PULP SCREEN.

(Application filed Aug. 10, 1897.)

(No Model.)

3 Sheets—Sheet 2.

Fig. 3

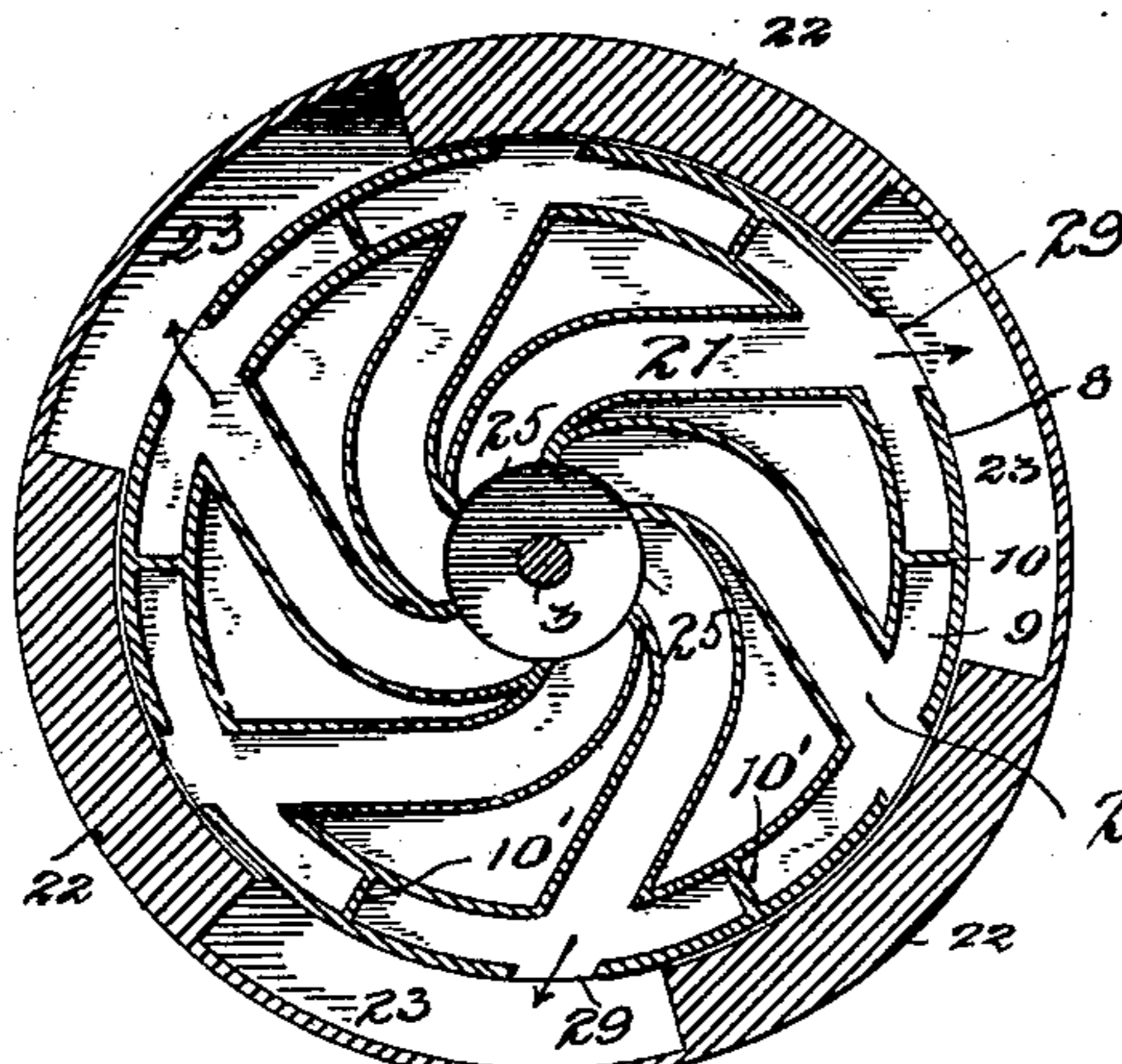


Fig. 6

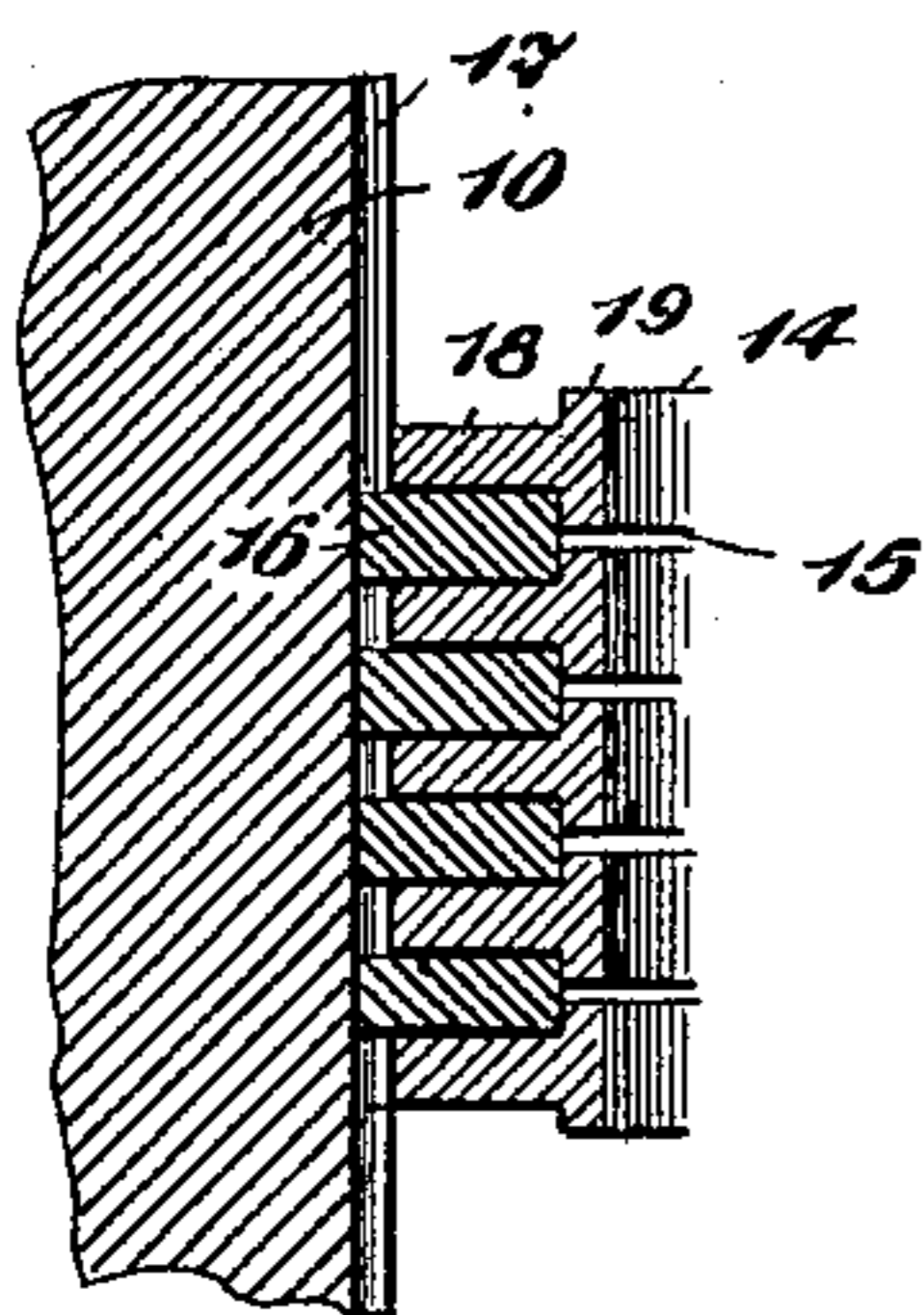


Fig. 7

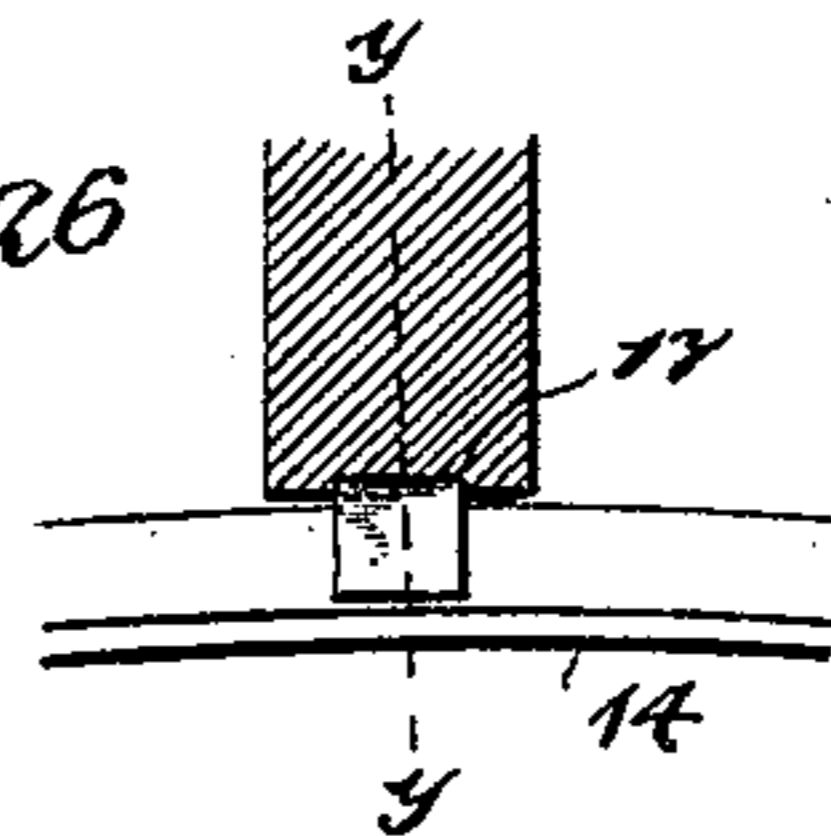


Fig. 4

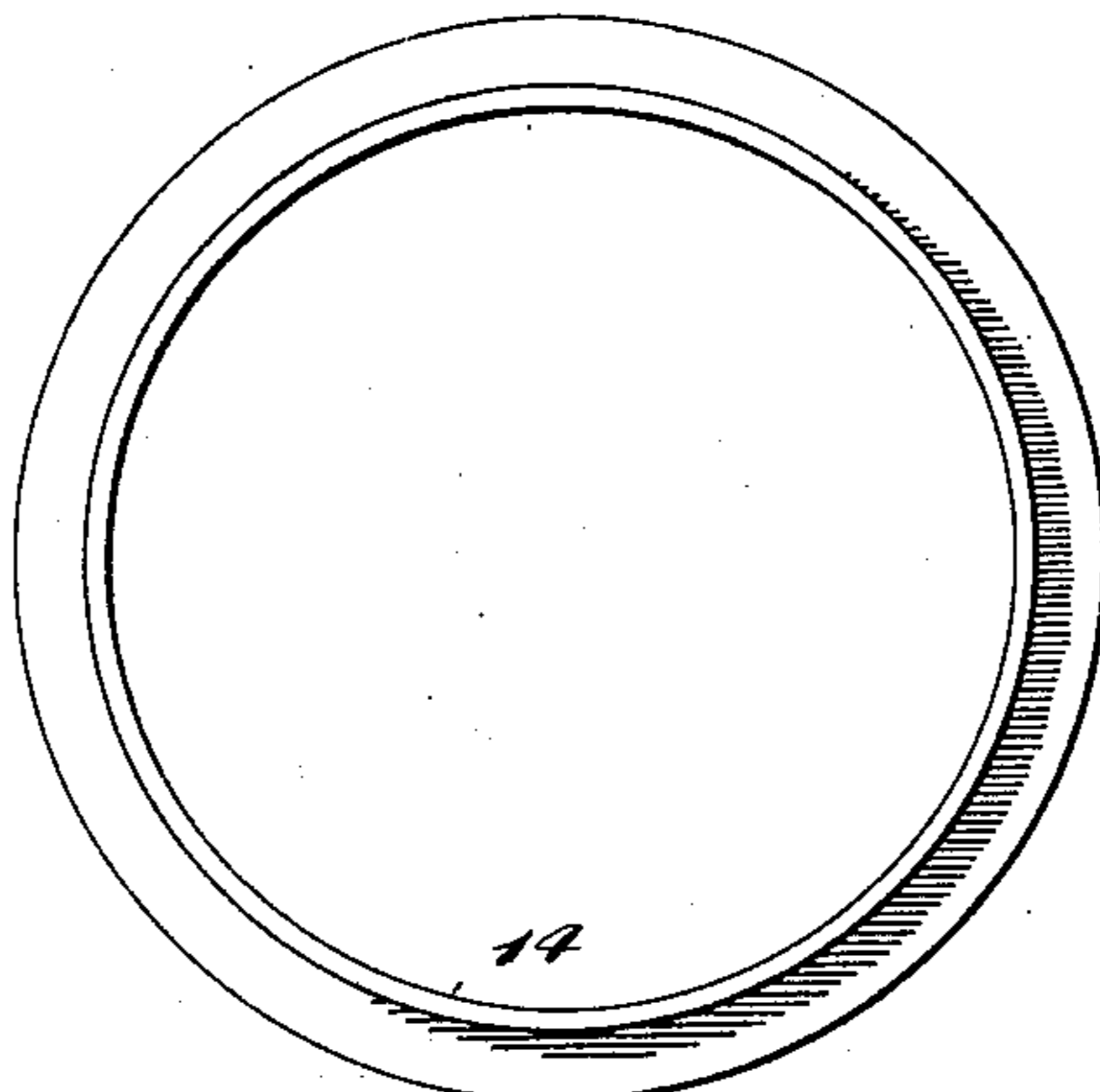


Fig. 8

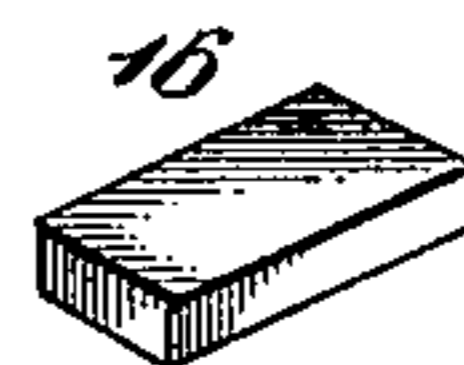
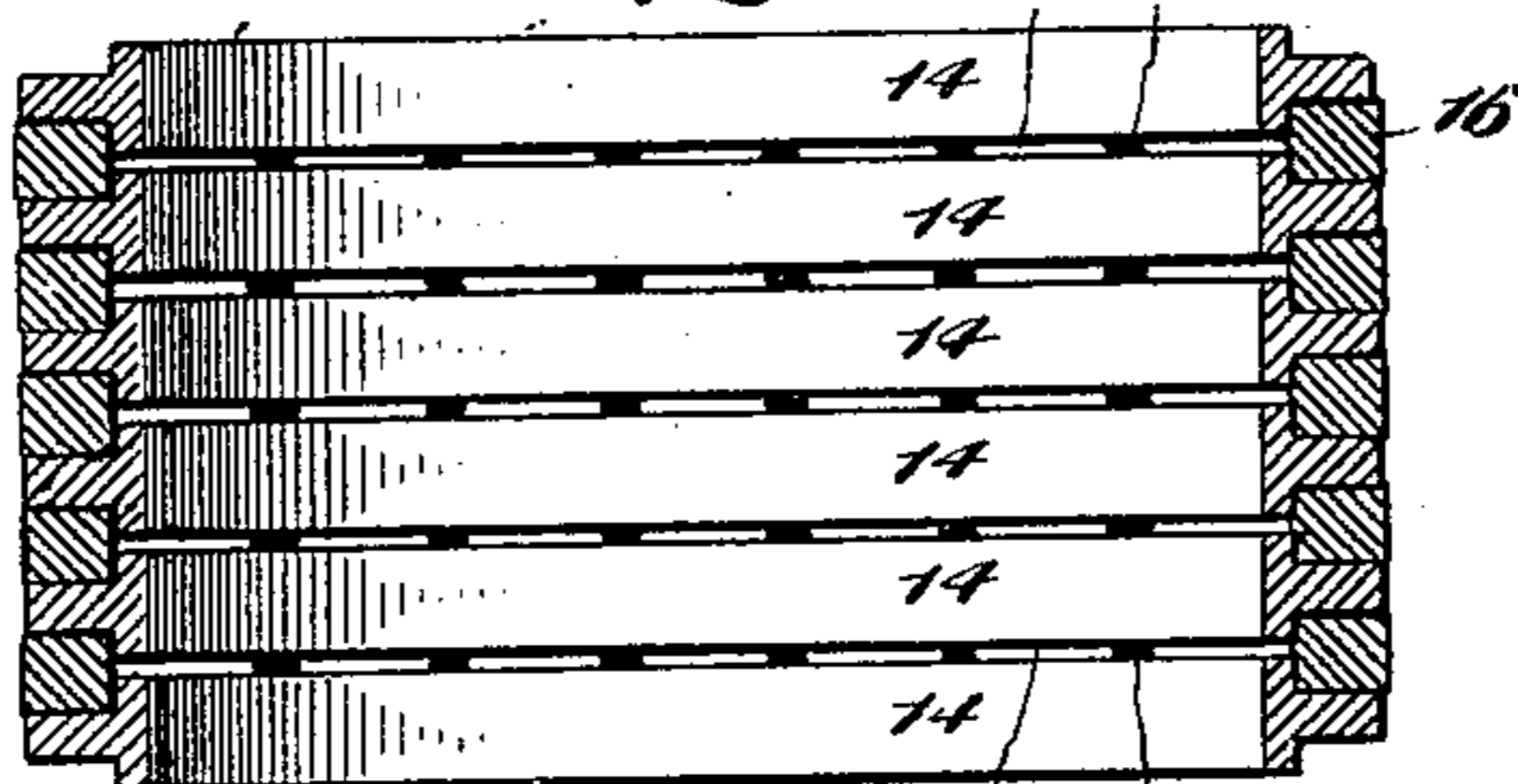


Fig. 5



Witnesses
Edmund A. Stancor.

R. A. Warfield.

Inventor:
Edward W. Goodrick
per Pleasant D. Boyer
Attorney

No. 611,901.

Patented Oct. 4, 1898.

E. W. GOODRICK.
PAPER PULP SCREEN.

(Application filed Aug. 10, 1897.)

(No Model.)

3 Sheets—Sheet 3.

Fig. 9.

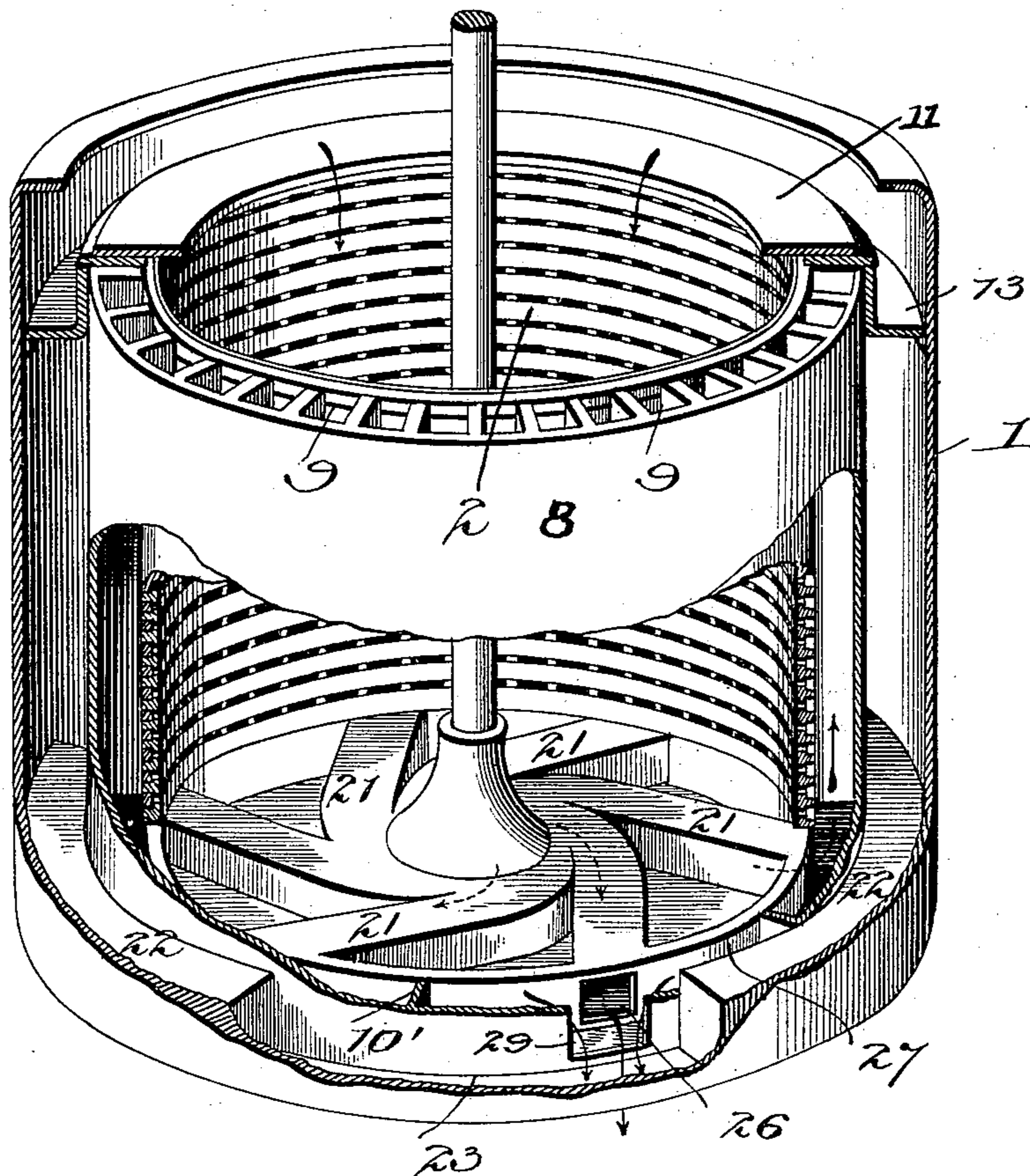
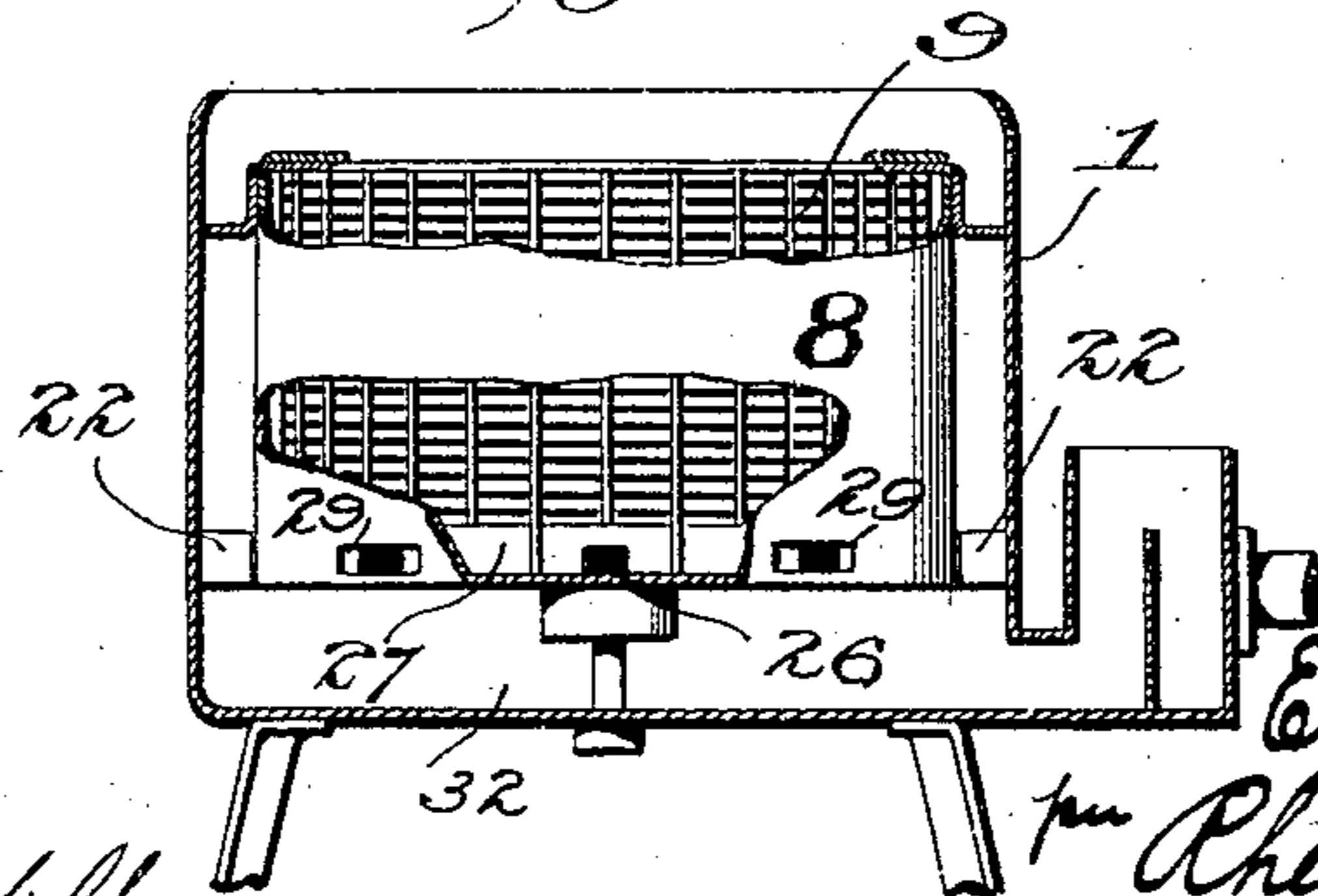


Fig. 10.



Witnesses
Wm. H. Shiden
Ralph S. Warfield

Inventor:

Edward W. Goodrick

Rhesa C. Dyer
Attorney

UNITED STATES PATENT OFFICE.

EDWARD W. GOODRICK, OF APPLETON, WISCONSIN.

PAPER-PULP SCREEN.

SPECIFICATION forming part of Letters Patent No. 611,901, dated October 4, 1898.

Application filed August 10, 1897. Serial No. 647,760. (No model.)

To all whom it may concern:

Be it known that I, EDWARD W. GOODRICK, a citizen of the United States, residing at Appleton, in the county of Outagamie and State of Wisconsin, have invented certain new and useful Improvements in Paper-Pulp Screens; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

Heretofore it has been common to construct pulp-screens of flat or cylindrical plates provided with meshes of various shapes. In such screens the meshes soon become enlarged by wear, thereby necessitating the removal of the plates and substituting new ones. These plates when placed in position remain stationary and an agitator is employed to create the necessary back action for the purpose of keeping the meshes clear. It has been found in practice that strings and lumps accumulate on the discharge side of the screen. These lumps and strings are a source of great annoyance, because they have to be constantly removed as soon as they form in order to maintain the efficiency of the screen. The stationary screen-plates frequently become loose and get out of place and much attention is required in inserting new screws and fastening them in place. This constant readjustment injures the woodwork to which the plates are fastened and is very objectionable.

The object of my invention is to overcome these and other defects in the screens now in common use. This I do by employing a centrifugal screen wherein the centrifugal force causes the pulp to flow outwardly and circulate over the interior of the screen and pass more rapidly through the meshes. This screen is composed of sections adapted to be adjusted so as to regulate the size of the meshes of the screen to compensate for wear. In connection with this centrifugal screen is employed an agitator for creating the necessary back action in the pulp to keep the screen-meshes clear. These, together with certain other peculiar features and combinations of

parts constituting the different characteristics of my invention, will be more fully described hereinafter and pointed out in the claims.

In the accompanying drawings, Figure 1 represents a vertical section of my invention on the line 1 1 of Fig. 2; Fig. 2, a plan, partly in section, on line 2 2 of Fig. 1; Fig. 3, a horizontal section through the line 3 3 of Fig. 1; Fig. 4, a detail view of one of the series of rings which compose the cylindrical screen; Fig. 5, a vertical section of the screen, in which the rings and their associated parts are shown enlarged; Fig. 6, an enlarged detail sectional view of a portion of the series of rings, showing the manner in which they are separated through the line *y y* of Fig. 7; Fig. 7, a top view, partially in section, showing a portion of a ring, a separating-block, and a rib within which one side of the block is seated. Fig. 8 is a perspective view of one of the separating-blocks. Fig. 9 is a perspective view of the screen and its casing, in which parts are cut away, and arrows designate the direction in which the pulp flows; and Fig. 10, a side elevation, partly cut away.

Reference-numeral 1 represents a circular vat in which the screening mechanism is located. This mechanism consists of a vertical cylindrical screen 2, keyed to a vertical drive-shaft 3, which latter is provided with a horizontal pulley 4. The lower end of this shaft revolves in a bearing 5 in the bottom of the vat, while the upper portion of the shaft revolves in a bearing 6 in a cross-bar 7. The screen 2 is surrounded by an outer cylindrical casing 8, having a larger diameter than the screen in order to leave vertical chambers 9, into which the pulp passes on leaving the screen. These chambers are separated from each other by a series of radial ribs 10, which extend from the top down to near the bottom of the screen, being closed at the top by a cap-plate 11, secured to the vat and not connected to the revoluble screen. They are open at the bottom in order to communicate with horizontal chambers 27 and the ducts of the centrifugal agitator 12, located in the bottom of the cylinder. At intervals the ribs 10 are prolonged down to the bottom of the horizontal chambers 27 to form end walls 10', which

close the opposite ends of the chamber and divide the vertical chambers into groups for a purpose to be presently described.

13 represents an annular flange extending across from the inside of the vat to the outside of the cylindrical casing 8 to form an overflow-trough for the reception of dirt and other refuse matter.

The screen is composed of a series of rings 14, placed one upon the other and spaced apart to form the desired meshes 15 by removable blocks 16. These blocks are arranged in horizontal rows between the rings and are retained in position and separated from each other by being seated in sockets 17 in the edges of the ribs 10. The rings are T-shaped in cross-section in order to form a horizontal flange 18, which rests upon the intervening block 16, and a vertical flange 19, which projects over the vertical face of the block a sufficient distance to leave the desired opening or mesh 15 between it and the flange or edge of the adjoining ring. Hence it will be seen that when the meshes become enlarged by wear the rings can be removed and thinner blocks substituted. When a sufficient number of rings have been placed in position to make a cylinder of the required height, the cap-plate 11 is placed over the top ring and screwed down, thereby binding all the rings in position.

The reaction or pulsating movement is obtained in the cylinder-chambers 9 for the purpose of keeping the meshes of the screen clear by means of a centrifugal agitator revolving with and having an axis common to the screen and constituting a part of the centrifugal cylinder. This agitator consists of a bottom plate 25', provided with a plurality of tangential ducts 21, receiving at their inner ends 25 and discharging at their outer ends 26 into the horizontal chambers 27 common to a group of the vertical chambers 9, whence it flows upward or downward, as will now be explained. The discharge is interrupted and made intermittent to create upward back pressure by means of a circular series of segmental cut-offs 22, with intervening open recesses 23. In the present instance three cut-offs and three recesses are shown. When the ends 26 of the ducts 21 come in front of one of these cut-offs 22, the outward flow is momentarily stopped and the inertia of the fluid creates a back pressure and action in the two cylinder-chambers 9 above the horizontal chamber 27 and between end walls 10', as denoted by upgoing arrows. This back action arrests and diverts the outflow of stock like that produced in a hydraulic ram, opening the meshes and driving the refuse matter away from the inside surface of the cylinder. This refuse matter, being driven back, will rise to the top of the cylinder.

The construction of my device having been set forth, I will now describe its operation, arrows denoting the flow of the pulp. A sufficient quantity of fluid pulp is introduced

into the top of the revoluble screen to raise the level to that of the gate 31 at the side, after which the screen is made to revolve. The bottom of the screen being closed, the only escape of the pulp is through the meshes in the vertical side. The centrifugal force created by the revolution of the screen makes the pulp leave the middle of the screen and climb up the inside, as represented by dotted lines 30 in Fig. 1, thereby urging the pulp outward through the meshes into the vertical chambers 9, whence it flows by gravity downward into the common horizontal chambers 27, outward through discharge-openings 29, thence into the intervening recesses 23 to the large chamber 32 below, and from the latter it flows outward into any suitable reservoir. The lower portion of the screen being immersed in the pulp which has passed through the screen, the pulp is sucked up into the ducts 21 of the agitator and forced outwardly into the horizontal chambers 27, from which it flows downward back into the subchamber 32, momentarily rising when the outer ends of the ducts are closed by the cut-offs, as heretofore described. When additional unscreened pulp is introduced into the top of the screen, it will make the screened pulp overflow the gate 31 and pass out of the machine. Thus cycles of intermittent currents are kept flowing in the vat while the screening takes place. After having been screened the stock passes from the centrifugal cylinder intermittently into the vat between the cut-offs 22, whence it flows out of the vat through the flow-box 24, as indicated by arrows.

The centrifugal action on the stock is such that it will keep chips and extraneous matter from going to the cylinder by means of their difference in specific gravity, the heavier matter going through the meshes and the lighter climbing to the top, where it can be readily removed by an attendant without stopping the continuous action of the machine. The rotary action of the cylindrical screen also keeps the stock in constant circulation without being stirred by an attendant.

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

1. In a pulp-strainer, a revoluble screen, and a centrifugal agitator below said screen, provided with outwardly-extending ducts in and through which the pulp is received and discharged, in combination with devices for intermittently closing the ducts to produce a pulsating movement in the pulp, substantially as described.

2. In a pulp-strainer, the combination of a centrifugal pulp-screen casing, a screen in said casing, a centrifugal agitator and means for producing an intermittent discharge from the agitator.

3. In a pulp-strainer, a pulp-screen casing, a centrifugal agitator provided with ducts and having a vertical axis, and devices for

giving the ducts an intermittent discharge, in combination with a vertical cylindrical screen discharging outwardly, substantially as described.

5 4. In a pulp-strainer, a pulp-screen, a centrifugal agitator provided with curved ducts, in combination with cut-off devices spaced
10 apart and located around the line of travel of the discharge ends of the ducts of the agitator to check intermittently the flow of the pulp from the ducts, substantially as described.

15 5. In a pulp-strainer, a centrifugal screen, in combination with a centrifugal agitator, substantially as described.

6. In a pulp-strainer, a centrifugal screen, in combination with a centrifugal agitator and means for producing an intermittent discharge therefrom, substantially as described.

20 7. In a pulp-strainer, a vat and a centrifugal screen having a vertical axis, located in

the vat, in combination with devices for causing an intermittent backflow through the meshes of the screen, substantially as described.

25 8. A cylindrical pulp-screen composed of disconnected rings T-shaped in cross-section, and blocks interposed between the outer flanges of the rings.

9. In a pulp-strainer, the combination with 30 a centrifugal screen, of a casing connected thereto and provided with surrounding vertical chambers into which the screen discharges, and an agitator arranged and adapted to create backflow in said chambers, and 35 hence through the meshes of the screen.

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

EDWARD W. GOODRICK.

Witnesses:

R. G. DU BOIS,

R. S. WARFIELD.