B. C. ROOT.

PULP THICKENER.

APPLICATION FILED NOV. 12, 1921.

1,438,860. Patented Dec. 12, 1922.

6 SHEETS—SHEET 1.

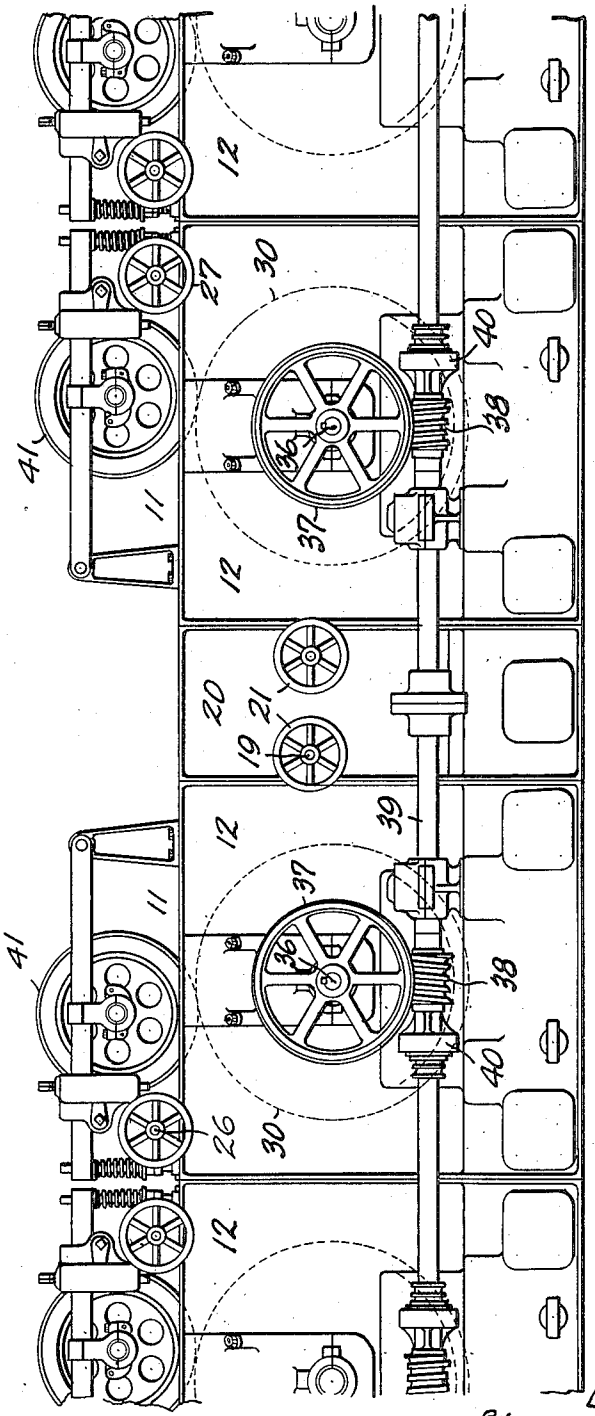


FIG. 1

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6 SHEETS—SHEET 2.

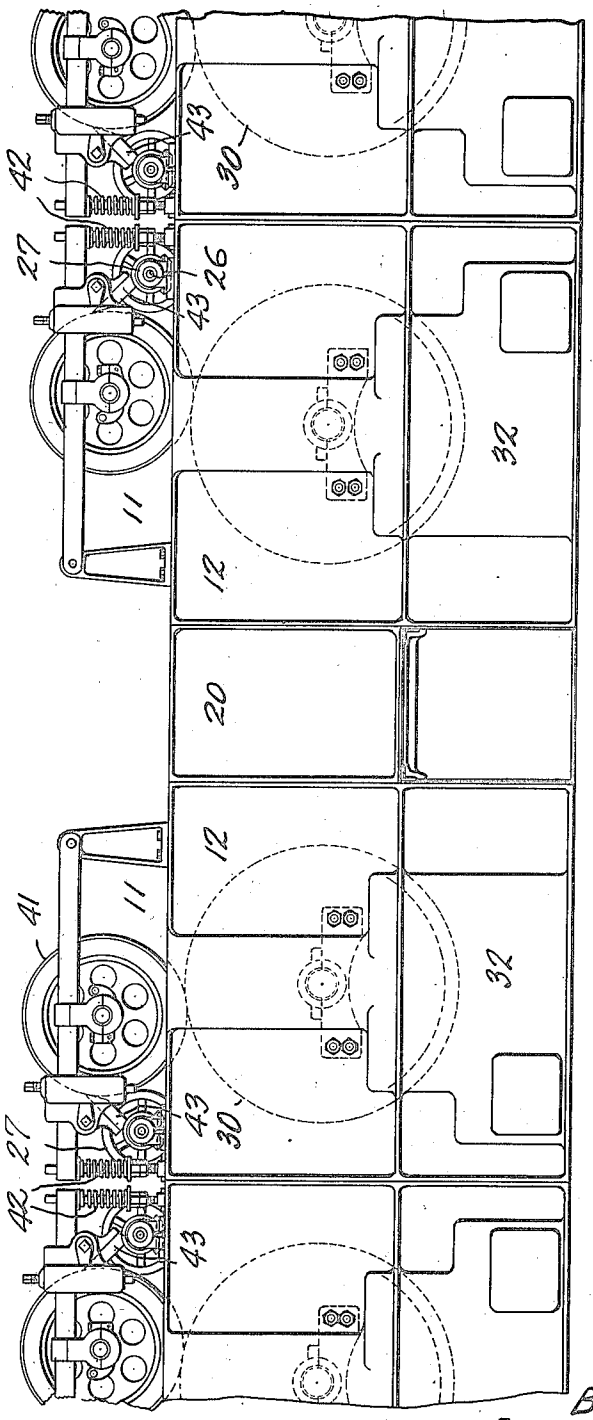


FIG. 2

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6 SHEETS—SHEET 3.

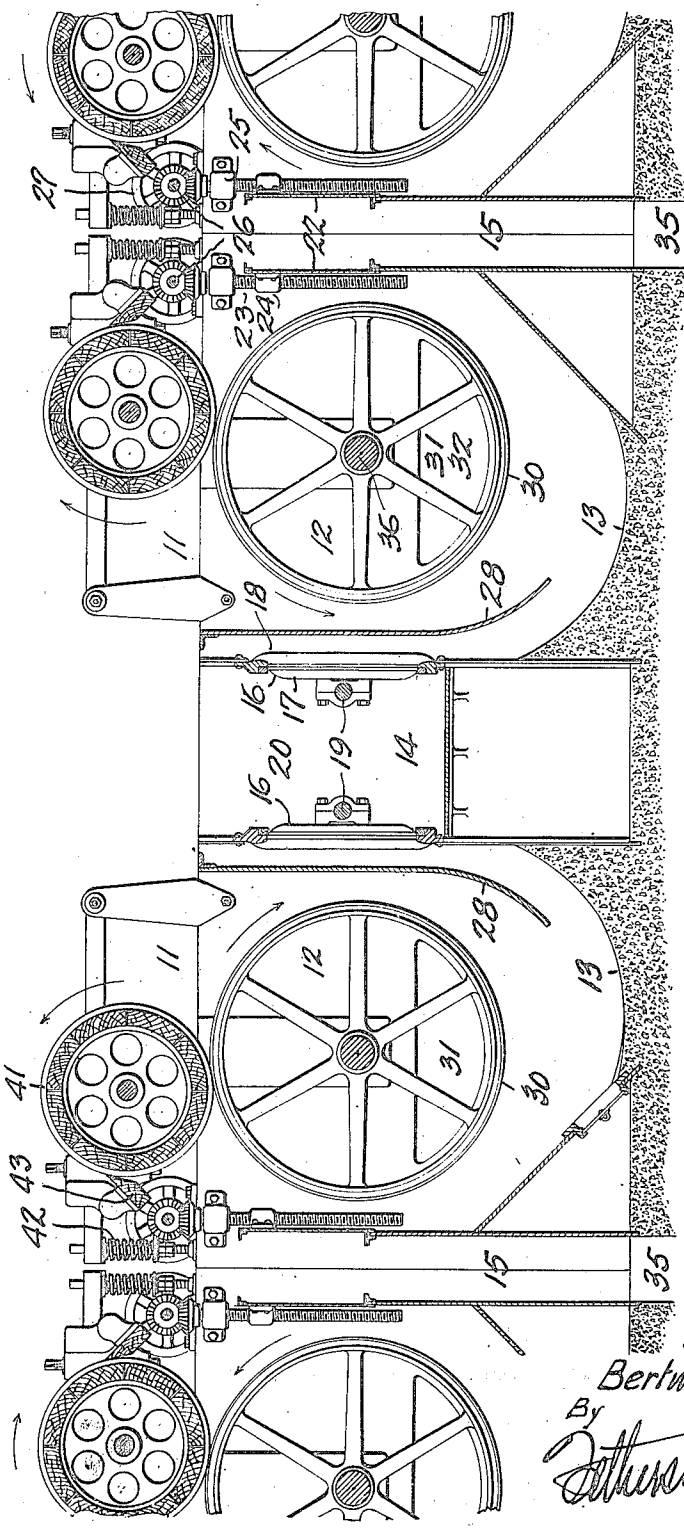


FIG. 3

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6 SHEETS—SHEET 4.

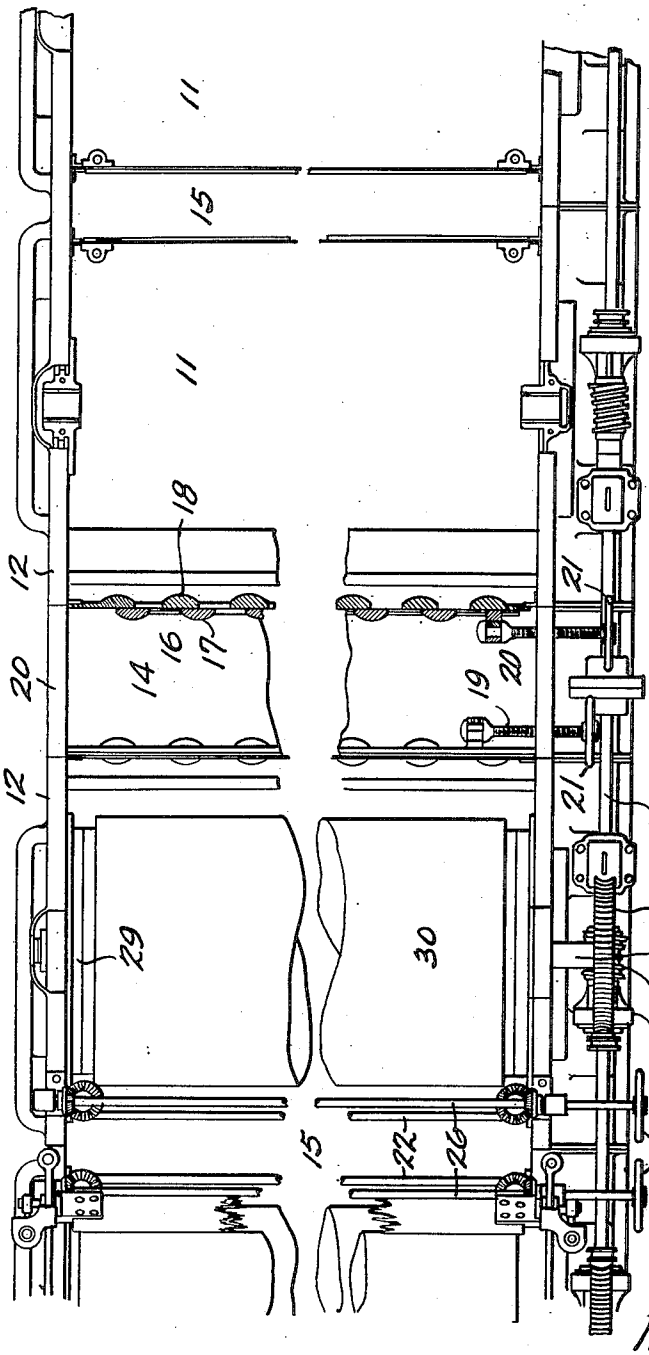


FIG. 4

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6 SHEETS—SHEET 5.

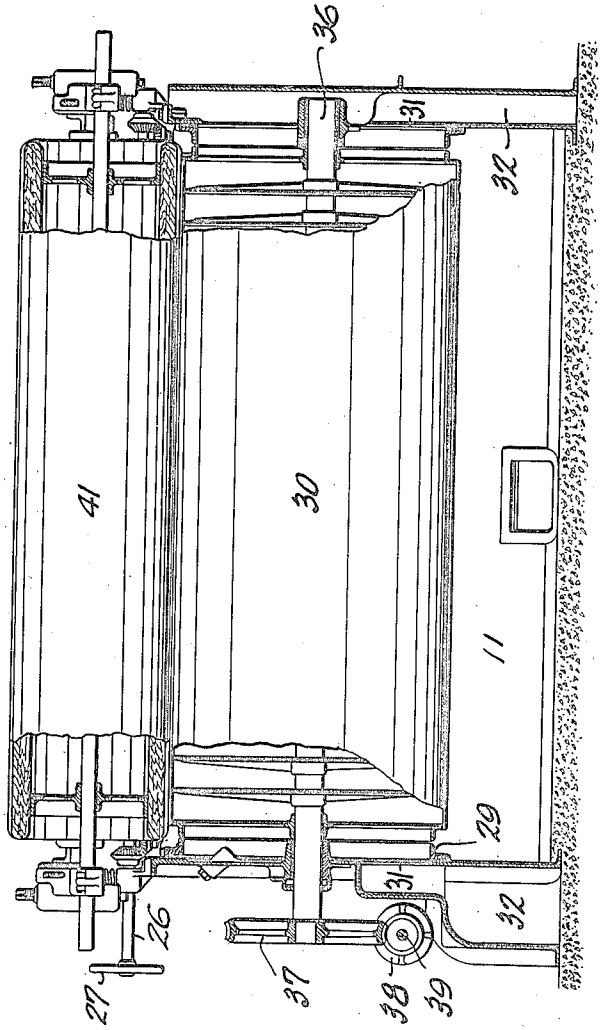


FIG. 5

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6 SHEETS—SHEET 6.

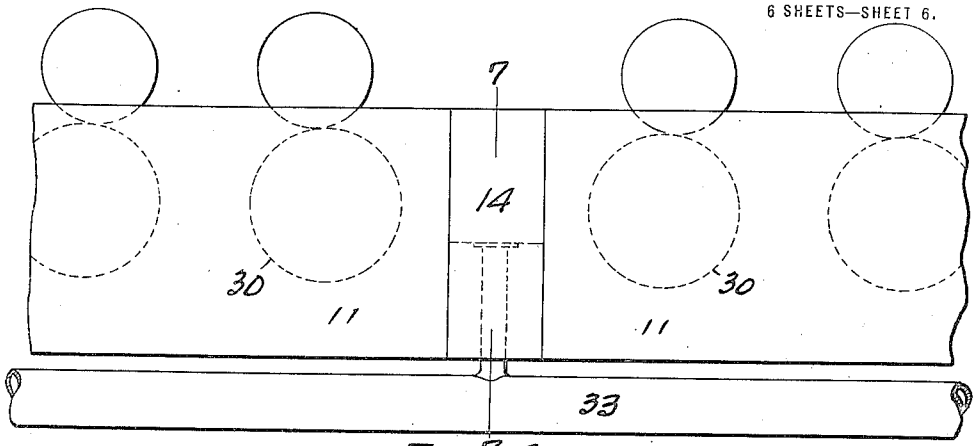


Fig. 6

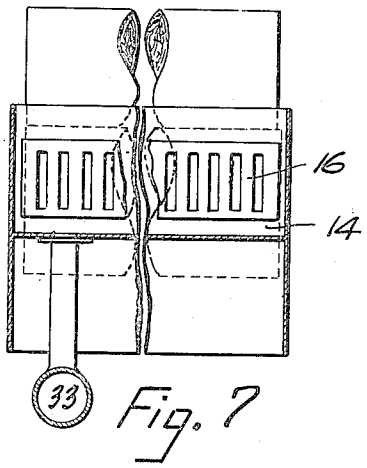


Fig. 7

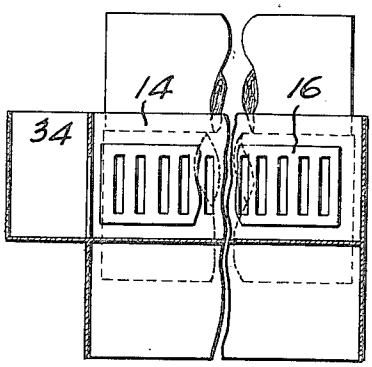


Fig. 8

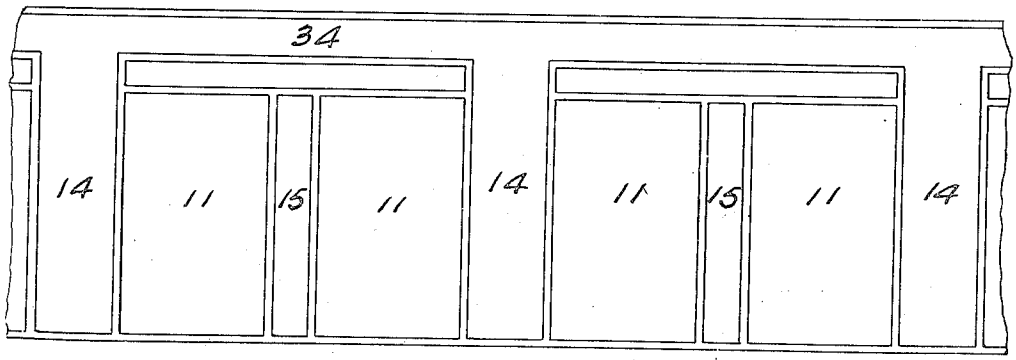


FIG. 9

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Patented Dec. 12, 1922. 1,438,860

UNITED STATES PATENT OFFICE.

BERTWELL C. ROOT, OF MONTREAL, QUEBEC, CANADA, ASSIGNOR TO HYDRAULIC MACHINERY COMPANY LIMITED, OF MONTREAL, QUEBEC, CANADA.

PULP THICKENER.

Application filed November 12, 1921. Serial No. 514,834.

To all whom it may concern:

Be it known that I, BERTWELL C. ROOT, a citizen of the United States of America, and resident of the city of Montreal, in the Province of Quebec and Dominion of Canada, have invented certain new and useful Improvements in Pulp Thickeners, of which the following is a full, clear, and exact description of the invention.

This invention relates to improvements in pulp thickeners, and the object of the invention is to provide for a simple and economical arrangement of the elements, particularly as regards the inlets and outlets. A further object is to provide for greater simplicity in the regulation of the machine than possible with thickeners of ordinary type. Various other objects and advantages will be apparent from the following description.

A series of ordinary deckers are arranged axially parallel in groups having group driving means and group pulp supply and discharge means.

In the drawings which illustrate the invention;

Figure 1 is a fragmentary front elevation of the machine;

Figure 2 is a fragmentary rear elevation;

Figure 3 is a vertical longitudinal section;

Figure 4 is a plan view;

Figure 5 is a vertical cross section at the axis of a drum;

Figure 6 is a diagram illustrating the manner of supplying pulp;

Figure 7 is a section on the line 7—7 Figure 6;

Figure 8 is a view similar to Figure 7, illustrating a slightly alternative means of supplying pulp;

Figure 9 is a diagrammatic plan view further illustrating the arrangement of Figure 8.

Referring more particularly to the drawings, 11 designates a series of vats arranged in spaced relation and formed in any suitable manner; for example of iron end plates 12 and the concrete floor or bottom 13, moulded to desired shape. Figures 1, 2, and 3, each illustrate part of a group, and it will be noticed especially in Figure 3 that the vats are spaced apart, leaving alternate wide and narrow spaces between them. These spaces, designated 14 and 15 constitute the pulp supply and discharge passages respectively for adjoining thickening elements. The side walls of the vats adjoining each space 14, are provided with large gate valves 16 in the form of apertured plates or grids 17, in sliding engagement with similar grids 18, fixed in the vat walls. Any suitable means may be provided to operate the gate valves, such as spindles 19, rotatably mounted in the gates 17, and threaded through the end walls 20 enclosing the spaces 14 as clearly shown in Figure 4. The outer ends of the spindles may be provided with hand wheels 21 or other suitable means to rotate them, and the spindles and hand wheels are arranged at what may be termed the front of the machine. The walls of the vats adjacent to spaces or passages 15 are provided with vertically slidable upper portions 22 which may be adjusted to increase or decrease the height of the walls. These adjustments may be effected by means of screw threaded rods 23 engaging nut members 24, fixed to the plates 22 adjacent opposite ends thereof, the rods being rotatable, but axially immovable in bearings 25, carried by the front and back walls 12 of the vats. The rods at opposite ends of each plate are gear driven from single shaft 26 controlled by a hand wheel 27 at the front of the machine, so that both ends of the plate may be moved exactly equal amounts. A baffle wall 28 is provided in each vat immediately within the gate valves 16 and extending from the top of the vat to a point adjacent the bottom thereof. The front and back walls of the vats are provided with circular rings or throats 29 against which the ends of screen drums 30 may bear lightly or otherwise as desired. Within the annuli of these rings, outlet openings 31 are provided, bringing the interiors of the drums into communication with water escape passages 32.

The pulp to be thickened is supplied to the spaces 14 between the vats by any suitable means, such as introduction at the tops of the spaces, or from beneath, through a main 33, or from the back of the machine through a trough 34 which communicates with the several spaces 14 as indicated in Figures 8 and 9. The outlet from the spaces 15 is preferably at the bottom as indicated at 35, Figure 3.

A screening drum 30 of any suitable construction is rotatably mounted in each vat.

At the front of the machine, the shafts 36, carrying the drums, extend through the plates 12 and have fixed thereto worm gears 37 meshing with worms 38 on a sectional shaft 39, mounted in bearings and extending across the front of the machine. Each of the worms 38 is preferably loosely mounted on the shaft, and a clutch 40 provided to afford driving connection between the two. As will be seen in Figures 1 and 3, the drums on opposite sides of the supply troughs or space 14, rotate toward one another. Above and engaging each drum is a floating felt-covered couch roll 41, which may be resiliently supported by springs 42, so that its entire weight will not bear on the drum 30. A doctor or doffer 43, of any suitable pattern, is provided for each couch roll, these doffers being positioned and arranged to discharge scrapings into the outlet passages 15 between the vats.

The operation of the device is as follows:—

Pulp is supplied to the various spaces or channels or chests 14 at a suitable rate. The valves 16 are adjusted to permit a suitable flow of the thin pulp into the adjoining vats 11, the inflowing pulp being separated from the rolls 30 by the baffle plates 28. The thin pulp is allowed to remain at a suitable level in the vats, which level results in almost complete submergence of the drums. The screens hold back the pulp but give passage to the water which escapes through the openings 31 at the front and back of the machine into the conduits 32. This flow of water plasters the pulp against the exterior of the screens. The throat rings 29 make sufficiently tight joints with the ends of the drums, to prevent any appreciable amount of pulp entering the drums. As the drums rotate, they carry the adhering pulp into contact with the felt-covered couch rolls. The pulp adheres better to the felt than to the screens of the drums, so that the couch rolls strip pulp from the screens, and carry it around to the doffers 43 which are in scraping engagement with the couch rolls. The pulp thus scraped off, slides over the inclined doffers and drops into the outlet passages 15. The screen drums have comparatively high surface speed, and therefore, by centrifugal action, throw off a certain amount of pulp on the ascending sides, which accumulates, producing much thicker pulp than on the descending sides. The amount of this thickened pulp which is allowed to overflow into the outlets 15, may be regulated by vertically adjusting the plates 22. The driving gear clutches and pulp regulating means are all at the front of the machine, thus facilitating the tending thereof.

Arrangement of the deckers in what may be termed interlocking pairs presents considerable advantage both as regards economy of space, and cost of construction, and also enables the supply and discharge of pulp to be of uniform amount. The flow of pulp is from each chest 14 into the adjoining outlets 15, and in this way, each outlet receives pulp from two chests. The arrangement of the screens in pairs on each side of the chests 14 provides for a substantially uniform draught of pulp from each chest, and the deep gate valves extending to the bottoms of the chests provide for the admission of pulp at practically all levels, so that if there is any stratification, all degrees of density of the pulp will be admitted to the vats. Owing to the rotation of the drums 30, there is always a considerable amount of thick pulp in the neighbourhood of the plates 22, which does not adhere to the drums. Accumulations of this thick pulp may be discharged into the outlets by temporarily lowering the plates, as the thickest pulp is always at the top. The vertical adjustment of the plates 22 will determine the minimum density of pulp which is allowed to flow over, into the outlets 15.

Having thus described my invention, what I claim is;

1. In a pulp thickener, a series of vats arranged in spaced relation, supply chests in alternate spaces, and discharge conduits leading from the remaining spaces.

2. In a pulp thickener, a series of screen drums arranged axially parallel in row, and means to rotate alternate drums in one direction, and the remaining drums in an opposite direction.

3. In a pulp thickener, a series of screen drums arranged axially parallel in a row, means to admit pulp between the adjacent drums, and means to withdraw thickened pulp from between adjacent drums.

4. In a pulp thickener, a series of screen drums arranged axially parallel, and in a row, and in pairs, means for rotating the drums of each pair toward one another; means for admitting pulp between the drums of each pair and means for withdrawing thickening pulp from between adjacent drum pairs.

5. In a pulp thickener, a series of vats arranged in spaced relation in pairs, a pulp supply trough between the vats of each pair, a pulp outlet conduit between each vat pair; a screen drum in each vat, and common driving means to rotate said drums to circulate pulp from the supply troughs to the adjacent outlet conduits.

6. In a pulp thickener, vats arranged in pairs, a supply trough between the vats of each pair; gate valves controlling flow from the troughs into the vats, a discharge conduit at each end of each pair, the discharge conduits between adjacent pairs being common to the two pairs, and vertically adjustable portions of the back walls adjacent the

discharge conduits, determining the overflow levels of the vats.

7. A device according to claim 6 in which the gate valve comprises stationary and movable plates, each having a plurality of vertically disposed slots, and means for relatively moving said plates to bring the slots thereof into and out of register.

8. In a pulp thickener, a plurality of vats arranged in pairs, a pulp supply conduit and branches from said conduits leading between the vats of each pair and discharge conduits disposed between each vat pair.

9. In combination with a device according to claim 8, means for controlling inflow and outflow of the vats; a screening drum in each vat, and a common driving means for said drums, including a clutch connection for each drum, said driving means and flow controlling means being disposed all on one face of the machine.

10. In a pulp thickener, vats arranged in pairs, supply means between the vats of each pair, discharge means between each vat pair, a screen drum in each vat, a couch roll engaging each drum, a doffer for each couch roll, the doffers of adjacent vats being arranged to discharge into the intervening discharge means, and overflow regulating means on each vat, arranged to discharge the overflow of adjacent vats into the intervening discharge means.

In witness whereof, I have hereunto set my hand.

BERTWELL C. ROOT.