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H. B. HOUSTON

1,759,983

SCREEN FOR FLOTATION PROCESSES

Filed June 22, 1925

Fig. 1.

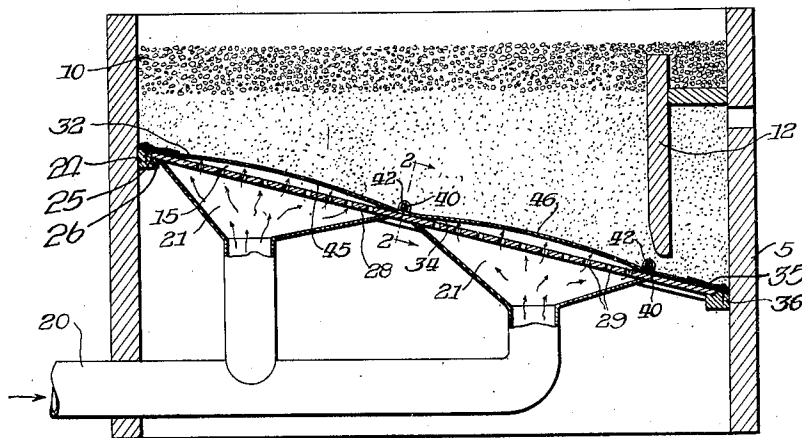


Fig. 2.

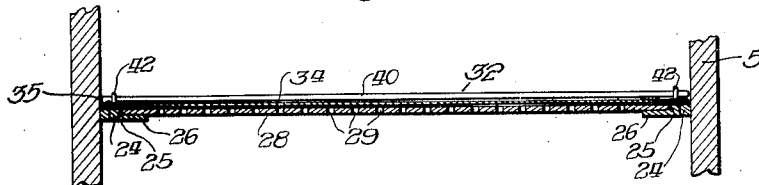


Fig. 3.

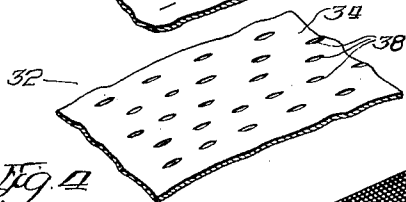
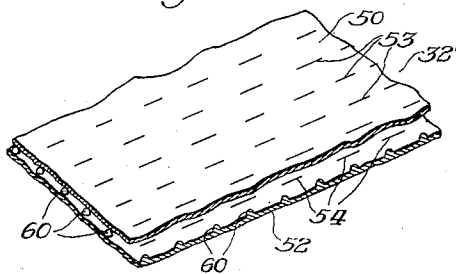
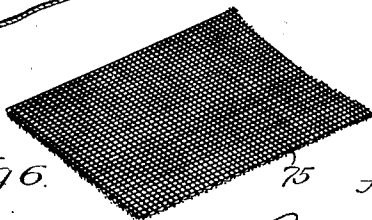


Fig. 4

Fig. 5.



Witness: *Fig. 6.*
Ed. Davis

By

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UNITED STATES PATENT OFFICE

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SCREEN FOR FLOTATION PROCESSES

Application filed June 22, 1925. Serial No. 38,608.

My invention relates to an improved screen for flotation processes.

While it is to be understood that the screen of my invention may be employed wherever found suitable or desirable, it is particularly adapted for disseminating a stream of air to form a great number of relatively small bubbles in the emulsion used in flotation apparatus for ore separation and the like, and the objects of the invention are the provision of a generally improved and simplified screen that will wear better, a screen that will not be swollen and shut off the air passages by the moisture to which it is subjected, one that will permit air or such other fluid as is employed to pass easily or freely there-through and adapted, when the air supply, for example, is discontinued, to retract and substantially shut off back leakage of the emulsion, thereby providing a self closing operation and an effective back check. Further objects are the provision of a screen from which particles may be dislodged or blown when the air is forced through the screen.

The screen or filter which I have provided is relatively inexpensive in cost, its function is better, and its life is greater than the cloth or other cloth fabric filters or screens heretofore provided. Its greater life decreases the number of replacements required and thereby the cost of operation and attendance.

To acquaint those skilled in the art with the construction and manner of practicing my invention, I shall now describe in connection with the accompanying drawings a particular embodiment thereof.

In the drawings:

Figure 1 is a more or less diagrammatic vertical sectional view through a flotation cell showing an embodiment of my invention in connection therewith;

Fig. 2 is a fragmentary vertical section taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary perspective view of the screen blanket in retracted condition;

Fig. 4 is a similar view showing how the stretching, bulging or tensioning of the sheet or blanket opens the air passages there-through;

Fig. 5 is a fragmentary perspective view of a modified or alternative form of blanket; and

Fig. 6 is a fragmentary perspective view of another form of blanket embodying my present invention.

Referring to the drawings, the cell shown is merely illustrative of a typical or any pneumatic type bubble-column machine.

It comprises generally a box 5 which is usually of rectangular section, although this is immaterial and may vary as desired. The pulp indicated at 10 is fed into the cell behind the baffle 12, as is well understood in the art, and the froth overflows the sides while the tailings are discharged or withdrawn through a suitable pipe (not shown).

The screen embodying my present invention is designated generally at 15 and it constitutes the sloping bottom of the box or lauder containing the pulp. Air under the desired pressure and from a suitable source (not shown) is introduced into the flotation pulp through the screen or filter 15 by means of suitable conduit means 20, the particular conduit means shown having a plurality of flared outlets 21 for equalizing the air application to the underside of the screen.

The screen 15 may be mounted as desired. In the embodiment shown it is mounted obliquely, to give the sloping bottom effect, upon a frame 24 secured to the interior of the box 5 in any suitable or preferred manner and providing a ledge about the interior of the box. The bottom may of course be flat or otherwise varied as may the other details of the cell. The ledge or frame 24 is scarfed at 25 and set down into the general plane of the frame 24 and supported upon the underlying tongues 26, provided by the scarfing at 25, is a substantially rigid grid 28 provided with a multiplicity of perforations, as indicated at 29. The grid 28 is preferably of hard rubber, a rubber composition, or wood. The grid 28 supports the blanket or filter element proper 32 and, as already pointed out, with said blanket or filter element 32 constitutes the bottom of the lauder or box 5.

The blanket or filter 32 comprises a per-

vious, elastic, yieldable or resilient sheet 34, preferably of rubber threads, woven together, or of rubberized stranded or woven material. Any other equivalent material may, of course, be employed. This blanket is adapted to support the comminuted mass of metal ore in the emulsion upon which the metal is to be floated, and to disseminate the air stream coming from below, so that it will pass into the emulsion in a great number of small streams or bubbles.

The sheet 34 may be provided with an edge binder 35 of the type disclosed in my co-pending application, Serial No. 24,710, filed April 20, 1925, and secured about its edge as through this binder 35 to the frame or ledge 24, as by a suitable fastening means 36.

The air passages or openings through the sheet 34 are provided by slitting the sheet 34, as indicated at 38 in Figs. 3 and 4. In the normal retracted condition of the sheet 34, that is, when the sheet 34 is not stretched or under tension by a flow of air therethrough, the slits 38 have no appreciable breadth and the retraction of the sheet by its own elasticity automatically closes or shuts off the air passages 38 against back leakage of the emulsion. Being resilient, elastic, or at least yieldable, the sheet 34 stretches or bulges, however, under the force of the air when it is turned on or introduced and opens the air passages 38, as indicated in Fig. 4, permitting the air to pass easily and freely into the emulsion and operating to disseminate the stream of air as it comes from below, so that it will enter the emulsion in a great number of small streams or be bubbled therethrough. Again, when the air is turned off, the sheet 34 retracts and closes the openings 38 against back leakage.

In addition to the new function above set out, I find that a rubber or rubberized blanket will wear better than a filter or blanket of untreated fabric. Also, harmful action of the moisture and emulsion upon the blanket or filter is avoided. The blanket will not absorb moisture to the extent that it will swell and shut off the air passages therein, and its elasticity also permits particles lodged in the interstices of the weave, or anywhere on the blanket to be blown therefrom when air is forced through the blanket.

With a rubberized textile material I find that there is little or no tendency for the air passages through the blanket to spread or remain open permanently. With a woven material I contemplate slitting across the weave in one direction only, so that the weave at right angles thereto will remain intact and will thereby hold the air passages provided against spreading, and will also prevent permanent opening of said passages and assure proper closing thereof when the air is shut off.

For the purpose of breaking up the area

of stretching of the sheet or blanket 32, I provide for holding said sheet down upon the grid 28, as, for example, along opposite sides or along the margins of the air outlets 21. This means may be in the form of rods 40, preferably of rubber or rubber coated. These rods extend through the box 5 above the blanket 32, but immediately adjacent the grid 28, and may be secured at their opposite ends to the frame 24 as by means of U-bolts 42, as shown in Fig. 2. These rods 40 may permit a limited stretching or bulging of the sheet 32 adjacent them, but they serve to hold the sheet down relatively close to the grid 28, so that the stretching of the sheet will occur in separated areas, as indicated at 45 and 46 in Fig. 1. This overcomes the large opening of the air passages at the center with practically no opening all around the side where one relatively large stretching or bulging area is employed.

In the embodiment of the invention shown in Fig. 5 the blanket 32' is shown as comprising two layers or sheets 50 and 52, preferably of the material described in connection with the previous embodiment, and both slitted at 53 and 54 to provide air passages therethrough. To preclude the possibility of this plural layer blanket failing to pass air therethrough, should the two layers come into contact with the air passages out of registration, I provide means between the two layers for spacing or holding them out of surface contact. This means may comprise small protuberances 60, formed integral with one sheet 52, as shown. Alternatively spacing means may be provided on each sheet or layer or it may be formed entirely separately from the two sheets and disposed between them. As already pointed out, the blanket of Fig. 5 may be of the same material as described in connection with the previous embodiment and in such case the opening and back check action of the air passages will be substantially the same as previously explained.

In the embodiment shown in Fig. 6, the blanket 75 is shown as comprising a pervious textile sheet preferably of rubber threads suitably woven together, or of rubberized stranded or woven material. The fabricated thread rubber sheet or blanket thus produced is pervious and its perviousness permits the air to penetrate it in its passage up into the flotation pulp. As the sheet or blanket 75 stretches or is tensioned under the force of the entering air, its perviousness may be increased by the accompanying opening up of the weave of the fabricated sheet, and when this sheet is elastic, its retraction when the air flow is discontinued, may, as before, close off or at least decrease the perviousness of the weave to the backflow or leakage of the emulsion. Slitting or other openings in the blanket, other than those produced by the weave itself, may thus be omitted, although,

of course, slitting of such a blanket in one direction as already pointed out, or in any other desired manner, is contemplated.

While I have described my invention in connection with the details of particular embodiments, it is to be understood that I do not intend to be limited to the precise details, use or application described.

I claim:

1. In flotation apparatus, a chamber having a wall made of a thin sheet of elastic material having relatively fine openings there-through, means for introducing fluid under pressure into said chamber through said sheet, said openings being opened by the pressure of the fluid and closed by retraction of the sheet, and means for preventing opening of said openings by a preponderating pressure of the material in the chamber, said means comprising a rigid sheet backing said elastic sheet and having relatively small openings therethrough.

2. A flotation screen comprising a relatively rigid perforate rubber backing sheet forming a grid, and a thin elastic sheet overlying said grid, said last sheet having slits for the passage of air therethrough, and said slits being opened by stretching of the sheet and substantially closed by retraction thereof.

3. A flotation screen comprising a relatively rigid perforate rubber backing sheet forming a grid, and a thin elastic sheet overlying said grid, said last sheet having slits for the passage of air therethrough, said slits being opened by stretching of the sheet and substantially closed by retraction thereof, and means for holding said sheet to the grid at a point within the active area to break up said area.

4. In combination, a rigid rubber backing sheet forming a grid, a thin elastic sheet overlying said grid and having passages for the flow of air therethrough, and means overlying said last sheet for holding it to the grid.

5. In combination, a rigid rubber backing sheet forming a grid, a thin elastic sheet overlying said grid and having passages for the flow of air therethrough, and means overlying said last sheet for holding it to the grid, said means overlying and dividing the active area of the elastic sheet.

6. The combination, with a flotation ore separator cell, of an aerator therein, said aerator comprising a bed member, a perforated rubber mat lying thereon, and means for forcing air between the two, the bed member and the mat being so constructed that the mat will seal against the bed member when the current of air is stopped and prevent the overlying material from flowing backward through the perforations of the mat.

In witness whereof, I hereunto subscribe my name this ninth day of June, 1925.

HENRY B. HOUSTON.