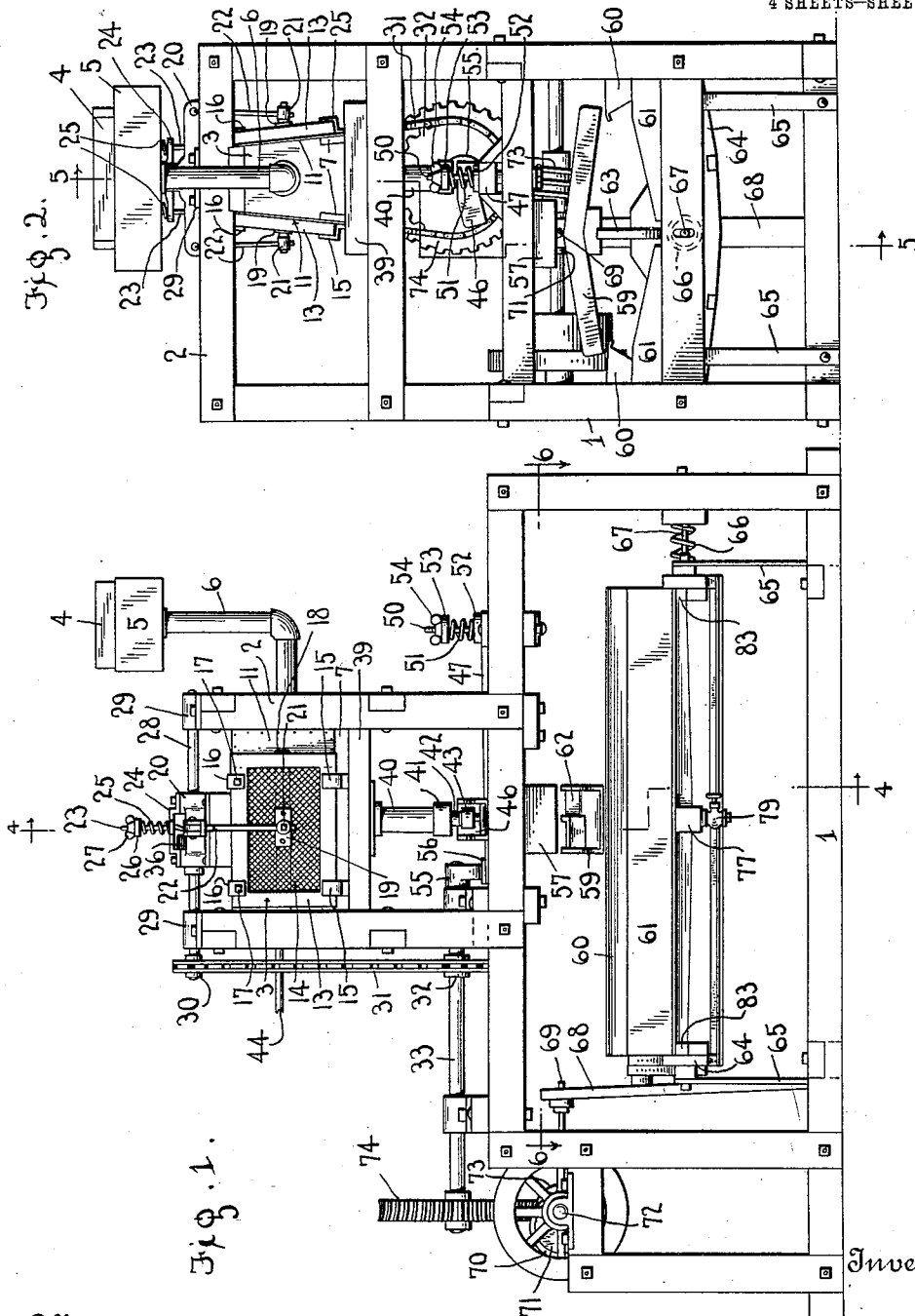


I. F. MONELL.
PULP CLASSIFIER.
APPLICATION FILED DEC. 26, 1911.

1,058,252.

Patented Apr. 8, 1913.

4 SHEETS-SHEET 1.

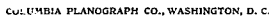


Witnesses
L. B. James
C. E. Hunt.

Ira F. Monell
by *A. B. W. W. W. W. W.*
Attorneys

1,058,252.

4 SHEETS—SHEET 2.

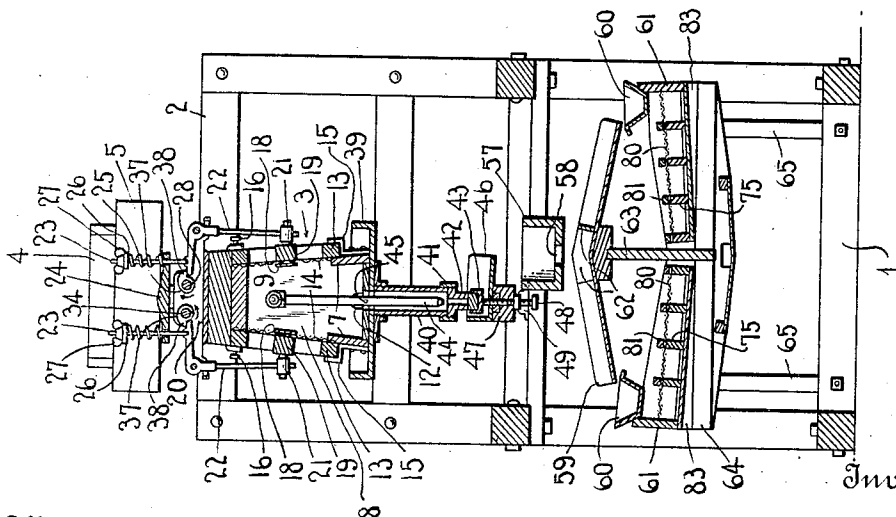
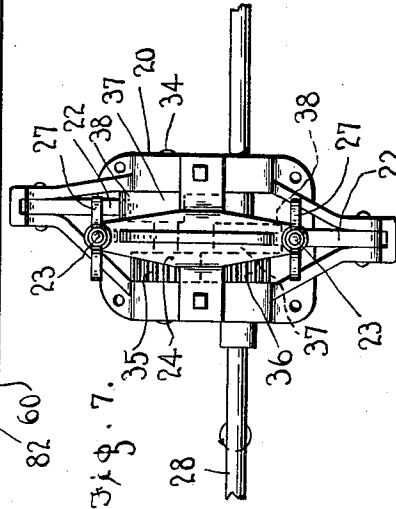
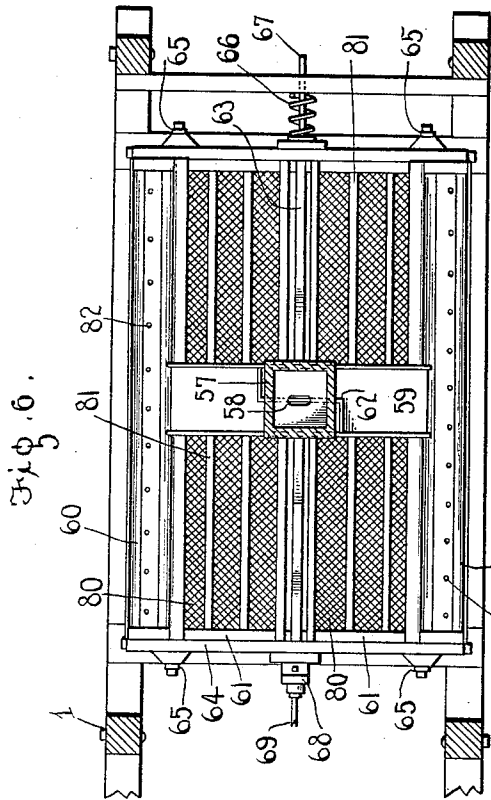


I. F. MONELL.
PULP CLASSIFIER.
APPLICATION FILED DEC. 26, 1911.

1,058,252.

Patented Apr. 8, 1913.

4 SHEETS—SHEET 3.



Witnesses

L. B. James
C. E. Hunt

Fig. 4.

Ira F. Monell

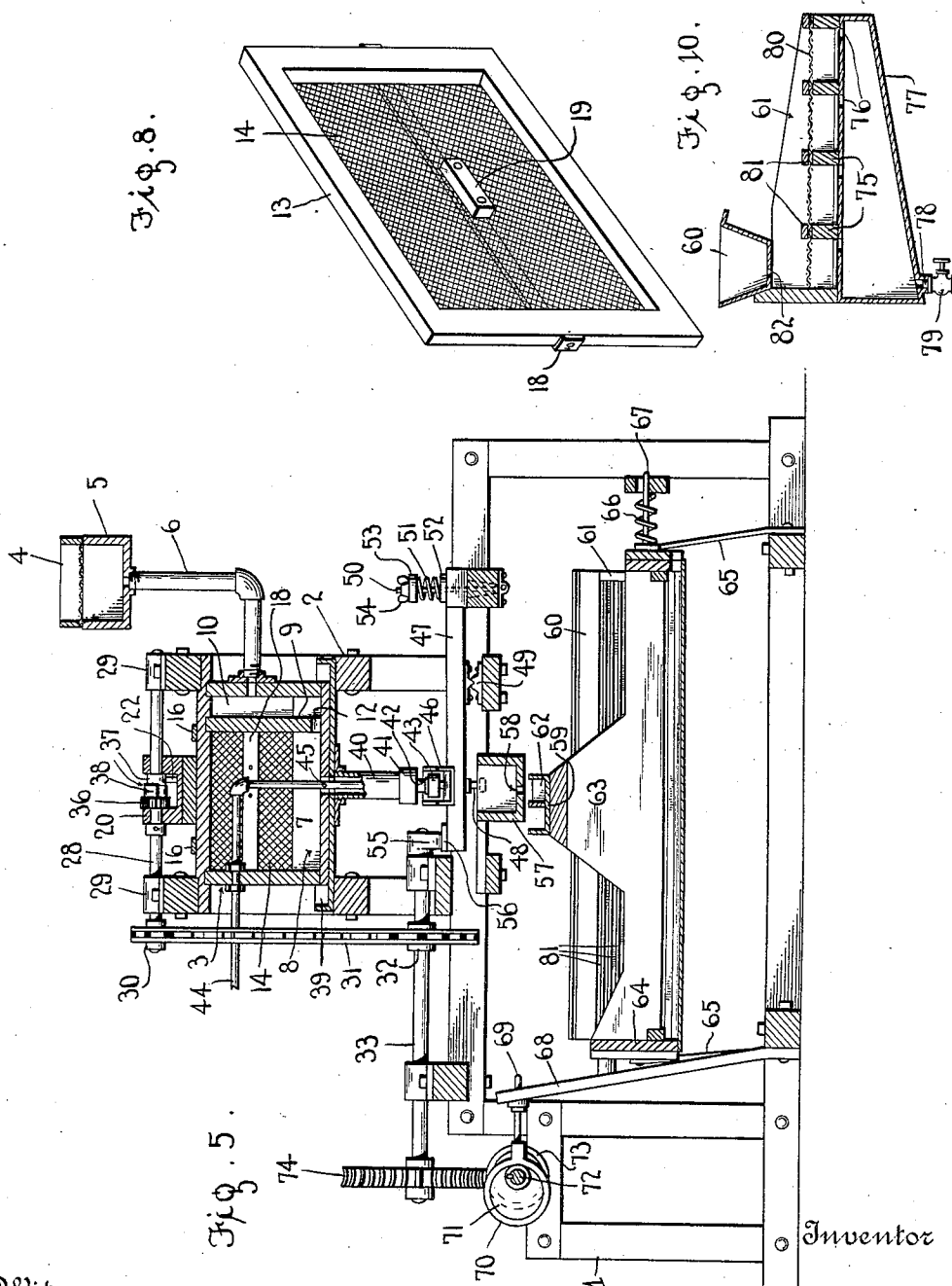
by *H. B. Wilson & Co.*
Attorneys

I. F. MONELL.
PULP CLASSIFIER.
APPLICATION FILED DEC. 26, 1911.

1,058,252.

Patented Apr. 8, 1913.

4 SHEETS—SHEET 4.



Witnesses
L. B. James
C. E. Hunt

Inventor
Ira F. Monell
by *A. B. Williams & Co.*
Attorneys

UNITED STATES PATENT OFFICE.

IRA F. MONELL, OF BOULDER, COLORADO.

PULP-CLASSIFIER.

1,058,252.

Specification of Letters Patent.

Patented Apr. 8, 1913.

Application filed December 26, 1911. Serial No. 667,953.

To all whom it may concern:

Be it known that I, IRA F. MONELL, a citizen of the United States, residing at Boulder, in the county of Boulder and State of Colorado, have invented certain new and useful Improvements in Pulp-Classifiers; 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.

This invention relates to improvements in pulp classifiers.

One object of the invention is to provide an apparatus of this character having an improved construction and arrangement of ore deslimer by means of which the slimes and fine sand are washed out and the pulp thickened before being fed to the screens.

Another object is to provide an automatically operated valve for controlling the feed of the pulp from the deslimer to the screens and means for uniformly distributing the pulp onto the screens whereby the pulp is properly classified for further treatment.

With these and other objects in view the invention consists of certain novel features of construction, and the combination and arrangement of parts as will be more fully described and claimed.

In the accompanying drawings; Figure 1 is a side view of one side of the apparatus; Fig. 2 is an end view of one end thereof; Fig. 3 is a similar view of the opposite end; Fig. 4 is a sectional view on the line 4—4 of Fig. 1; Fig. 5 is a similar view on the line 5—5 of Fig. 2; Fig. 6 is a horizontal sectional view on the line 6—6 of Fig. 1; Fig. 7 is an enlarged plan view of the vibrating mechanism for the deslimer screens; Fig. 8 is a detail perspective view of one of the screened sides of the deslimer. Fig. 9 is an enlarged plan view of one of the screen pans and the pulp distributing trough thereof; Fig. 10 is a central cross sectional view of the same. Fig. 11 is a detail perspective view of one of the vibrating hammers of the deslimer screens.

In the embodiment of the invention, I provide a main supporting frame 1 on which is arranged a superstructure 2 in which is mounted the deslimer 3 of the apparatus and on which is arranged the pulp feeding mechanism. The pulp feeding mechanism comprises a guard screen 4 consisting of an

open frame having a screen bottom and which is arranged over and supported upon a stock box 5. The box 5 is connected by a feed pipe 6 with one end of the deslimer 3.

The deslimer comprises a frame, the sides of which incline inwardly toward the upper end thereof and is provided with a solid bottom and top and closed ends as shown. The lower portion of the frame is provided with solid sides 7 which extend a short distance up and together with the solid ends, form in the lower portion of the frame a washing chamber 8. In the frame near one end thereof is arranged a vertically disposed partition 9 which separates this end of the deslimer into a pressure chamber 10, the sides of which are closed by side plates 11. To the pressure chamber 10 is connected the lower end of the feed pipe 6 from the stock box, said chamber thus receiving the pulp fed from said box. In the lower end of the partition 9 is formed a passage 12 through which the pulp passes from the pressure chamber into the main portion of the deslimer. The sides of the main portion of the deslimer are in the form of frames 13 covered by wire screens 14, said frames being supported and secured at their lower edges to the sides of the deslimer by angle brackets 15 and at their upper edges are secured by clamping bars 16 arranged across the top of the deslimer frame and having depending ends in which are arranged clamping screws 17 by means of which the upper portions of the screen frames are clamped into firm engagement with the upper portion of the deslimer frame. Arranged across the inner sides of the screens 14 and secured at their ends to the ends of the frames 13 are screen vibrating strips 18 to which are secured on the outer side of the screen, vibrating blocks 19 adapted to receive the blows or strokes of the screen vibrating mechanism hereinafter described.

The screen vibrating mechanism comprises a hammer supporting frame 20 secured to the top of the deslimer frame and having pivotally mounted in its laterally projecting ends vibrating hammers 21, the handles of which are in the form of bell crank levers 22. The levers 22 have their horizontally disposed upper ends projecting inwardly in the frame 20 and connected with operating rods or links 23 which extend upwardly through the ends of a spring supporting bracket 24 which is secured to

the frame 20 as shown, said rods projecting above the bracket 24 and having arranged thereon coiled hammer operating springs 25, the upper ends of which are engaged with caps 26 through which the upper ends of the rods 23 project, said projecting upper ends of the rods being threaded to receive spring retaining nuts 27 whereby the springs are confined and the pressure thereof exerted to retract the hammers or to swing the same into engagement with the screen vibrating blocks 19 when the levers 22 of the hammers are tripped by a tripping mechanism to be described.

The hammer tripping mechanism comprises a main operating shaft 28 which is revolubly mounted in suitable bearings in the hammer supporting frame 20 and in bearings 29 on the superstructure 2 of the main frame of the machine as shown. On one end of the shaft 28 is fixedly mounted a sprocket gear 30 connected by a sprocket chain 31 to a sprocket gear 32 on a drive shaft 33 hereinafter more fully described. Also revolubly mounted in the hammer supporting frame adjacent to and parallel with the shaft 28 is a short counter-shaft 34 on which is fixedly mounted a spur gear pinion 35, said pinion engaging a similar gear 36 fixed on the shaft 28 whereby the motion of said shaft 28 is imparted to the shaft 34. On the shafts 28 and 34 are fixedly mounted tappet disks 37 having thereon tappets 38 which are adapted to be engaged with the inner ends of the horizontally disposed upper portions of the bell crank hammer operating levers 22 on the opposite sides of the deslimmer whereby said levers are tripped and the hammers 22 thus swung outwardly against the resistance of the springs 25 whereby when the levers are released from the tripping devices, said springs will retract the levers 22 and bring the hammers 21 into forcible engagement with the vibrating blocks 19 on the vibrating strips 18, thus imparting a succession of vibrations to the deslimmer screens whereby any pulp adhering to the inner sides of the screens will be dislodged and thus prevented from clogging the screens and preventing the free discharge of the slimes and fine sand from the pulp.

The deslimmer 3 may be constructed in the form of a series of screened compartments separated by suitable partitions or as herein shown and described may consist of but one screen covered compartment. The deslimmer rests in a launder or drip pan 39 which is supported on cross bars in the superstructure 2 of the main frame as shown and which receives the slimes and fine sand passing through the screens on the sides of the deslimmer and from which this product is discharged into a suitable trough, hopper or box (not shown) for further treatment.

Connected at its upper end and opening through the center of the wash box 8 of the deslimmer is a pulp discharging pipe 40 through which the thickened pulp is conducted from the deslimmer. The discharge pipe 40 has on its lower end a cap 41 in which is arranged a nipple 42 which forms a reduced discharge opening at the lower end of the pipe. The lower end of the nipple 42 forms a valve seat with which is adapted to be engaged a valve 43 whereby the discharge of the pulp from the pipe 40 is controlled.

Connected with one end of the deslimmer is a hydraulic or fresh water supply pipe 44, said pipe extending into the screened compartment of the deslimmer and having its inner end projecting downwardly into and to a point near the lower end of the pulp discharging pipe 40 as shown. The lower end of the water supply pipe 44 is reduced to a one-eighth inch discharge opening, while in the pipe near the upper end of the discharge pipe 40 and bottom of the wash box 8 of the deslimmer are formed a series of water discharging perforations 45. The water passing from the reduced end of the water supply pipe 40 prevents the reduced discharge opening in the pulp discharging pipe 40 from becoming clogged and the water discharging through the perforations 45 in the supply pipe keeps the pulp in the wash box of the deslimmer agitated and washes the slimes and fine sand upwardly through the screened sides of the deslimmer.

The valve 43 is arranged in a launder 46 secured to a valve operating bar 47. The valve is preferably in the form of a reducing coupling in the smaller end of which is screwed a bolt 48, while the larger upper end of the reducer is filled with Babbitt metal or similar composition which forms the seat engaging surfaces of the valve. The bolt 48 extends through the bottom of the launder 46 and through the valve operating bar 47 at a point directly below the discharge nipple 42 on the lower end of the pulp discharging pipe 40 and on the lower end of the bolt is arranged a nut whereby the valve and the launder are held in position on the bar 47. The bar 47 is pivotally connected intermediately its ends to one of the bars of the main supporting frame as shown at 49 and one end of the bar is loosely connected to another cross bar of the frame 1 by a bolt 50 the upper end of which projects a considerable distance above the lever and has arranged thereon a lever operating spring 51, said spring having its lower end engaged with a socket 52 on the upper side of the bar 47 and having its upper end engaged with a cap 53, said cap being held in position and the tension of the spring regulated by a thumb nut 54 engaged with the upper end of the bolt as shown. When thus

arranged it will be seen that the pressure of the spring 51 is exerted to lock the valve operating bar 47 in the proper direction for engaging the valve 43 with its seat on the lower end of the nipple 42 thereby closing the lower end of the discharge pipe 40. The valve 43 is periodically opened at suitable intervals or as often as desired by a valve opening mechanism comprising a cam disk 55 which is fixedly mounted on the inner end of the drive shaft 33 and is adapted to be engaged with the wear plate 56 on the free end of the valve operating bar 47 whereby the latter is rocked and the valve opened at each revolution of the shaft 33 and the cam 55.

The pulp when discharged from the nipple 41 in the end of the discharge pipe 40 on the opening of the valve 43 flows into the launder 46 and is conducted thereby to a receiving box 57 suitably supported below the discharge end of the launder and having in the center of its bottom a discharge opening 58 through which the pulp flows into one side or the other of a double launder or pulp conducting chute 59 the ends of which project and incline in opposite directions and are connected with pulp distributing troughs 60 arranged over the outer ends of pulp classifying screens 61 hereinafter described. The launder or chute 59 has arranged therein below the discharge opening in the box 57 suitable partitions 62 whereby the launder is divided into two compartments which are alternately brought beneath the discharge opening in the box 57 so that the pulp passing from the box is discharged first into one side or compartment and then into the other side or compartment of the launder and is conducted thereby in opposite directions to the distributing troughs of the classifying screens.

The launder 59 is secured to and supported on a bracket 63 arranged in the center of a vibrating screen supporting frame 64. The frame 64 is supported at its ends on flexible supporting posts or legs 65 which are preferably in the form of spring metal bars and which are secured at their lower ends to the base portion of the main supporting frame 1 as shown. By thus supporting the frame 64 the same may be swung back and forth to a limited extent by a vibrating mechanism whereby the screens 61 are shaken or vibrated as will be more fully described.

The vibrating mechanism for the screen compartment comprises an elastic buffer arranged between one end of the frame 64 and the adjacent end of the main supporting frame 1, said buffer comprising a coiled spring 66 which is arranged on and supported by a guide bolt or rod 67 secured to one side of the screen compartment and having a sliding engagement with a portion of

the main frame 1 as shown. The pressure of the spring 66 when thus arranged is applied to push the screen supporting frame 64 in one direction, said frame being pushed in the opposite direction by a spring operating lever 68 secured at its lower end to the base portion of the main supporting frame and projecting upwardly into engagement with the end of the screen supporting frame as shown. To the upper end of the lever 68 is connected the inner end of a pitman rod 69 the outer end of which is connected with the strap 70 of an eccentric 71 fixed on a main drive shaft 72 journaled in suitable bearings on a portion of the main frame 1 as shown. By thus connecting the operating lever 68 it will be seen that when the shaft 72 and the cam 71 are revolved, a reciprocating or swinging motion is imparted to the lever 68 and through the same to the screen supporting frame 64 to swing the latter in one direction, said frame being returned or pushed back in the opposite direction by the buffer spring 66 as hereinbefore described. The shaft 72 may be driven in any suitable manner and on said shaft is fixedly mounted a worm 73 with which is engaged a worm gear 74, fixed on the drive shaft 33 whereby said shaft is driven at a reduced speed by the main drive shaft 72 thus imparting the proper motion to the valve operating bar 47 and to the vibrating hammers of the deslimmer as hereinbefore described.

The classifying screens 61 comprise rectangular frames, one of which is arranged on each side of the center of the screen supporting frame 64 and said screen frames are divided longitudinally by a series of partitions 75 and are provided with sheet metal bottoms which incline from the ends to the center of the frames and have formed therein between each of the partitions 75 a discharge opening 76. Secured to the bottom of the screen frames at the lowest point thereof and below the discharge openings 76 are transversely disposed troughs 77, the bottoms of which incline from the inner toward the outer sides of the screen frames and to said bottoms adjacent to the outer ends and at the deepest part of the troughs are connected discharging nipples 78 in which are arranged valves 79 for controlling the discharge of the pulp passing through the screens 80 which are secured to the upper edges of the partitions 75 and over which the thickened pulp from the distributing troughs 60 passes on the screens 80. Over the partitions 75 are arranged two longitudinally disposed strips 81 which are of any suitable shape in cross section and serve to fasten the screens to the partitions and also provide riffles over which the pulp passes and which serve to retard the flow of the pulp across the screens, thus permitting

the finer particles to settle through the screens into the spaces between the partitions in the screen frames from which this finer portion of the pulp is discharged through the openings 76 and into the troughs 77 from which the same is discharged through the nipple 78 to suitable receptacles for further treatment.

The thickened pulp which enters the distributing troughs 60 from the launder 59 is discharged from said troughs through discharge passages 82 in the bottoms of the troughs and is thus evenly distributed onto the screens 80 adjacent to the outer edges thereof and is jarred or shaken across the screens and over the riffles 81 by the shaking action of the screen supporting frame and screens, said action being imparted to the screens by the vibrating mechanism hereinbefore described. The spaces between the partitions 75 of the screen frames are at all times running over full of water which prevents clogging of the screens covering said spaces and causes the separation of all fine mineral and pulp from the coarse or oversize pulp, the floating slimes and mineral having been taken out through the screened sides of the deslimmer. The excess of water flowing through the screens from the spaces below the latter will flow off from the screens with the oversize pulp, thus removing the latter from the screens, this water, however, will not carry the mineral which will remain on the screens between the riffles or pass through the screens into the spaces between the apparatus from whence it is removed in the manner described. The screens 61 are inclined from their outer toward their inner sides by wedge shaped strips 83 arranged beneath the edges of the same as shown.

An ore classifier constructed as herein shown and described will effectually separate the slimes and coarser valueless material from the minerals and as will be seen from the drawings, is strictly automatic in operation and is not liable to become clogged as the guard screen 4 screens out the coarser chunks from the mill or grinder screen while the stock box 5 governs or controls the fluctuation in the flow of pulp, thus causing the latter to be fed uniformly into the pressure chamber of the deslimmer from which the pulp is forced into the screen covered chamber of the deslimmer where the separating operation begins.

From the foregoing description taken in connection with the accompanying drawings the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention as claimed.

Having thus described my invention, what I claim is:

1. In an ore classifying apparatus, a deslimmer comprising a pressure chamber, a washing chamber and a separating compartment, said compartment having screened sides, a pulp feeding mechanism connected with said pressure chamber, a pulp discharging pipe connected with said washing chamber, and a screen vibrating mechanism adapted to vibrate the screened sides of said separating compartment whereby the pulp is prevented from accumulating on and clogging said screened sides.

2. In an ore classifying apparatus, a deslimmer comprising a pressure chamber, a washing chamber and a separating compartment, said compartment having screened sides, a pulp feeding mechanism connected with said pressure chamber, a pulp discharging pipe connected with said washing chamber, a water supply pipe extending through said washing chamber into said pulp discharging pipe and having perforations disposed therein near the bottom of said washing chamber to admit water for agitating the pulp in said chamber and to wash all slimes and fine sand upward through the screened sides of said separating compartment, and a screen vibrating mechanism adapted to vibrate the screened sides of said separating compartment, whereby the pulp is prevented from accumulating on and clogging said screened sides.

3. A deslimmer for an ore classifying apparatus comprising a frame having the sides thereof inclined inwardly toward their upper ends, said frame having a solid bottom and top and closed ends, said sides having solid lower portions and foraminous material arranged above, a partition arranged in said frame and forming a pressure chamber and a washing chamber, a pulp feeding mechanism connected with said pressure chamber, a pulp discharging pipe connected with said washing chamber, and screen vibrating mechanism adapted to vibrate the screened sides of said separating compartment.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

IRA F. MONELL.

Witnesses:

W. T. MCGINNIS,
J. S. SWITZER.