

Jan. 25, 1938.

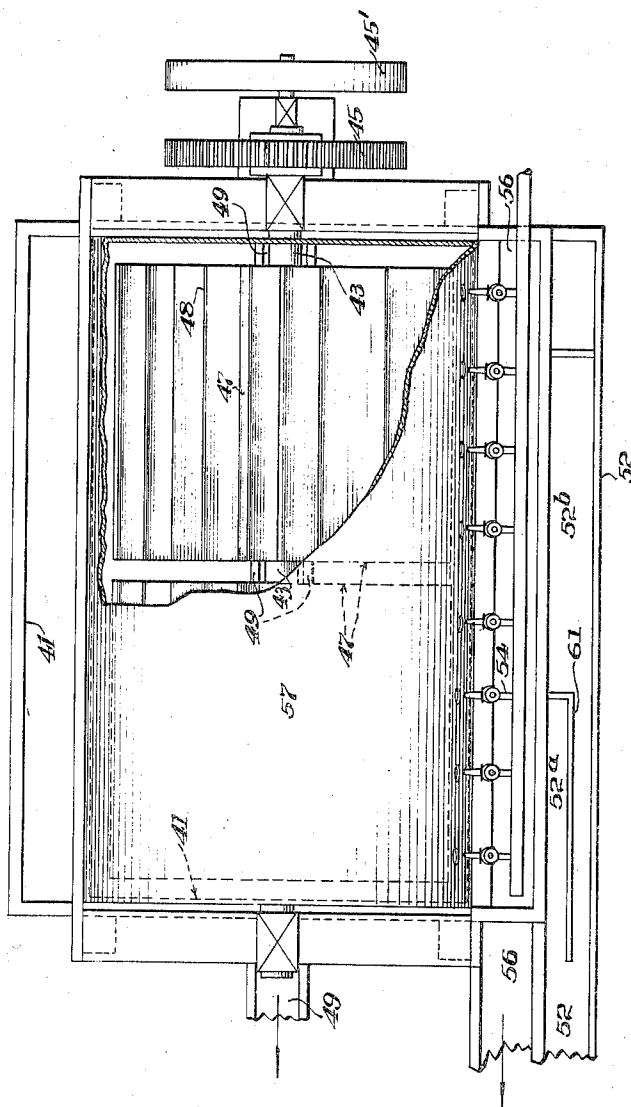
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2,106,154

ELEVATOR CLASSIFIER

Original Filed June 30, 1936 3 Sheets-Sheet 1

Fig. 1.



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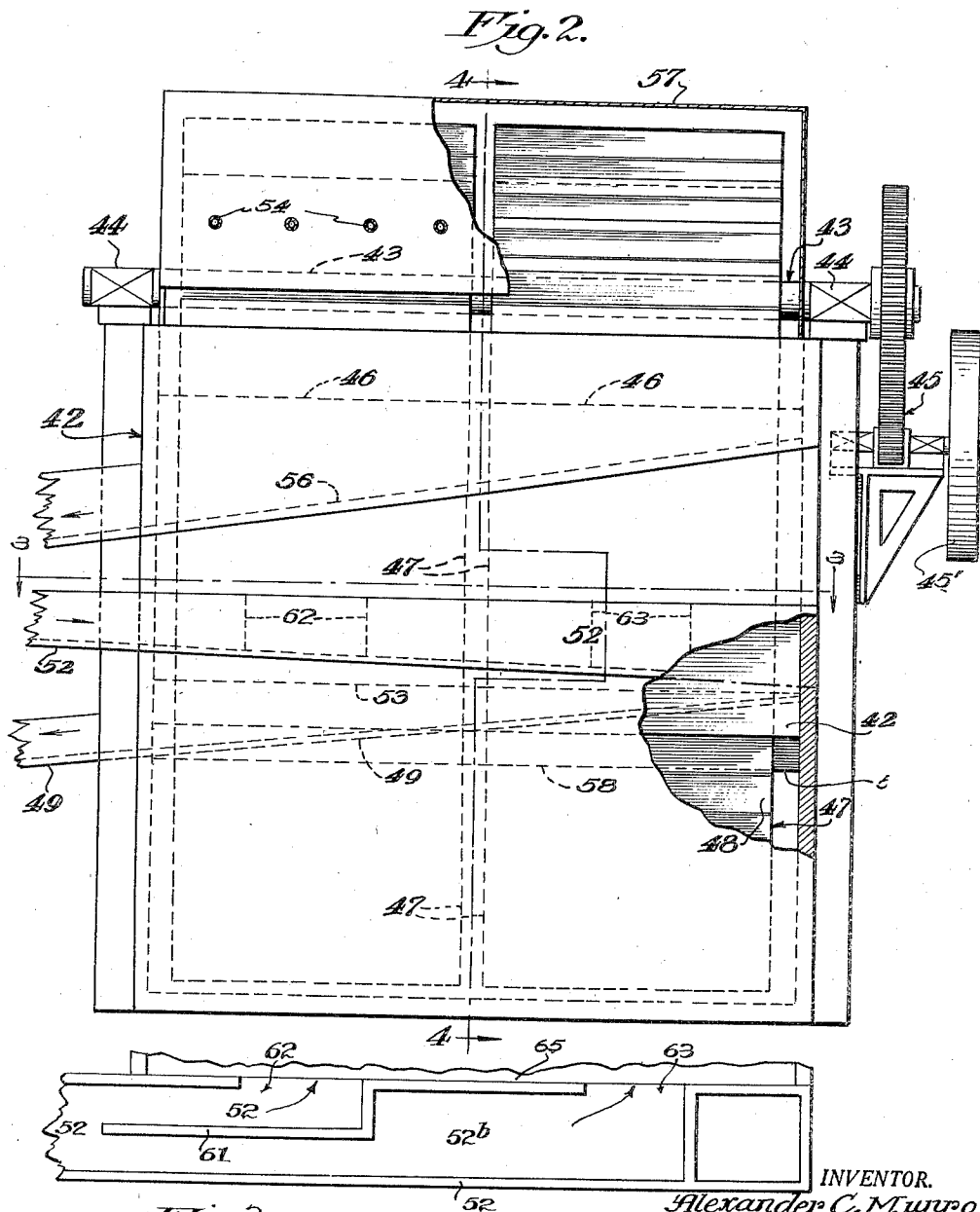
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Fig. 4.

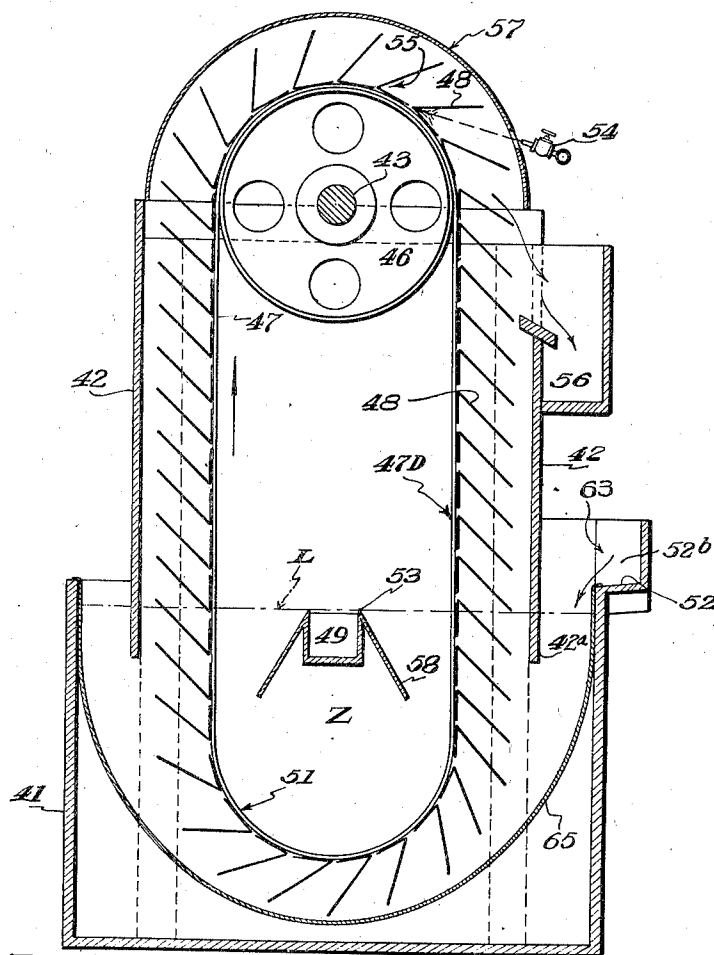
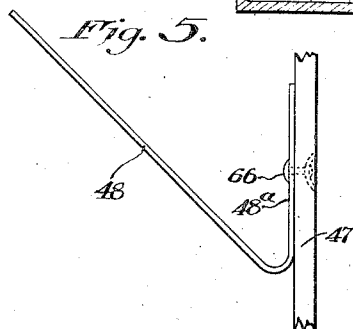


Fig. 5.



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UNITED STATES PATENT OFFICE

2,106,154

ELEVATOR CLASSIFIER

Alexander C. Munro, Britannia Beach,
British Columbia, CanadaApplication June 30, 1936, Serial No. 88,155. Re-
newed August 31, 1937. In Canada March 31,
1936

4 Claims. (Cl. 209—463)

This invention relates to means for classifying, or segregating according to size, divided materials such as ores, minerals, or the like. This application is a continuation-in-part of my co-
 5 pending application Serial Number 15,041, filed April 6, 1935, allowed April 21, 1936.

The main object of the invention is to provide an apparatus of the character described which will have maximum classifying efficiency together
 10 with large capacity for given size and cost.

A further object of the invention is to provide classifying apparatus which will operate effectively with minimum power consumption.

A further object of the invention is to provide
 15 a classifier employing a continuous moving flexible carrier member provided with a plurality of agitator and elevating elements arranged to pass through a body of liquid containing solids in suspension, said apparatus being characterized by a
 20 remarkably low power consumption per unit of tonnage handled, absence of "banking" of solids within the body of liquid, and a freedom of surging at the fluid overflow portions of the device.

A further object of the invention is to provide
 25 a classifying apparatus provided with a looped carrier element having a plurality of agitator and elevator elements secured thereto, said carrier element having its lower portion mounted for movement through a body of fluid in such
 30 manner as to define a quiescent zone within the loop thereof, and characterized by the provision of slimes overflow means disposed within said quiescent zone.

My invention comprises a receptacle or boot in
 35 which the pulp or material which is to be subjected to classification is introduced and an elevator-classifier operating in said receptacle or boot in such manner as to subject said material
 40 therein to the required amount of agitation and to scoop up and elevate or lift the coarser material and discharge it from the receptacle, separated from the finer material which is allowed
 45 to overflow from the receptacle at a quiescent zone disposed interiorly of said receptacle.

Other objects and features of the invention will be brought out in the following description, or will be apparent therefrom. The accompanying
 50 drawings illustrate a preferred embodiment of the invention, and referring thereto:

Fig. 1 is a partly broken-away plan view of a classifier according to the present invention;

Fig. 2 is a partly broken-away side elevation thereof;

Fig. 3 is a horizontal section taken on line 3—3
 55 in Fig. 2;

Fig. 4 is a transverse section taken on line 4—4 in Fig. 2; and

Fig. 5 is an enlarged end view of one of the elevator elements with which the device of the present invention may be provided.

Referring to the drawings, the apparatus may
 5 comprise a tank or receptacle 41 provided with a vertically extending rectangular housing 42 extending downwardly a short distance into the
 10 receptacle 41 and carrying a horizontal shaft 43 at its upper end mounted on suitable bearings 44 and provided with operative connection to a
 15 suitable driving means as through the agency of a gear train 45 and a pulley 45'. The shaft 43 carries, in this embodiment, two pulleys or drums
 20 46 on each of which a flexible carrier 47 is disposed, said carrier being provided with a plurality of elevator and agitator elements 48. The
 25 tank or receptacle 41 is adapted to contain a body of fluid, and the level of fluid therein is maintained by means of a slimes overflow launder
 30 49 extending longitudinally of the housing 41 through the central space defined by the loops 51 of the carrier elements 47. A feed launder 52 may
 35 be provided along one side of the receptacle 41, adjacent the liquid level L defined by the overflow lips 53 of said launder 49, and preferably
 40 extends substantially the full length of said receptacle. Said feed launder is preferably disposed at the side of the receptacle 41 adjacent
 45 the descending run 47D of the carriers 47 at the side thereof removed from the launder 49, and preferably comprises a separate launder portion
 50 for each of the carriers 47, as at 52a and 52b, the main launder 52 being divided by a partition 61 to form the aforesaid portions 52a and 52b. Suitable
 55 openings 62 and 63 are provided for the respective launder portions, providing for supply of feed to each of the flexible carriers. The feed
 launder is preferably located at the descending run of the carriers, although I may provide the feed launder adjacent the ascending runs of the carriers if the occasion demands. In the event
 that the feed launder is provided at the ascending run of a carrier, I preferably cause it to enter the receptacle 41 at a point below the pulp
 level L to avoid washing settled material out of the ascending buckets, or, if it is impracticable to so supply the feed, I may introduce the same
 to the space between the receptacle wall and the depending portion of the housing 42, as at the space shown in Fig. 4 at the left side of the
 receptacle 41. In this latter case, it is in general preferable to extend the lower end of the housing 42 somewhat further into the receptacle 41

to ensure that no substantial washing effect is obtained at the position of the ascending buckets.

Water jet means are preferably provided adjacent the upper or head end of the carriers 47, as indicated at 54, to provide for fluid discharge of the collected solid material from the crotches 55 of the bucket members 48, said solid material together with the jet water being removed from the classifier through a sands launder 56 located adjacent the upper end of the descending run 47D, said sands launder extending substantially the full length of the housing 41. If desired, a cover of sheet metal or the like may be provided as at 57 over the upper or head end of the carrier members 47, whereby the classifier is completely enclosed and water loss from the jets 54 is substantially eliminated.

In the operation of the device, the material to be classified, which may comprise a comminuted ore or the like, is suitably diluted with water or other desired liquid and supplied to the receptacle 41 through the feed launder 52. The carriers 47 are set in motion in the direction indicated by the arrow in Fig. 4. The buckets 48 will lift settled material from the receptacle and carry the same over the head pulley 46 into position such that the water jets from 54 will flush such material into the launder 56. The unsettled fine material in the receptacle 41 will be carried away as slimes in suspension, through the agency of the launder 49. It will be understood that the device may be used in closed circuit with a ball mill or other suitable form of comminuting device, if desired, so that the discharge from 56 may be conveyed directly to such mill.

The above-described form of the invention provides a quiescent zone Z within the depending loops 51 of the carrier members 47, and the slimes overflow launder 49 is disposed within this quiescent zone which provides for accurate control of the fluid level within the classifying compartment defined by the tank, whereby any desired height of fluid may be maintained above the overflow lips 53 of said launder and a highly efficient classifying action obtained, in the substantially complete absence of surge at said overflow lips. Suitable baffles 58 are preferably provided adjacent the launder 49, depending downwardly from the lips 53, to assist in the maintenance of the aforementioned quiescent zone.

For the purpose of preventing undue banking of solids within the receptacle 41, I preferably provide a curved bottom apron 65 looped downwardly within said receptacle below the lower end of the carriers 47 and the tips of the elements 48, and extending from adjacent the feed launder 52 to the opposite side of said receptacle. The apron 65 may be formed of sheet metal or the like, and functions primarily to decrease the volume of solid material which may settle out in the case of an unexpected shut-down due to power failure or the like, whereby the carriers 47 are subjected to a minimum starting load.

As shown more particularly in Fig. 5, the elevator or agitator elements 48 may comprise a blade or plate shaped to form an open-ended bucket which may be riveted or otherwise secured to the flexible carrier 47 as at 66. The rivet 66 is preferably located adjacent the mid-point of the height of the portion 48a of the element 48 which backs against the carrier 47, whereby the carrier may make a smooth bend around the head pulley 46, as shown in Fig. 4. Alternative forms

of elevator elements may advantageously be provided for the carrier 47, if desired, numerous examples of such alternative forms being disclosed in the aforesaid pending application.

The lower or looped ends of the carriers 47 are allowed to form their own path through the pulp body, the weight of said carriers plus the weight of the elevator elements secured thereto being adequate to force the lower ends thereof downwardly within the receptacle. In some cases, however, particularly on small installations where a relatively light weight carrier is employed, it is advantageous to provide an idler pulley or the like within the looped portion, to ensure the proper path for such looped portion, as shown, for example, in my above-mentioned pending application.

The side portion of the housing 42 adjacent the feed launder 52 is preferably carried downwardly as at 42a so as to provide baffle means extending from above to below the liquid level L but spaced from the bottom of the tank 41, whereby direct passage of material is prevented between said feed launder 52 and the slimes launder 49.

Other modifications of this invention will occur to those skilled in the art, and while I have actually illustrated but a single example of structure, it will be appreciated that I do not view my invention as limited thereto, but rather to the scope of the appended claims.

I claim:

1. A classifier comprising a tank provided with means for supplying divided material together with liquid thereto, movable elevator means extending into said tank and having its upper end mounted above the level of liquid in said tank, said elevator means comprising a flexible endless carrier means having ascending and descending run portions looped downwardly within said tank and provided with open-ended agitating and elevating members mounted thereon and adapted to agitate material in said tank and to scoop up coarse material from the tank and lift the same from the body of material in the tank while permitting liquid to drain through the open ends of said agitating and elevating members and to discharge the coarse material so lifted at a point above said liquid level, slimes overflow means located in said tank within said downwardly looped portion of said endless carrier means, and means for supporting and driving said carrier means.

2. The invention set forth in claim 1, said means for supplying divided material comprising launder means disposed at one side of said tank separated from said slimes overflow means by said downwardly looped portion of said carrier means.

3. The invention set forth in claim 1, said means for supplying divided material comprising launder means at the side of said tank adjacent the descending run portion of said carrier means.

4. The invention set forth in claim 1, said means for supplying divided material comprising launder means disposed at one side of said tank separated from said slimes overflow means by said downwardly looped portion of said carrier means, said invention comprising in addition, baffle means extending along said one side of said tank between said feed launder and said carrier means, said baffle extending from a position above said liquid level to a position below said liquid level and spaced from the bottom of said tank.

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