PROCESS AND APPARATUS FOR REGULATING THE DENSITY OF FLUIDS CONTAINING SOLID PARTICLES

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The present invention has for its purpose to provide a device designed to regulate the density of mixtures of water and solid particles and more particularly abrasives serving for grinding and smoothing glass, marbles and other materials.

Heretofore, in order to provide apparatus for grinding and smoothing glass, marbles and other materials, with the desired proportions of abrasive materials, each material was first put in suspension in the water, being classified in grains of different sizes. The solid materials thus classified settled in the compartments of the classifying apparatus or in tanks or deposit vats, from which they were taken to form abrasive mixtures of suitable concentration, which were then sent at the desired time to the materials to be ground and smoothed.

The inconveniences which this manner of operation presents, reside in the discontinuity of operations, which has for its effect:

1. To permit the classified abrasive materials to separate, during the periods when they are not used in grinding and smoothing, from the liquids in which they were in suspension, and to accumulate at the bottom of the classifying compartments, or in the deposit vats. It results from this that when it is desired to utilize these materials to the extent needed it is difficult to extract them from said compartments or vats, the difficulty being greater as the materials are more fine, and stored for longer periods.

2. To necessitate a special regulation of the concentration for each grinding and smoothing operation.

3. To require cumbersome installations and complicated and delicate manipulation.

The present invention has for its object to overcome these defects by operating and regulating in a continuous manner the concentration of each liquid mixture which contains in suspension grains of predetermined size and nature, this concentration being capable of being different for each mixture. To this effect, the different liquid mixtures are caused to pass in an uninterrupted manner through as many apparatus as there are mixtures, each of these apparatus being composed of two parts, to-wit:

1. A concentrating device or concentrator, from which on the one hand the concentrated mixture passes out, and on the other the excess of decanted liquid.

2. A regulating device operating in such manner that when the degree of concentration of the mixture should be weaker, the passage of the mixture is delayed, which increases the accumulation of grains in the concentrator, whereas when the degree of concentration should be greater, the quantity of mixture which passes is increased, which diminishes the proportion of grains in the concentrator.

To assure the continuity of circulation during the periods when the grinding apparatus is not operating, the mixtures, which leave both devices, are again sent to the classifier or are eliminated if they are in excess.

To illustrate these ideas, reference is to be had, for example, to the annexed drawings showing an embodiment of the present invention.

Fig. 1 illustrates in vertical section the complete apparatus composed of the concentrating and regulating devices.

Fig. 2 is a transverse section of the concentrator.

Fig. 3 shows a modified form of partition which may be used in the concentrator.

As shown in these drawings, the concentrator is composed of a tank e having two inclined walls d and containing inclined separating partitions a, the effect of which is to aid the descent of the grains and the ascent of the decanted liquid. The number and the inclination of these partitions are chosen according to the volume of mixture to concentrate and according to the size and nature of the grains suspended in the mixture.

These separator partitions are formed by plates of sheet iron or other material, in flat, curved or undulated form.

A pipe e, opening at f at a suitable level, conveys to the tank the mixture of water and previously classified abrasives. Notches in the separator partitions permit the mixture to fill equally all parts of the tank.

The bottom of the tank where the concen-
trated mixture lies in the form of a hopper g provided with an outlet opening h, while the upper part has an outlet opening i for the decanted liquid.
5 The regulating device consists of a receiver j connected to the opening h of the tank a by means of a pipe k, and containing a float l provided with a rod m. This is connected at s to the middle point of an adjustable spring n limiting the reciprocation of the float. It carries two valves p and q adapted to regulate the passage of the concentrated mixture through the openings r and s, through which this mixture flows into the receiver j. A tube f provides a communication between the upper part of the opening r and the lower part of the opening s.

Finally the receiver j has an outlet opening u, through which the properly concentrated mixture is carried away by means of a pipe v. This pipe has a goose neck whose outlet w is at a suitable level in order to maintain the float l immersed. A clearing cock x is placed at the lower part of the pipe v in order to permit the emptying and cleaning of the whole apparatus, when required.

The operation is as follows:

The mixture of liquid and abrasive material arrives at e and fills the space between the various partitions, due to the notches f. The effect of these partitions is to cause a more rapid descent of the grains toward the lower part g of the tank, thus increasing the concentration of the mixture in this lower part. At the same time the decanted liquid is taken off by way of a tube t.

The concentrated mixture leaves through the opening h and is conveyed by the pipe k to the regulating device.

This is so arranged that, in normal operation, the valves p and q are moderately open.

If the concentration of the mixture increases, the float rises. The valves open wide and the circulation of the mixture is accelerated which reduces its concentration in hopper g. If, on the other hand, the density of the mixture diminishes the valves reduce the section of the passage, which permits the mixture to become properly concentrated at g.

The device shown comprises two valves p and q. It is also possible to operate with a single valve by eliminating the tube t.

It is to be understood that the construction described above is given only by way of example, and that the shapes, dimensions and structural details of the elements constituting the invention may be modified as needed.

What I claim as my invention is:

1. In an apparatus of the class described, the combination of a chamber having inclined partitions therein, means for delivering to the said chamber fluid mixed with solid particles, a settling compartment at the base of said chamber in which the particles collect, an outlet at the top of said chamber for the clarified water, a chamber containing a float and connected to the bottom of the first named chamber, and a valve controlling such connection and actuated in accordance with the movements of the float due to the density of the liquid issuing from the first named chamber.

2. In an apparatus of the class described, the combination with a vessel containing a liquid and having in the bottom thereof solid particles, of a container for a liquid issuing from said vessel, a float in the container, and a valve interposed between the vessel and the container and controlling the flow of liquid from the vessel to the container and the density of such liquid.

3. In an apparatus of the class described, the combination with a vessel containing a liquid and having in the bottom thereof solid particles, of a vessel connected therewith, a float in said vessel supported in liquid issuing from the first mentioned vessel and a valve interposed between the first vessel and the float for controlling the flow of liquid from the first vessel to the float and the density of such liquid.

4. In an apparatus of the class described, the combination of a vessel having partitions therein, means for delivering to said vessel liquid carrying solid particles, a settling compartment in the base of said vessel, an outlet at the top of said vessel for the clarified liquid, a tank containing a submerged float connected to the first named vessel and a valve connected to the float and interposed between the two vessels, said valve regulating the density of the liquid which issues from the first named vessel.

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