March 21, 1933. H. MÜLLER-CLEMM 1,902,659

APPARATUS FOR THE CONTINUOUS CONTROL OF THE PROPERTIES OF SOLID BODIES DISPERSED IN A LIQUID

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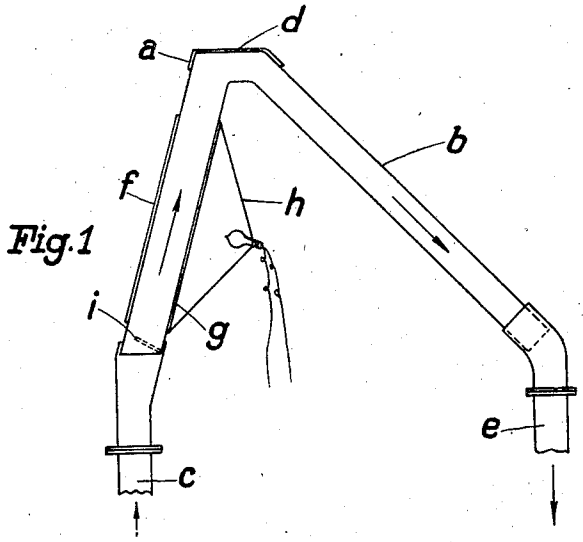


Fig. 1

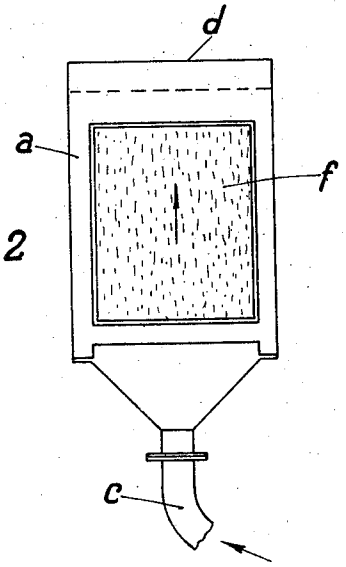


Fig. 2

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# UNITED STATES PATENT OFFICE

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## APPARATUS FOR THE CONTINUOUS CONTROL OF THE PROPERTIES OF SOLID BODIES DISPERSED IN A LIQUID

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In order to control the properties (for example, purity, size, color, etc.) of solid bodies dispersed in liquids, it was formerly necessary to take and examine tests of the suspension. This process has, however, the drawbacks that considerable time and labor are involved in taking and examining the tests and it was often impossible to obtain the results in the required time. The process was not adapted for continuous observation (for example, in examining the purity of the liquid at any time in a cleansing operation), in which a very large number of tests are required.

These drawbacks are completely obviated by the present invention according to which a thin layer of the liquid, or a portion derived from it, is caused to flow past a source of light illuminating the layer whereby the liquid may be examined in all its details through a sheet of glass or other transparent medium. In this way, a continuous clear view of the substances dispersed in the liquid is obtained and its properties are shown at a glance. It is seen at once whether the material contains impurities (in cellulose washings, for example splinters, chips, etc.); the size or color of the particles and any imperfections present are visible. The efficiency of a mechanical or chemical treatment of the material can be determined and the treatment controlled as required. Any changes in the composition or other properties (purity, color, etc.) of the suspended bodies are made obvious.

The accompanying drawing shows diagrammatically examples of apparatus embodying the invention and for use, for example, in testing the washings of fibrous materials (wood pulp, paper pulp or the like).

Fig. 1 shows the apparatus in section and Fig. 2 is a front view.

The liquid containing the matter in suspension flows in the direction shown by the arrow through two flat boxes *a* and *b* inclined at an acute angle to one another, the liquid enters at the lower end of the box *a*, where it is connected with the inlet pipe *c*, rises in the box and flows over the upper edge at *d* into the box *b*, descends therein and leaves by the outlet pipe *e* to return to the main body of the material. The front wall *f* and rear wall *g* of the box *a* are formed of glass sheets; behind the rear wall *g* there is a source of light *h* with a screen, so that the illuminated material can be clearly examined at the front wall *f*.

The box *b* can be opened at the junction *d* of the two boxes. A plate *i* is placed at the lower end of the box *a*, in order to reduce the rate of flow so that the individual particles of the material and any impurities can be clearly seen. In apparatus, such as sizing or grinding mills, through which there is a constant flow, and where a continuous control of the properties of the material is required, the apparatus is simply inserted in the effluent. In apparatus fed intermittently, but in which the suspension is in constant motion (for example washing apparatus, bleaching machines or the like), one portion of the liquid containing the matter in suspension can be branched off to the apparatus and the control device inserted in the branch pipe.

The funnel-shaped enlargement shown in the drawing at the inlet to the box *a* has the advantage that the velocity of flow is reduced, or the pressure lessened, and this flow easily controlled.

For a better estimation of the properties, a standard example of the particular suspension can be provided within or without the illuminated field of observation.

The apparatus described above for use in connection with fibrous materials can be used in all other operations, for instance with china clay and other mineral washings, colored clays and other dyestuffs, suspensions of various animal or vegetable origin, which have to be purified, comminuted or otherwise treated.

The suspension may be illuminated indirectly by providing the interior of the box traversed by the suspension with a reflecting rear wall.

The direction of flow which in the example shown is from below upwards can obviously be in other directions, for example in horizontal or inclined or (particularly in treating very heavy substances) from above downwards.

I claim:—

1. Apparatus for viewing the presence and nature of solid matter in suspension in a liquid in motion, the said apparatus comprising a vessel having its front and back walls spaced apart a distance less than the distance between its side walls and having an outlet at one end, a chamber having one of its ends in open communication with the other end of said vessel and having an inlet in its opposite end, the cross section of said chamber increasing from said inlet toward said vessel, a source of light disposed outside the vessel and sheets of transparent material forming the front and rear walls of said vessel and disposed opposite said source.

2. Apparatus for viewing the presence and nature of solid matter in suspension in a liquid in motion, the said apparatus comprising a vessel traversed by the liquid, the said vessel consisting of a straight inflow portion and a straight outflow portion, each of substantially rectangular cross-section, the two portions being relatively inclined with their axes in the same vertical plane, a junction connecting the said inclined portions, a source of light disposed in the space between the said inclined portions, sheets of transparent material forming opposite sides of one of said inclined portions and disposed opposite said source of light, a throttle plate inserted in one of said inclined portions and a funnel shaped enlargement at the base of said inflow portion.

3. Apparatus according to claim 1 wherein a baffle extends obliquely from the rear wall toward and terminates short of the front wall of the vessel adjacent the inlet end of the vessel.

In testimony whereof I have signed my name to this specification.

HELLMUTH MÜLLER-CLEMM.