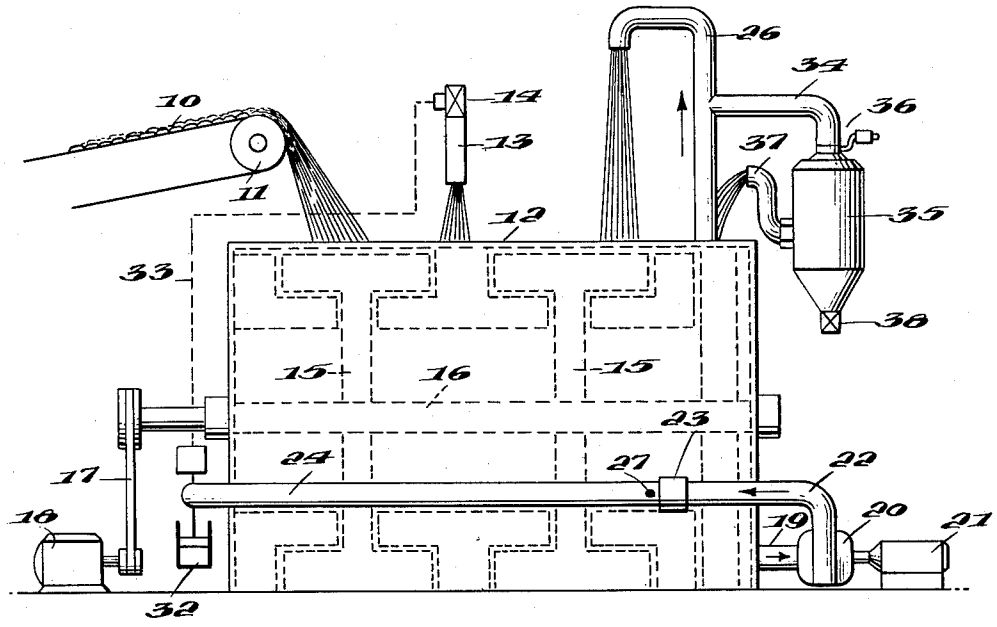
Sept. 27, 1955 W. SEBARDT 2,719,018

CONTROLLING SPECIFIC WEIGHT OF A LIQUID

Filed Jan. 22, 1953

Fig. 1.



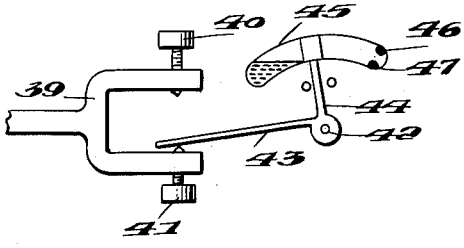
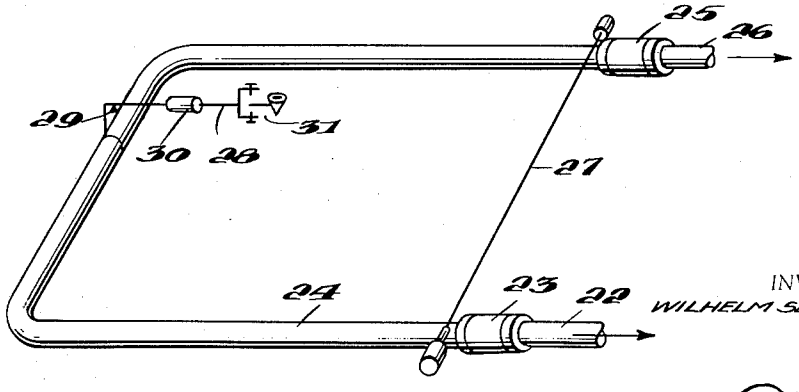


Fig. 3.

Fig. 2.



INVENTOR
WILHELM SEBARDT,

BY Robert B Pearson
ATTORNEY

United States Patent Office 2,719,018
Patented Sept. 27, 1955

2,719,018

CONTROLLING SPECIFIC WEIGHT OF A LIQUID

Wilhelm Sebardt, Bromma, Sweden, assignor to International Ytong-Stabalite Company Ltd., London, England, a corporation of Great Britain

Application January 22, 1953, Serial No. 332,765

Claims priority, application Sweden January 29, 1952

8 Claims. (Cl. 249—14)

The present invention relates to an apparatus for automatically controlling the specific weight of a liquid and to the method for providing this automatic control. Such an apparatus is useful in various technical fields where a liquid composed of a plurality of substances is used in which the carrier liquid has a substantially different specific gravity from the substances mixed therewith. Specifically, such an apparatus is useful in the production of concrete containing a mixture of water and cementing components such as slate ashes and lime or quartz sand in finely ground state.

In pouring concrete moulds, it has been the practice to add sufficient concrete to fill the mould to overflowing to insure that the entire mould is completely filled. As a result of this practice and as a result of subsequent leveling-off operations, there is substantial waste of the mixed concrete. This waste should preferably be used in the production of a subsequent concrete mixture. However, in order to avoid a varying concrete mixture it can be seen that a sufficient supply of waste concrete must be kept on hand at all times. Obviously, mixed concrete cannot be stored for any length of time due to the tendency of this material to bind. Due to these difficulties, little success has been attained heretofore in utilizing the waste mixed concrete in making up subsequent concrete mixtures.

It is well known that the tendency of the mixed concrete to bind can be avoided by suspending the concrete in water. Such a slurry has, however, a tendency to leave deposits in a container where it is kept so that deposits form on the sides and bottom of the container. These deposits cause an error in weighing the added amount of mixed concrete.

The present invention provides an apparatus and method for automatically controlling the weight of a slurry and therefore its consistency.

According to the present invention, the mixed concrete which is the waste from previous moulding operations is brought to the vessel in which the waste slurry is held. There is provided means for weighing the slurry as it leaves this vessel, which means functions to add water to the slurry should the slurry become too heavy. As the slurry becomes lighter with the addition of the water, the weighing means stops the flow of additional water. In addition, there is provided means within the container to properly agitate the slurry to prevent the formation of deposits within the vessel.

One form of the present invention is shown in the attached drawing wherein:

Fig. 1 is a side elevation of the entire apparatus,

Fig. 2 is a perspective view of the weighing means, and

Fig. 3 is a side elevation of the control means associated with the weighing means.

Referring now to Fig. 1, there is shown at **10** a suitable conveyor in the form of a belt or chain, running over a pulley or gear **11**. This conveyor serves to feed the mixed concrete waste to the container **12**. Water is added to the container through a conduit **13** provided with a relay

controlled valve **14** of a type well-known in the art. Within the container **12** there are provided agitators **15** which are mounted on a shaft **16** suitably journaled in the end walls of the container. There is provided a motor **18** and belt drive **17** to rotate shaft **16**. Agitators **15** are so shaped as to serve as scrapers to remove the deposits which may have formed on the bottom and side walls of vessel **12**. It can be seen that a vessel **12** should have a cylindrical bottom and side walls with a radius of curvature corresponding to the radius of agitators **15**.

Adjacent the bottom of the vessel **12** there is provided a tap for the slurry consisting of a pipe **19** having a pump **20** driven by motor **21** connected therewith. The output conduit **22** from the pump is connected to a flexible coupling **23** which in turn is connected to a U-shaped pipe-loop **24** which passes around three sides of the vessel **12**. There is connected to the other end of the U-shaped pipe **24** a flexible coupling **25** to which is connected a pipe **26** which is thereafter bent angularly upwards opening above the vessel **12** shown in Fig. 1. It can be seen that the pipe-loop **24** will be filled with the slurry during use of the device and the weight of the volume of slurry passing through the pipe is measured by a means hereinafter described more fully. The pipe-loop **24** is balanced about a shaft **27** which is suitably journaled within the walls of container **12**.

The weighing means is shown diagrammatically in Fig. 2 wherein it can be seen that there is provided an arm **28** which is adapted to pivot about a balanced edge **29**. Arm **28** carries a counterweight **30** and is provided with a bifurcated end portion cooperating with the electrical contact device **31**.

The electrical contact device is shown in detail in Fig. 3. The end portion of the arm **28** is shown at **39** and it can be seen that setting screws **40** and **41** are provided in the end portions. Pivotally mounted on a shaft **42** is an arm **43** which extends between the end portions of the arm **28**. Arm **43** is provided with an angularly bent portion **44** having a container **45** mounted on the outer end thereof. Container **45** is shaped as shown and is provided with contacts **46** and **47** on the inner surface thereof. The container is partially filled with mercury so that in one position of the arm **44** the contacts **46** and **47** will be closed. There is further provided as shown in Fig. 1 a damping device **32** of any suitable variety which serves to damp the oscillations of the U-shaped pipe **24**.

The operation of the presently disclosed apparatus is as follows: It will be assumed that so much waste concrete has been added and mixed into the slurry within vessel **12** that the weight of the slurry has increased to its maximum value allowed. The pipe-loop **24** will then, due to the increased weight of the slurry, move downward. Simultaneously, the arm **28** moves upwards and will, during the latter part of its movement, cause movement of the arm **43** until the mercury within container **45** is shifted to a position to close contacts **46** and **47**. Contacts **46** and **47** close an electrical circuit **33** to operate a valve **14** which regulates the amount of water to be added to thin the slurry. By adding the water, the slurry is thinned and as a consequence the pipe-loop **24** is displaced upward until container **45** shifts to the other position whereby the valve **14** is again closed. In this manner the slurry in the container **12** will continuously be kept at a consistency which within a rather small margin will be constant.

For tapping the slurry the following arrangement is made. A branch conduit **34** from pipe **26** ends in a vessel **35**. Since the construction of this vessel has no relation to the present invention, it has only been schematically shown. There is provided a valve **36** at the input side of the vessel and a tapping pipe **37** is provided on one side of the vessel so that the opening of pipe **37** is

over the edge of vessel **12**. It is therefore apparent that when fluid is passing through pipe **34** and vessel **35** it may be returned through pipe **37** to vessel **12**. There is shown at **38** a tap-off valve for the vessel **35**.

The slurry will be continuously subjected to activation by means of activators **15** and will be subjected to a continuous weight control by the mechanism associated with pipe-loop **24**. The agitators prevent deposits of the slurry within the vessel **12** and assures a homogeneous consistency of the slurry. The control means associated with pipe-loop **24** shows that the homogeneous consistency of the slurry will be the correct consistency. Consequently, it is certain that the slurry tapped off from the vessel **35** will always have a correct and homogeneous consistency. The pump **20** also functions as a crusher for any clods which, in spite of the action of agitators **15**, may be carried through pipe **19**. The continuous circulation of the slurry through the system also assists in maintaining the homogeneous consistency of the slurry. As a matter of fact, in certain forms of the invention, the agitators can be omitted without substantial impairment of the operation of the device.

It should be observed that the quantity of water added through the valve **14** is not measured directly but is only measured insofar as its action in thinning out of the slurry to the correct concentration. The apparatus, therefore, functions equally as well when there is a large quantity of slurry stored within the container as when only a small quantity is present, and it is further apparent that the apparatus operates independently of the purity of the water used. Therefore, it is a further advantage of this invention that as diluting water the slurry-containing surplus water may be used, which water it is otherwise impossible to use.

In certain cases it is not necessary to mount the pipe-loop **24** pivotally about the shaft **27** as fully satisfactory results can be obtained by using a fixed pipe loop which can be made subject to bending depending upon the weight of the medium passing through the pipe-loop.

As many apparently widely different embodiments of the invention may be made without departing from the spirit thereof, it is to be understood that I do not intend to limit myself to the specific form of the invention as set forth except as indicated in the appended claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. The method of controlling the weight per unit volume of a fluid medium which includes a relatively heavy substance and a liquid, comprising the steps of continuously circulating the fluid medium through a pipe, weighing the fluid medium as it passes through the pipe, and regulating the amount of liquid added to the fluid medium to maintain the weight per unit volume of the fluid medium within a desired range.

2. The method of controlling the specific weight of a slurry which includes a mixture of two substances of different specific weights, comprising the steps of continuously circulating the slurry through a U-shaped pivotally supported pipe section, weighing the slurry as it passes through the pipe, closing an electrical circuit when the weight of the slurry exceeds a predetermined value, and adding an additional amount of the lighter susbtance to the slurry when the electrical circuit is closed.

3. The method according to claim 2 including the step of continuously agitating the slurry.

4. An apparatus for controlling the specific weight of a fluid mixture, comprising a container, a pipe loop in communication with the container, means mounting said pipe loop for position response to the weight of fluid mixture passing therethrough, and means associated with said pipe loop and responsive to the position of the same for controlling the amount of liquid added to said fluid mixture.

5. An apparatus as described in claim 4 wherein said pipe loop is U-shaped and is pivotally mounted on a horizontal shaft.

6. An apparatus for controlling the specific weight of a slurry which comprises a liquid and a relatively heavy substance, comprising, in combination, a container, agitating means within said container, an outlet in said container, a pipe loop connected to said outlet, pump means for circulating the slurry through the pipe loop, means pivotally mounting said pipe loop for position response to varying weight in the slurry passing through the pipe loop, means associated with said pipe loop and responsive to the position of the same, and means controlling the addition of liquid to said slurry, said means responsive to the position of the pipe loop actuating said control means whereby the specific weight of the slurry is maintained within a predetermined range.

7. The combination recited in claim 6 wherein said pipe loop is provided with flexible couplings and is pivotally mounted on a horizontal shaft.

8. An apparatus for automatically controlling the specific weight of a slurry containing a mixture of a liquid and a solid relatively heavy substance, comprising a vessel within which the slurry is mixed, an outlet including a pump for discharging the slurry, a pipe loop pivotally supported and extending around the vessel, said pipe loop connected to said outlet by means of a flexible coupling, circuit closing means associated with said pipe loop and responsive to the position of the same, the position of said pipe loop varying according to the weight of the slurry passing therethrough, and valve means for adding the liquid to said slurry mixture, said valve means being controlled by said circuit closing means.

References Cited in the file of this patent

UNITED STATES PATENTS

484,078	Wittemann	Oct. 11, 1892
1,536,589	Keen	May 5, 1925
1,978,558	Van der Horst	Oct. 30, 1934
2,072,326	Forster	Mar. 2, 1937
2,273,180	De Castro	Feb. 17, 1942