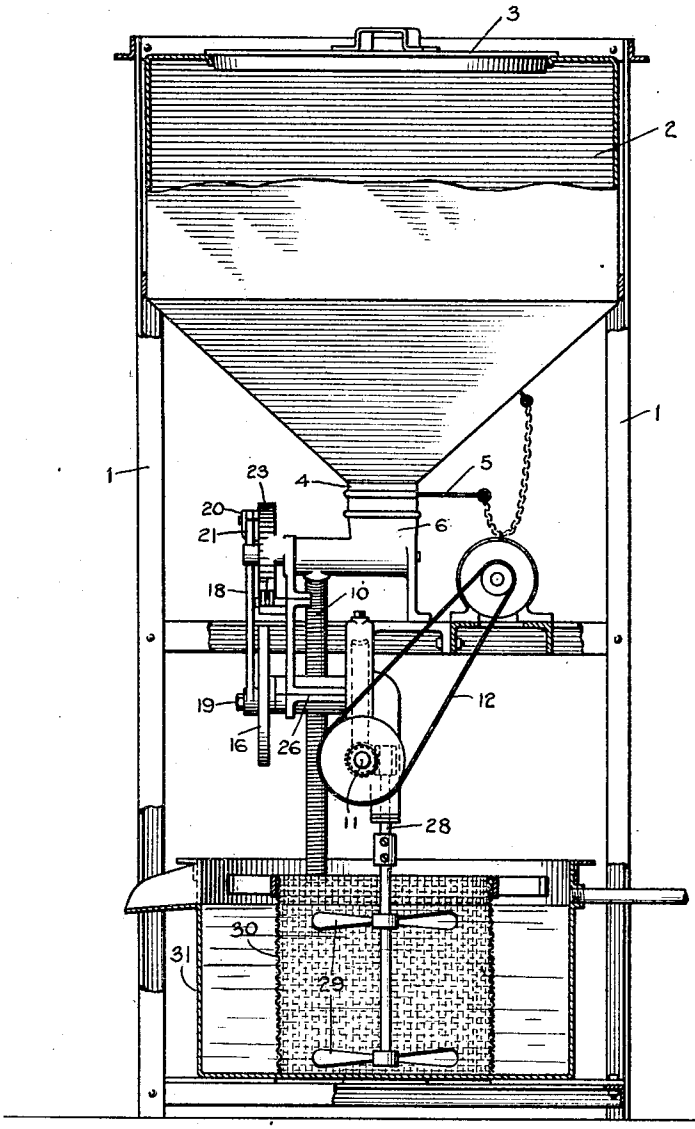
Dec. 30, 1930. G. G. THOMAS 1,787,289

REAGENT FEEDER

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Fig. 1.



INVENTOR
GEORGE G. THOMAS
BY
ATTORNEY

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Fig. 2.

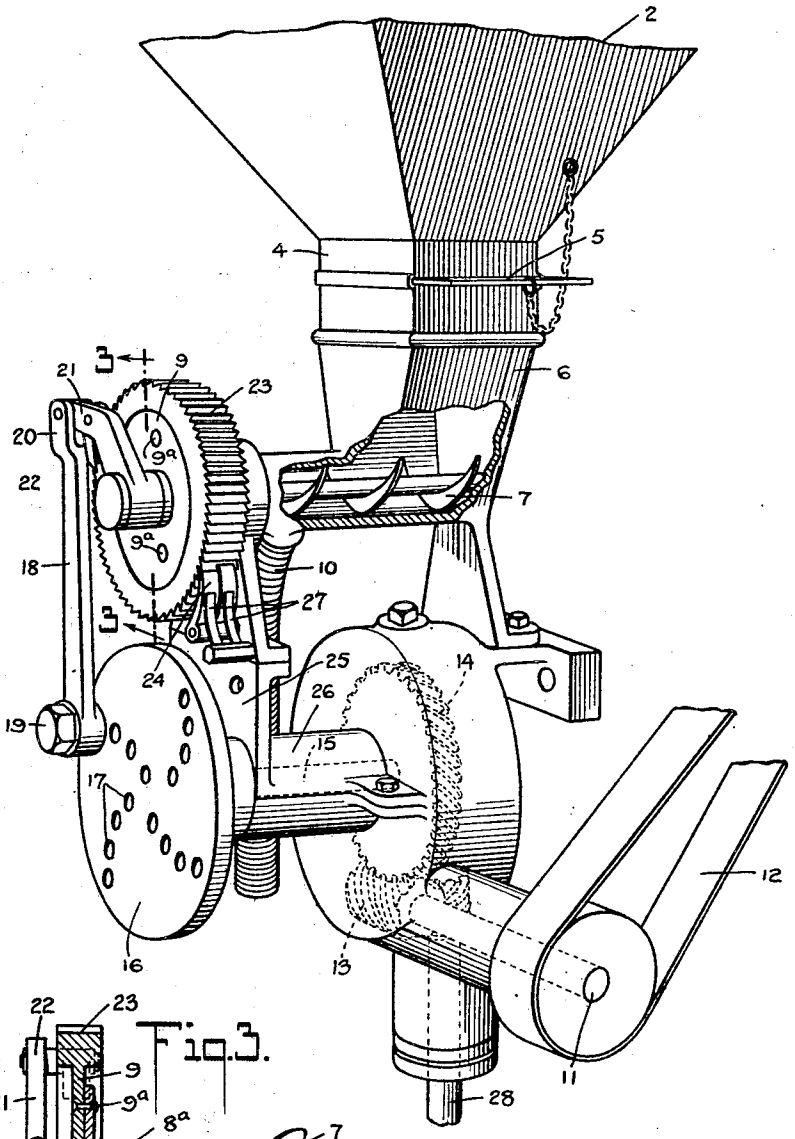
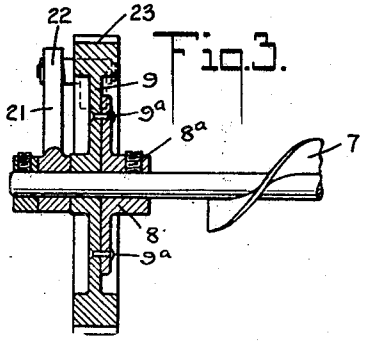


Fig. 3.



INVENTOR
GEORGE G. THOMAS

BY

ATTORNEY

Patented Dec. 30, 1930 1,787,289

UNITED STATES PATENT OFFICE

GEORGE G. THOMAS, OF HILLSIDE, ARIZONA, ASSIGNOR TO AMERICAN CYANAMID COMPANY, OF NEW YORK, N. Y., A CORPORATION OF MAINE

REAGENT FEEDER

Application filed November 28, 1928. Serial No. 322,341.

My present invention relates to a device and method for feeding solid material in regulated amounts, or feeding solutions by measuring the solid in the dry state.

The invention is particularly adapted for the feeding of dry materials which are to be dissolved in a solvent and the solution used for various purposes, rather than to dissolve the substance and then feed quantities of the solution.

It has been very common practice in the art of floating ores to use this latter process of feeding reagents, but it has been found in a number of instances, particularly where the reagent or a part thereof is either difficultly soluble or contains some insoluble matter, that if the liquid material is attempted to be measured and fed to the apparatus, frequently the feeding mechanism becomes clogged by the insoluble substance contained in the solution. The principal object of the invention, therefore, is to overcome this difficulty.

To this end the invention contemplates the provision of a hopper adapted to contain the solid material to be fed, in the lower part of which is located a feed worm of any desired type which will cause movement of the solid material in the hopper to a discharge pipe where it will enter the dissolving tank or other mechanism. Means are provided for intermittently driving the feed worm at various intervals capable of adjustment, and by this means the amount of feed is positively controlled.

The invention further consists in the novel arrangement, combination and construction of parts and combination of steps more fully hereinafter described and shown in the accompanying drawings in which:

Fig. 1 is a perspective view of a device embodying my invention.

Fig. 2 is an enlarged perspective view of the drive and worm detail.

Referring now with particularity to the embodiment illustrated, I have shown at 1 a framework adapted to support the mechanism which consists of a hopper 2 located at the top of the frame, closed by cover 3. The lower portion of the hopper 2 is substantially of inverted pyramidal shape which terminates in a throat 4. A slide 5 is provided for closing off the throat when it is not desired to feed additional material from the hopper to the mechanism.

The throat 4 connects with a worm housing 6 in which is located a feed worm 7 of the usual helical form having one end of its shaft journaled in housing 6. Near the other end is a flange member 8 secured to the shaft by set screws 8*a*. To the flange 8 a ratchet member 9 is secured as by means of shear pins 9*a*. The worm housing 6 is provided with an orifice at the bottom thereof, which orifice is covered by a discharge pipe 10 through which the material fed by the feed screw is discharged for use as will be more fully described hereinafter.

The feed worm is intermittently rotated through the ratchet 9 which receives its impulse through a connection to the drive shaft 11. This shaft is connected to a suitable source of energy as by means of belt 12. The shaft 11 is provided at one end with a worm 13 meshing with a gear 14 which latter element through shaft 15 rotates a crank plate 16. This plate 16 is provided with a series of apertures 17 for adjusting the stroke of the connecting rod which in turn determines the amount of rotation of the feed worm, and thereby the amount of feed of the material from the hopper.

A connecting rod 18 is secured to the plate 16 as by means of crank pin 19, the upper portion of the connecting rod being bifurcated as at 20 to receive one end of the pawl arm 21. The other end of the pawl arm is pivoted to the shaft of the feed worm. Pivoted to the pawl arm 21 is the pawl 22 which is caused to bear against and engage the series of teeth 23 on the ratchet 9. Non-reverse pawls 24 mounted upon an extension 25 of the gear box 26 are likewise pressed against the ratchet 9 by means of springs 27, and prevent a reverse movement of the ratchet.

Also geared to the element 13 and driven from shaft 11 is an agitator shaft 28 carrying agitators or impellers 29. Surrounding these agitators is a basket or screen 30 contained within a receiving or dissolving tank

31 but spaced therefrom. The discharge pipe 10 is so located as to dump material therefrom directly into the basket or screen 30.

Water or other solvent or menstruum is supplied to the receiving or dissolving tank 31 by any desired means, not shown, preferably in a regulated stream, and this solvent or menstruum with the reagent dissolved or suspended therein overflows from a lip of the tank, to the apparatus for using the same.

The operation of the device is as follows: It having been determined which of the apertures 17 should be used, the connecting rod is secured to the plate 16 at that point, the slide 5 opened and the motor started. Through the gear train the plate 16 will be rotated which causes a reciprocation of the connecting rod 18, and through it and the pawl arm 21 an intermittent up and down motion of the driving pawl 22. This causes an intermittent counter-clockwise rotation of the ratchet 9. As this latter element is attached to the shaft of the feed worm, this worm likewise rotates intermittently and causes the solid material within the hopper to move toward the discharge pipe where it enters the dissolving or receiving tank.

It will be noted that means are provided for agitating the material within the dissolving or receiving tank, also driven from the shaft 11. This assists in uniformly dispersing the reagent in the solvent or menstruum from which it flows to the device or mechanism for utilizing the same.

The invention contemplates, therefore, the feeding of a solid reagent intermittently to a tank also supplied with a constant stream of liquid menstruum, the feeding of both the solid reagent and the liquid to the tank is so regulated that a substantially constant quantity of the reagent either dissolved in the menstruum or suspended therein, overflows from the tank and finds its way to the flotation or other apparatus designed to use the material. The agitation provided in receiving tank is of material benefit in that it serves to make a more uniform distribution of the reagent even though the reagent is only intermittently fed to the receiving tank.

The screen serves the purpose of retaining any large lumps which may find their way through the discharge pipe until they have had sufficient time to be acted upon by the regulated menstruum. In the operation of the device a certain amount of solid material will be thrown against the screen by the impellers under the action of centrifugal force and held by the screen until the fluid stream set up by the agitator has had time to dissolve this solid matter.

From the above it is seen that I have provided both a method and apparatus for feeding a solid reagent in a manner which will definitely prevent clogging of the feeding apparatus, which overcomes the defects heretofore experienced with delivering a solution or suspension of the reagent. Obviously the series of apertures 17 in the plate 16 are so arranged that any desired movement of the reagent may take place within the worm housing 6 and this degree of movement is regulated only by the movement of teeth on the ratchet 9.

It will be observed that the shear pin connection between the ratchet member 9 and worm shaft serve to prevent breakage in other vital parts of the apparatus if the feed worm should fail for any reason. These pins 9*a* may be made of any desired material designed to withstand a given amount of tendency to shear.

It is to be noted that by driving the agitator shaft by the same worm that drives the crank disc shaft a very compact mechanism results.

It is to be noted that the non-return pawls are of different length and this serves to accurately operate the feed change device.

By providing a flexible discharge pipe it may be swung out from the dissolving tank for effecting the calibration of the device, and this is an important feature of the apparatus.

I claim:

1. A method of feeding a reagent which comprises intermittently delivering a quantity thereof to a receiving tank, constantly supplying a quantity of liquid menstruum thereto, agitating both reagent and menstruum and constantly overflowing menstruum and reagent from the tank.

2. A feeding device comprising a hopper for solid material, a receiving tank, a basket within the receiving tank and spaced from the walls thereof, means for intermittently feeding material from the hopper to the basket, means for constantly supplying a liquid menstruum to the receiving tank, and an agitator within the basket.

In testimony whereof, I have hereunto subscribed my name this second day of November, 1928.

GEORGE G. THOMAS.