April 3, 1945. R. GUYER ET AL 2,373,026

DEVICE FOR MEASURING SPECIFIC VOLUME

Filed Oct. 2, 1942

Fig. 1

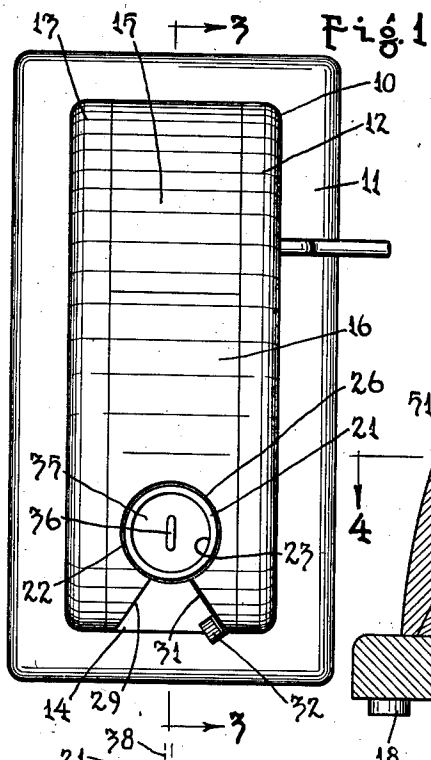


Fig. 3

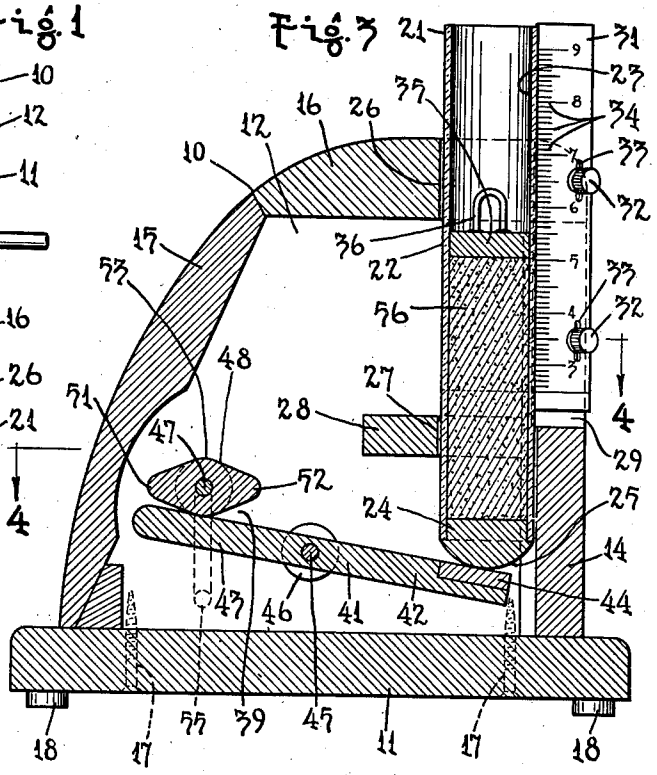


Fig. 2

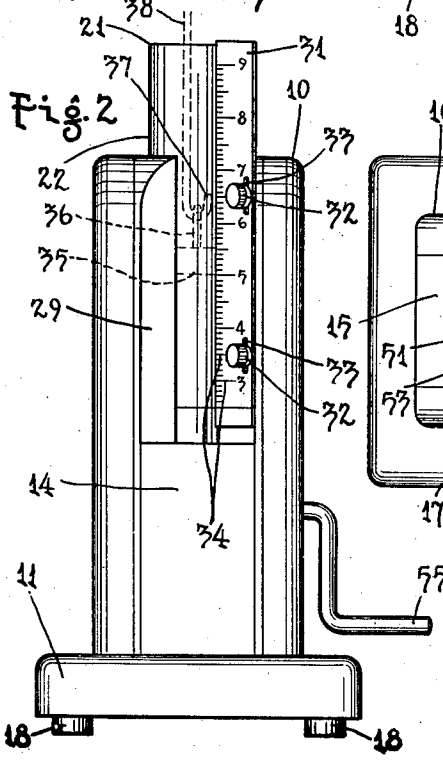
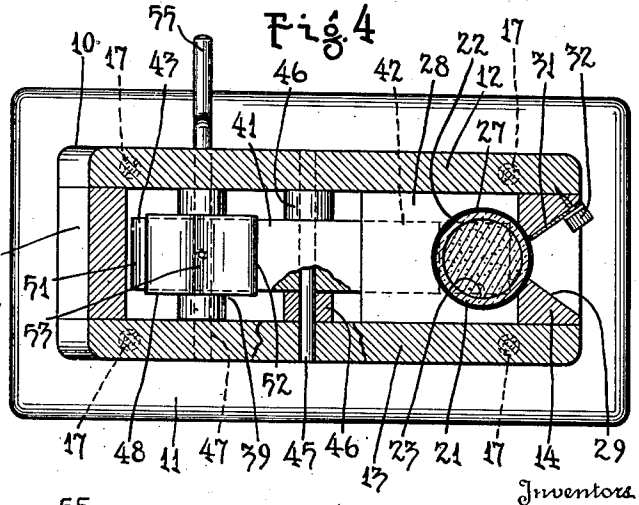


Fig. 4



Inventors

Reynolds Guyer and

Gerald G. Johnston

By Caswell & Lagace

Attorneys

Patented Apr. 3, 1945 2,373,026

UNITED STATES PATENT OFFICE

2,373,026

DEVICE FOR MEASURING SPECIFIC VOLUME

Reynolds Guyer and Gerald G. Johnston, St. Paul, Minn., assignors to Waldorf Paper Products Company, St. Paul, Minn., a corporation of Minnesota

Application October 2, 1942, Serial No. 460,502

7 Claims. (Cl. 73—427)

Our invention relates to measuring devices for measuring specific volume and has for an object to provide a measuring device by means of which the specific volume of a bulky material, such as a powdered or granular substance, may be readily determined.

Another object of the invention resides in providing a measuring device comprising a case having a base, spaced side walls and a front wall connected to said side walls, said front wall having a vertical slot therein.

A still further object of the invention resides in providing a tubular receptacle and in supporting said receptacle for vertical movement between the walls of the case and adjacent said slot.

A feature of the invention resides in constructing said agitating device with a lever disposed between said side walls and adapted to engage the bottom of the receptacle to procure agitation of the contents thereof.

A feature of the invention resides in constructing the receptacle with a shock resisting bottom adapted to be engaged by said lever.

Another object of the invention resides in providing cam means for operating said lever.

An object of the invention resides in providing a weighted head within said receptacle slidable along the receptacle and adapted to cause settling and compacting of the substances within the receptacle upon up and down movement of the receptacle.

A still further object of the invention resides in providing a graduated scale on said front wall adjacent the receptacle and slot for indicating the volume of the contents thereof and in providing said weight with a surface adapted to register with the graduations of the scale.

Other objects of the invention reside in the novel combination and arrangement of parts and in the details of construction hereinafter illustrated and/or described.

In the drawing:

Fig. 1 is a plan view of a measuring device illustrating an embodiment of our invention.

Fig. 2 is a front elevational view of the structure shown in Fig. 1.

Fig. 3 is an elevational sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a plan sectional view taken on line 4—4 of Fig. 3.

Our invention comprises a case 10 which is preferably constructed of wood or some other suitable material. This case comprises a base 11 and two side walls 12 and 13 extending upwardly therefrom. Disposed between the side walls 12 and 13 is a front wall 14, a rear wall 15 and a top 16. The front wall 14 extends in a vertical direction, while the rear wall 15 and the top 16, as well as the rearward portions of the side walls 12 and 13 are curved to give the device an attractive appearance. The lateral walls and top of the case 10 may be secured together by gluing or otherwise and the bottom 11 may be detachably secured to the lateral walls by means of screws 17 which extend through said bottom and are screwed into the lower ends of the walls 12 and 13. Cushion pads 18, attached to the under surface of the base 11, serve to support the entire case upon the surface on which the same rests.

Operating in conjunction with the case 10 is a tubular receptacle 21 which has a cylindrical portion 22 formed with a bore 23 therein of uniform cross section throughout its extent. The tubular receptacle 21 is open at the top and is closed at its lower end by means of a bottom 24 which is preferably constructed of a shock-resisting material such as one of the well-known plastic compositions, now on the market. This bottom has a rounded portion 25 through which the receptacle 21 is supported.

The receptacle 21 is guided for vertical movement by means of a cylindrical hole 26 formed in the forward portion of the top 16 adjacent the front wall 14 and in another cylindrical hole 27 formed in a block 28 extending between the side walls 12 and 13 and secured thereto. These holes are sufficiently loose so that the receptacle 21 may move freely in an up and down direction therein, said holes serving as guide means for guiding the receptacle for up and down movement.

In the uppermost portion of the front wall 14 of the case 10 is formed a V-shaped vertically extending slot 29. This slot forms a window adjacent the uppermost portion of receptacle 21 through which the interior of the receptacle may be viewed. A scale 31 is disposed along the front wall 14 and adjacent the slot 29 and is held in adjusted position with reference to the case 10 by means of two screws 32 which extend through slots 33 in said scale and are threaded into the portion of the front wall 14 adjacent the slot 29. The scale 31 has graduations 34 thereon which indicate the volume of the tubular receptacle 21 in cubic inches or in any other suitable units of volume.

For the purpose of maintaining the uppermost surface of the contents of the receptacle flat and at right angles to the axis of the receptacle and for causing the contents to settle and pack, a weighted head 35 is employed. This head fits

closely within the bore 23 of the tubular receptacle 21 and scrapes the substance within the receptacle from the walls thereof, compressing and compacting the same within the receptacle and causing the upper surface of the substance to become flat at right angles to the receptacle. The head 35 acts as a piston within the receptacle 21 upon agitation of the receptacle. For the purpose of removing the head 35, a loop 36 is secured to the uppermost portion thereof which is adapted to be engaged by a hook 37 formed on a rod 38 capable of being inserted into the receptacle and manually operated to lift the head 35 out of the receptacle.

In order to agitate the substance within the receptacle 21 and for causing the same to settle in said receptacle through the action of the weighted head 35, an agitating device is employed which is indicated in its entirety by the reference numeral 39. This agitating device comprises a lever 41 which is disposed within the interior of the case 10 and is situated between the two walls 12 and 13. This lever has a forwardly extending arm 42 and a rearwardly extending arm 43. Arm 42 has an engaging member 44 secured thereto which is adapted to engage the rounded portion 25 of the bottom 24 of receptacle 21. The lever 41 is pivoted by means of a shaft 45 which extends through the two walls 12 and 13 of case 10 and through the said lever intermediate the ends thereof. Washers 46 on the said shaft, situated between the lever 41 and the walls 12 and 13 hold said lever in spaced relation to said walls.

The lever 41 is operated as follows. For this purpose, a shaft 47 is employed which extends through the two walls 12 and 13 of case 10. This shaft has secured to it an actuating member 48 which consists of two cams 51 and 52 and circular portions 53 therebetween. The shaft 47 has formed at the outer end thereof a crank 55 by means of which said shaft may be rotated. When the shaft 47 is turned, the cams 51 and 52 alternately engage the arm 43 of lever 41 and cause swinging movement of lever 41, which produce up and down movement of the tubular receptacle 21.

The operation of the invention is as follows. The tubular receptacle 21 is designed for a certain weight of substance. When a given quantity of the substance has been placed in the receptacle 21, as indicated at 56, the weighted head 35 is inserted into the uppermost portion of the receptacle and the receptacle inserted into the guide means formed in the case 10. The weight of the head 35 depends upon the kind of material to be tested and is determined by experiment. When in proper position, the portion 25 of bottom 24 of receptacle 21 rests upon the engaging member 44 of lever 41. In normal position, the arm 43 of lever 41 engages one of the circular portions 53 of the member 48 which serves to limit the downward movement of the receptacle 21. Upon rapid rotation of the shaft 47, the cams 51 and 52 are caused to alternately strike arm 43 of said lever and cause rapid alternate oscillation of the lever. This causes successive raising and lowering of the receptatcle 21, which, when the cams 51 and 52 are swung out of engagement, drops downwardly by gravity until the lever 41 reaches the position shown in Fig. 3. Such action of the agitating means 39 causes the weighted head 35 to descend until the same is in position shown in Fig. 3. The height of the lower surface of the head 35 is then measured on the scale 31 by the graduations 34 thereon which accurately gives the cubic volume of the contents of the receptacle below the weighted head 35. Calibration of the scale 31 may be prepared by loosening the screws 32 and sliding the scale vertically along the slots 33.

The advantages of our invention are manifest. Our measuring device is extremely simple and practical and may be constructed at a nominal expense. With our invention, the specific volume of powdered, granular or similar substances can be readily and quickly determined. Our invention may be constructed from materials readily available for the purpose and when in operation, operates positively and with a minimum amount of wear. The tubular receptacle is readily removed during filling, so that the powders are not spilled upon the machine proper. With the particular bottom used for the receptacle, injury thereto in using the device is entirely prevented. With our apparatus, the specific volume is quickly and accurately determined.

Changes in the specific form of our invention, as herein disclosed, may be made within the scope of what is claimed without departing from the spirit of our invention.

Having described our invention, what we claim as new and desire to protect by Letters Patent is:

1. A measuring device comprising a support, a tubular receptacle open at the top and having a shock resisting bottom attached thereto, said bottom comprising a plug forming a bottom closure for said receptacle, means for guiding said receptacle for up and down movement, a fixed measuring scale on said support adjacent said receptacle, and agitating means for engaging the bottom of the receptacle and causing the contents thereof to settle within the receptacle.

2. A measuring device comprising a case having a base, spaced side walls, a front wall connected to said side walls, said front wall having a vertical slot therein, a transparent tubular receptacle disposed within said case between said side walls and in proximity to said slot, means for guiding said receptacle for vertical sliding movement adjacent said slot, a scale carried by said front wall and disposed adjacent said slot, said scale having graduations thereon, means for raising and lowering said receptacle within said guide means, said means being disposed between said side walls and means for limiting the downward movement of said receptacle.

3. A measuring device comprising a case having a base, spaced side walls, a front wall connected to said side walls, said front wall having a vertical slot therein, a transparent tubular receptacle disposed within said case between said side walls and in proximity to said slot, means for guiding said receptacle for vertical sliding movement adjacent said slot, a scale carried by said front wall and disposed adjacent said slot, said scale having graduations thereon, a lever disposed between said side walls and engaging said receptacle, pivot means extending through said side walls and supporting said lever, and means for swinging said lever about said pivot means.

4. A measuring device comprising a case having a base, spaced side walls, a front wall connected to said side walls, said front wall having a vertical slot therein, a transparent tubular receptacle disposed within said case between said side walls and in proximity to said slot, means for guiding said receptacle for vertical sliding movement adjacent said slot, a scale carried by said front wall and disposed adjacent said slot,

said scale having graduations thereon, a lever disposed between said side walls and engaging said receptacle, a shaft extending through said side walls and supporting said lever, a second shaft extending through said side walls, a cam on said second shaft, and means for turning said second shaft.

5. A measuring device comprising a support, a transparent tubular receptacle, means for guiding said tubular receptacle for vertical movement relative to the support, a scale disposed adjacent the receptacle and having graduations thereon, a weighted head insertable into the receptacle through the upper end thereof and having a flat surface adapted to engage the substance within the receptacle and indicating means adapted to register with the graduations on said scale, a lever pivoted to said support and having an arm engaging said receptacle for moving the same and a second arm extending rearwardly therefrom, a shaft, an operating member mounted on said shaft and having a cam engaging said second arm for raising the receptacle and a circular portion adapted to support said lever with the receptacle in its lowermost position and in proper relationship with respect to the scale.

6. A measuring device comprising a tubular transparent receptacle open at its top and closed at its bottom, a support for said receptacle holding said receptacle substantially vertical and axially slidable, means for sliding said receptacle vertically including means for limiting the downward movement of said receptacle, a weight slidably supported within said receptacle, and a scale on said support adjacent said receptacle.

7. A measuring device comprising a hollow tubular transparent receptacle having a closed bottom and an open top, means supporting said receptacle in a substantially vertical position for slidable movement vertically, a weight slidably positioned within said receptacle, means for reciprocating said receptacle vertically including means for limiting the extreme position of said receptacle, a scale secured to said supporting means adjacent said receptacle, said scale extending longitudinally of said receptacle.

REYNOLDS GUYER.
GERALD G. JOHNSTON.