R. L. CHAMBERS.

APPARATUS FOR SAMPLING LIQUIDS.

APPLICATION FILED JULY 13, 1914.

1,146,402.

Patented July 13, 1915.

2 SHEETS—SHEET 1.

FIG: 1.

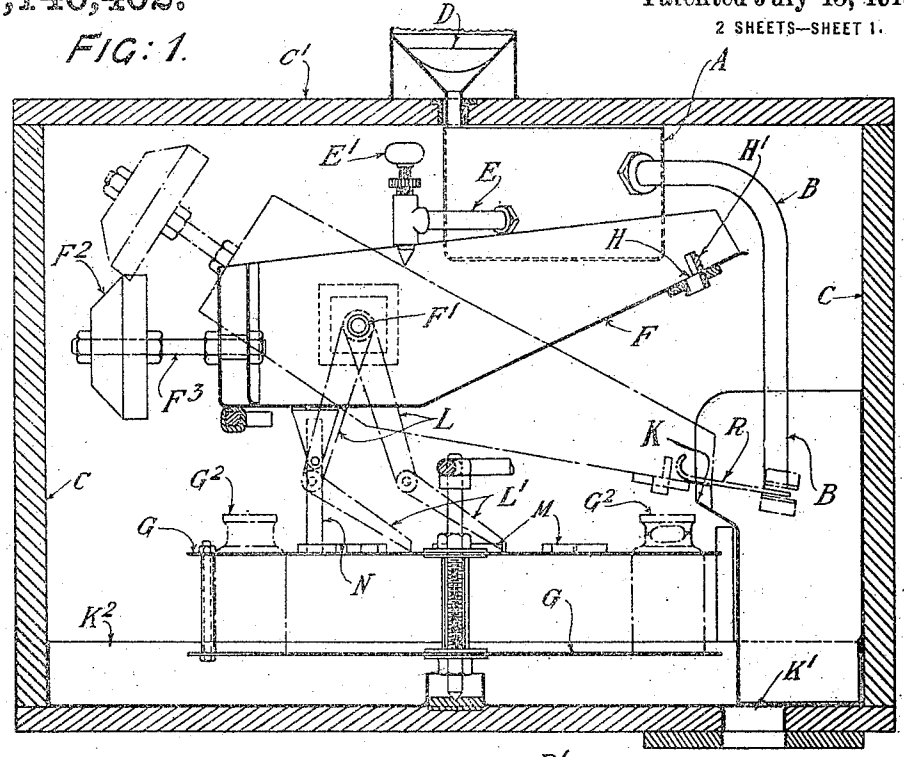
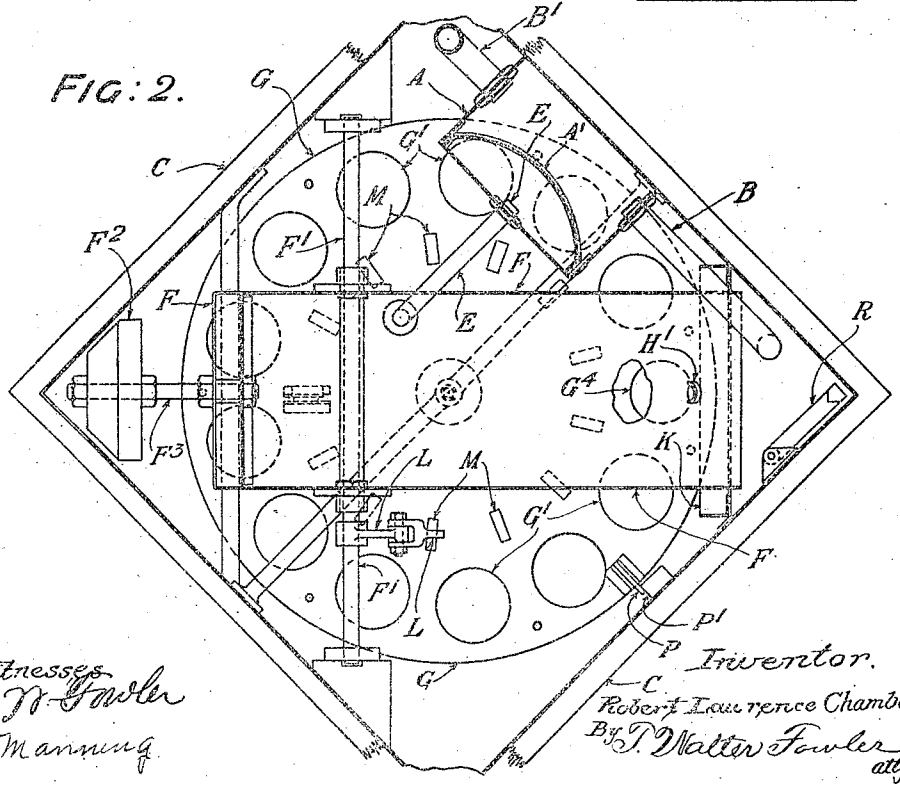


FIG: 2.



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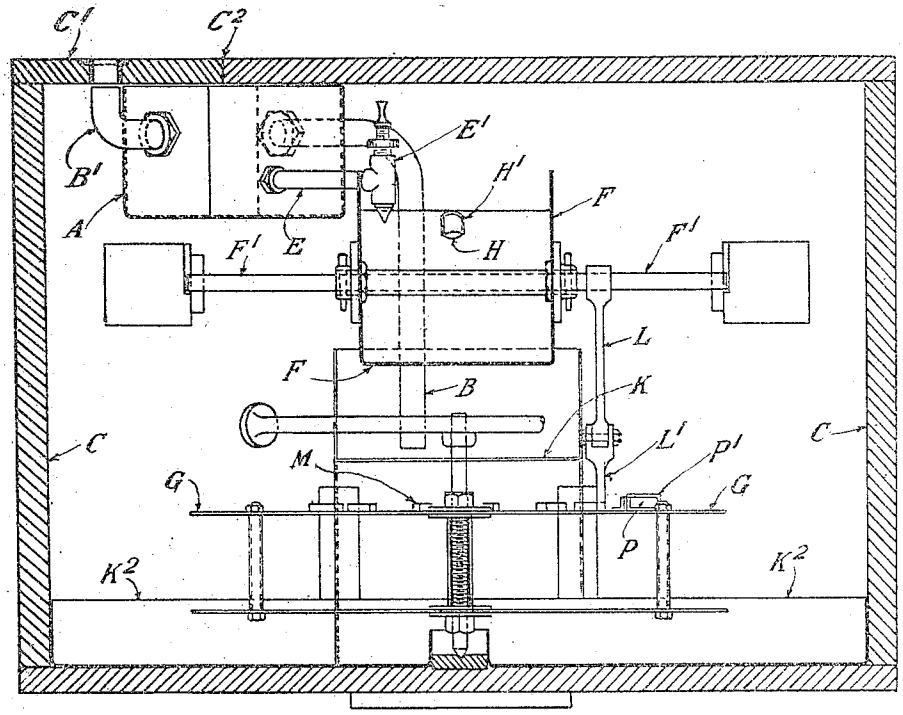
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2 SHEETS—SHEET 2.

FIG: 3.



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APPARATUS FOR SAMPLING LIQUIDS.

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To all whom it may concern:

Be it known that I, ROBERT LAURENCE CHAMBERS, a subject of the King of Great Britain and Ireland, residing at Elmore, Broxburn, Linlithgowshire, Scotland, have invented new and useful Improvements in or Connected with Apparatus for Sampling Liquids, of which the following is a specification.

This invention relates to improvements in or connected with apparatus for use in taking samples from liquid periodically, especially from flowing liquid running to waste or in its course to be delivered for supply or storage, and in which the samples are received each in a separate receptacle of a series thereof. For this purpose apparatus has been devised having a series of receptacles for receiving the samples as they are taken, the distribution to the respective receptacles being effected by the aid of mechanism which in most cases has depended upon clockwork actuation or control.

According to this invention the motive power required for the operation of the apparatus and the control required for regulating the intervals of time at which successive samples are to be taken are derived from liquid taken from the source to be sampled.

An example of apparatus embodying features according to this invention will now be described with reference to the accompanying drawings, in which:—

Figure 1 is a view representing some parts in elevation, some in vertical section and some in dotted lines. Fig. 2 is a plan, and Fig. 3 is a sectional elevation at right angles to Fig. 1, looking from the left toward the right.

In practice, according to this invention, a portion only of the liquid from the source to be sampled is preferably made use of for giving the required motive power and control, and in order that these shall be regular, a constant head is desirable, which may be obtained by permitting a portion of the liquid to flow into a tank A having an overflow B adapted to cope with the delivery. It will, however, be recognized that, if desired, the whole of the liquid might be permitted to pass into the tank. In the apparatus shown, liquid delivered to the tank A enters by a supply pipe B^1, which presents its mouth to an aperture in a lid C^1 of a casing C within which the mechanism is contained, the lid C^1 being hinged at C^2, see Fig. 3. No hinge is shown in the drawings. A strainer D may, as shown, be fitted over the aperture in the lid for intercepting foreign matter. From near the base of the tank A liquid is taken by a pipe E, its rate of flow, if required, being regulated by a valve E^1, and delivered into a device, which, when charged to a predetermined extent, discharges its contents and in doing so exerts a force which is applied to perform, or store energy, for the purposes of the operations required, delivers a sample of its contents to a receptacle, which may conveniently consist of a bottle and will hereinafter be referred to as such, and discharges the surplus of the charge. A straining screen, A^1, shown in Fig. 2, may be fitted in the tank A in front of the supply pipe, E.

In one form of construction as exemplified in the drawings, the device consists of a tilting trough F (mounted on trunnions F^1), arranged to be normally held in a charging position by means of a balance weight F^2, which after discharge operates to return the trough F to its normal position and exert energy for the required operations. The balance weight F^2 may be arranged so as to be capable of adjustment relative to the trunnions. For this purpose, in the construction illustrated, the weight F^2 is mounted upon a screwed rod F^3 projecting from the inner end of the trough. For receiving a number of samples a stand is provided, which, in the form illustrated, consists of a rotary table G having recesses G^1 for a series of bottles G^2 to stand in, and in step-by-step rotation each to be successively brought into position to receive its respective sample. For delivering each sample to its respective bottle, the trough F is provided at a position toward its outer or downwardly tiltable end, above the level the liquid reaches at which the weight is overbalanced, with a duct H which, when the trough F tilts, comes over the mouth of the bottle, the outer end of the trough beyond the duct being open and extended to overlap a gutter K when in its tilted position, so that when the charge of liquid flows down the trough F, a portion passes through the duct H to the bottle and the rest into the gutter K, from whence it passes through a drain K^1 formed in the base of a

pan K^2, to run to waste or be conducted to join the liquid in its flow beyond the apparatus. The quantity of liquid passing out through the duct H may be regulated by providing a lip to intercept the flow. This lip may consist of a portion of a tube H^1 capable of being turned about the axis of the duct H, and cut away on one side to present, say, a semicircular lip in plan, which by adjustment may intercept any quantity within the limits required.

A step-by-step rotation of the table G may be obtained by mechanism operated by the rocking movements of the trough F; for instance, as shown in the example of construction illustrated, a shaft forming the trunnions F^1 for the trough to turn about may be provided with a depending arm L having a pawl L^1 pivoted at its lower end adapted to engage with steps M on the surface of the table G, and the back end of the trough F may be provided with a depending detent N adapted to enter between the steps M and prevent rotation when the trough approaches or is in its normal position. The force required for the rotation of the table G may be derived from the weight F^2 in the reactionary movement which it makes to return the trough after discharge. As shown at Fig. 2, a stop P adapted to engage with an abutment P^1 is preferably provided for preventing the table G from making more than one rotation, and the table is provided with an orifice G^4 corresponding to the position which, at the completion of rotation of the table, would be otherwise occupied by a bottle, arranged in conjunction with the drain K^1 so that continued discharge through the duct, after the table has been stopped, would run to waste. In the construction shown, the discharge from the duct H through the orifice G^4 would run to waste by passing into the pan K^2 and escape therefrom by the drain K^1. To facilitate the removal and replacement of the bottles G^2, a bolt R may be provided to retain the trough F in its tilted position, and so withhold the detent N from engagement with the steps M, to permit the table to be rotated freely forward. Discharge openings which are required in the casing C may be covered, for example, with wire network.

It will be recognized that the intervals of time at which the tilting occurs can be regulated by the valve E^1 of the delivery from the tank A.

The apparatus is applicable for use generally, but is particularly adapted for taking samples from effluents, such, for example, as the spent water from ammonia plant, which may contain valuable matter.

I claim:—

1. An apparatus having a support for a series of receptacles, means for taking from a source of liquid samples in succession and delivering them each to a separate receptacle of the series, and means for operating the apparatus and regulating the intervals of time at which the samples in succession are taken operated by motive power derived from the liquid taken from the source to be sampled and controlled by liquid derived from the said source.

2. An apparatus having a support for a series of receptacles, means for taking from a source of liquid samples in succession and delivering them each to a separate receptacle of the series, and means for operating the apparatus and regulating the intervals of time at which the samples in succession are taken operated by motive power derived from the liquid taken from the source to be sampled and controlled by liquid derived from the said source, and means for maintaining the liquid to be so used at a constant head.

3. An apparatus having a support for a series of receptacles, a tank into which liquid from a source to be sampled is permitted to flow, an overflow adapted to cope with the delivery of liquid to the tank, an outlet from the tank, and means operated by liquid which flows from the outlet arranged to deliver samples in succession each to a separate receptacle of the series.

4. An apparatus having a support for a series of receptacles, a tank into which liquid from a source to be sampled is permitted to flow, an overflow adapted to cope with the delivery of liquid to the tank, an outlet having means for controlling the rate of flow of liquid from the tank, and means operated by liquid which flows from the outlet arranged to deliver samples in succession each to a separate receptacle of the series.

5. An apparatus having a support for a series of receptacles, means for taking liquid from a source to be sampled, a device to receive liquid so taken constructed and arranged to discharge its contents when charged to a predetermined extent and exert a force, and means for applying the force to operate the apparatus, deliver a sample of its contents to one of the receptacles, and successively bring each of the receptacles into position.

6. An apparatus having a support for a series of receptacles, means for taking liquid from a source to be sampled, a tilting trough arranged to be normally held in a charging position to receive liquid so taken and tilt when charged to a predetermined extent, a duct in the trough at a position toward its outer end above the level the liquid reaches at which the device tilts, the outer end of the trough beyond the duct being open, and means operated by the movements of the trough for bringing the receptacles of the series each in succession beneath the duct.

7. An apparatus having a support for a series of receptacles, means for taking liquid from a source to be sampled, a tilting trough arranged to be normally held in a charging position to receive liquid so taken and tilt when charged to a predetermined extent, a duct in the trough at a position toward its outer end above the level the liquid reaches at which the device tilts, the duct having a lip to intercept liquid as it flows down the trough, the outer end of the trough beyond the duct being open, and means operated by the movements of the trough for bringing the receptacles of the series each in succession beneath the duct.

8. An apparatus having a support for a series of receptacles, means for taking liquid from a source to be sampled, a tilting trough arranged to be normally held in a charging position to receive liquid so taken and tilt when charged to a predetermined extent, a duct in the trough at a position toward its outer end above the level the liquid reaches at which the device tilts, the duct having a lip capable of being turned about the axis of the duct for regulating the quantity of liquid intercepted, the outer end of the trough beyond the duct being open, and means operated by the movements of the trough for bringing the receptacles of the series each in succession beneath the duct.

9. An apparatus having a tilting trough, means for delivering liquid taken from a source to be sampled to the trough, a rotatable stand for the support of a series of receptacles, means for imparting a step-by-step rotation to the stand operated by the tilting movements of the trough, the trough having a duct arranged when the trough is tilted to deliver a sample to a receptacle, for the purposes set forth.

10. An apparatus having a tank into which liquid from a source to be sampled is permitted to flow, an overflow adapted to cope with the delivery of liquid to the tank, an outlet from the tank, a tilting trough to receive liquid flowing from the outlet, a rotatable stand for the support of a series of receptacles, means for imparting a step-by-step rotation to the stand operated by the tilting movements of the trough, and a duct in the trough arranged when the trough is tilted to deliver a sample to a receptacle, for the purposes set forth.

11. An apparatus having a stand for the support of a series of receptacles, means for advancing the stand step-by-step to bring each receptacle in succession into a charging position operated by power derived from liquid taken from the source to be sampled, and means for charging the receptacles successively operated and controlled by liquid taken from the source to be sampled.

12. An apparatus having a rotatable stand for the support of a series of receptacles, means for imparting a step-by-step rotation to the stand to bring each receptacle in succession in a charging position operated by power derived from liquid taken from the source to be sampled, and means for charging the receptacles successively operated and controlled by liquid taken from the source to be sampled.

13. An apparatus having a rotatable stand for the support of a series of receptacles, a tilting trough, a duct at the outer end of the trough, a balance weight arranged to hold the trough normally in a charging position, means operated by the tilting trough for imparting a step-by-step rotation to the stand to bring in succession each of the receptacles beneath the duct when the trough is tilted, and means for permitting liquid from a source to be sampled to flow into the trough at the rate required.

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