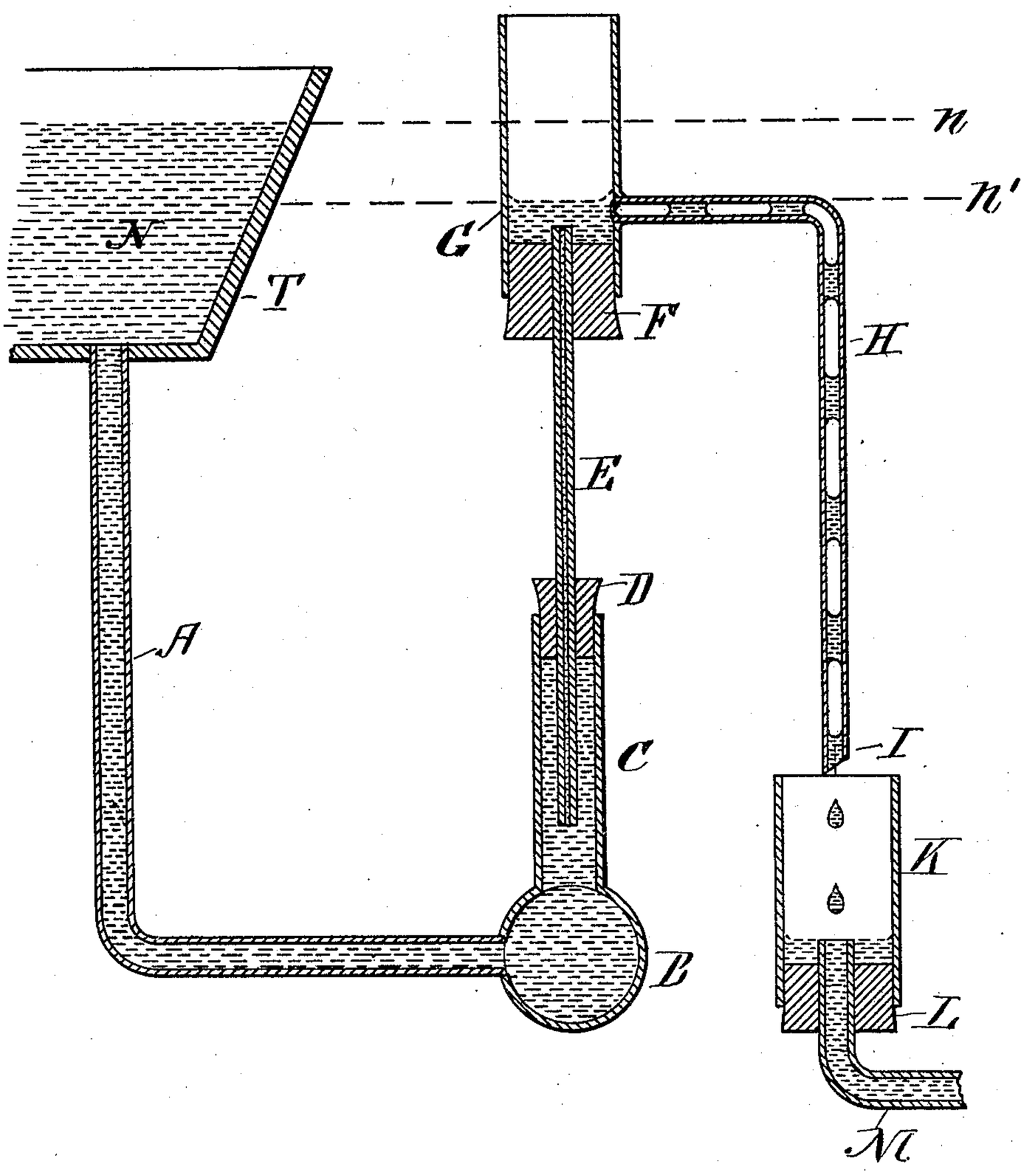
No. 679,050. Patented July 23, 1901.

R. GIROUARD.

LIQUID FEED DEVICE FOR ELECTROLYTIC APPARATUS.

(Application filed May 11, 1899.)

(No Model.)



WITNESSES

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LIQUID-FEED DEVICE FOR ELECTROLYTIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 679,050, dated July 23, 1901.

Application filed May 11, 1899. Serial No. 716,389. (No model.)

To all whom it may concern:

Be it known that I, RAOUL GIROUARD, a citizen of the United States of America, and a resident of Westbrook, Cumberland county, State of Maine, have invented certain new and useful Improvements in Liquid-Feed Devices for Electrolytic and Kindred Apparatus, of which the following is a specification.

This invention relates to devices for feeding liquid to electrolytic apparatus or to any vessels where such electrical conditions prevail that it is important to guard against accidental leakage of electricity through the liquid contact of a continuous stream to an external supply-tank and elsewhere and where also the nature of the process carried on demands a substantially constant supply of liquid. A situation where these conditions prevail is described in connection with Figure 10 of Patent No. 518,710, issued April 24, 1894, to Henry Carmichael.

My invention hereinbelow described accomplishes the object desired without the use of moving mechanical parts and is susceptible of nice adjustment to regulate the quantity of liquid supplied.

In the drawing hereto annexed there is shown a feed device which embodies the substance of my invention.

T is a supply-reservoir, which contains a quantity of liquid N, which is to be fed to an apparatus—such as, for instance, the apparatus described in Carmichael's patent aforesaid. The level of liquid N is maintained substantially constant in the supply-reservoir T either by a ball-cock or by a weir, in which latter case the liquid is fed to the supply-reservoir in a constantly superfluous quantity. From this reservoir the liquid is to be delivered to the receiving-funnel K, which communicates by pipe M to the electrolytic or other apparatus, which is not shown in the drawing. In order that the liquid N shall be fed to the receiving-funnel K in small constantly-intermitting quantities, my feed apparatus is interposed between the supply-reservoir T and the receiving-funnel K. A pipe A leads from the bottom of the reservoir T to a distributing-main B, which may be a pipe of suitable length, from which at intervals project risers C, the number of risers corresponding to the number of individual receiving-funnels K. The distributing-main is shown only in cross-section in the drawing, for the reason that a multiple apparatus involves only the reduplication of the single device which is there exhibited in cross-section. The top of the riser C is closed with a plug D, which in turn is perforated, so as to admit the flow-restraining tube E. The restraint which this tube E exerts upon the flow of liquid from the supply-reservoir T is due to the frictional resistance between the liquid and the side of the tube E, and the requisite amount of friction may be obtained by using a tube of greater length with a relatively large bore or a short tube with a fine bore, the adoption of said dimensions in any particular case depending upon the condition under which the apparatus operates. If the liquid-supply is so highly concentrated as to be viscous or should approach that condition or if by accident the situation involves the passage with the liquid of many solid particles it will be well to use a long tube with a relatively large bore; but, on the other hand, if the liquid is clean and flows easily space may be saved and a short tube with a fine bore used to restrain the flow. The fit of the tube E in the plug D is such as to permit the tube to be moved up or down in the plug, but sufficiently close to retain the tube securely in position under normal conditions. The upper end of the tube E enters the bottom of a delivery vessel G, which may be a short section of tube closed at the bottom by a plug F, which is penetrated by the tube E. From the delivery vessel G an outlet-pipe H leads to the receiving-funnel K, the outlet I of the pipe H overhanging the funnel K, which may be simply constructed by introducing the pipe M through a plug L, which fits the lower end of the funnel-tube K. The delivery vessel G is moved to a position, as shown in the drawings, where the upper end of the tube E and the outlet from vessel G to tube H stand below the level of the liquid N in the supply-reservoir T. If the outlet I were closed, the liquid would soon find the same level as the liquid in the supply-reservoir, this level being indicated by the dotted line *n;* but as the outlet I is open and the tube H is of sufficient

capacity to carry away freely all the liquid which can pass through the flow-restraining tube E the resistance due to the very small bore of the tube E reduces the level of liquid in the delivery vessel G, say, to the level indicated by the dotted line *n'*, so that in practice the opening from the delivery vessel G to the pipe H will be more than sufficient to carry off the liquid and will never be covered by the liquid in the delivery vessel G. In fact, were it not for the simplicity of the apparatus here shown and the facility with which it can be constructed out of ordinary material the delivery vessel G might be reduced to a minimum no larger than the tube H, in which the tube E might terminate. The employment of the flow-restraining tube in effect diminishes the head under which the liquid is supplied to the delivery vessel, and this head can be adjusted to compensate for variations in the internal bore of the flow-restraining tube by pushing the tube up or down in the plug B. At the same time the arrangement here shown protects the flow-restraining tube against such casualties as stoppage by the introduction of accidental foreign matter and insures the continuous operation of the feeding apparatus. The flow through this tube is so small that the outlet end I of the tube H is supplied with an intermittent succession of drops which disengage themselves and fall singly into the funnel K, thus automatically insulating themselves from the continuous body of liquid in the feed apparatus and supply-reservoir.

The flow-restraining tube I prefer to make of glass, and inasmuch as it is difficult to obtain tubes of this material of uniform bore I cut each tube of such length as is found by trial to give the same flow as a standard tube when the liquid is under the same head.

The function of the flow-restraining tube is in effect to throttle the flow from the reservoir, which it does by increasing the frictional resistance to the movement of liquid. As the length of this throttling-tube is increased its bore may be proportionately increased and the same effect be retained. I prefer to use a tube of such small bore that it may correctly be termed "capillary;" but it is evident that tubes which in other situations might not be strictly regarded as capillary will operate as full equivalents for a capillary tube, as I have above suggested.

Capillary tubes offer a distinct advantage, however, for the reason that a short and easily-handled length of tube supplies the requisite resistance to the flow and also because uniformity of regulation in an apparatus requiring many such tubes may more readily be secured by calibrating or testing capillary tubes in comparison with a selected standard than by any attempt at reducing long tubes of large bore to a uniform resistance.

What I claim, and desire to secure by Letters Patent, is—

1. The combination with a supply-reservoir of a delivery vessel open to the air, a flow-restraining tube connecting the supply-reservoir with the delivery vessel, and an outlet from the delivery vessel having a capacity greater than the delivering capacity of the flow-restraining tube.

2. The combination with a supply-reservoir of a delivery vessel open to the air, a capillary conduit connecting the supply-reservoir with the delivery vessel, and an outlet from the delivery vessel having a capacity greater than the delivering capacity of the capillary conduit.

3. The combination with a supply-reservoir of a delivery vessel, open to the air, a vertically-adjustable capillary conduit connecting the supply-reservoir with the delivery vessel, and an outlet from the delivery vessel having a capacity greater than the delivering capacity of the capillary conduit.

4. The combination with a supply-reservoir of a distributing-main connected therewith, risers branching from the distributing-main, delivery vessels, open to the air, connected with said risers by flow-restraining tubes, and outlets from the delivery vessels having a capacity greater than the delivering capacity of their respective flow-restraining tubes.

5. The combination with a supply-reservoir of a distributing-main connected therewith, risers branching from the distributing-main, delivery vessels, open to the air, connected with said risers by vertically-adjustable flow-restraining tubes, and outlets from the delivery vessels having a capacity greater than the delivering capacity of their respective flow-restraining tubes.

6. The combination with a supply-reservoir of a delivery vessel open to the air, a capillary conduit connecting the supply-reservoir with the delivery vessel, the said delivery vessel mounted on and carried by the capillary conduit and vertically adjustable therewith, and an outlet from the delivery vessel having a capacity greater than the delivering capacity of the capillary conduit.

7. The combination with a supply-reservoir, of a delivery vessel open to the air, a vertically-adjustable flow-restraining tube leading to said delivery vessel and upon which said delivery vessel is mounted and carried, and an outlet from the delivery vessel having a capacity greater than the delivering capacity of the flow-restraining tube.

Signed by me at Boston, Massachusetts, this 5th day of May, 1899.

RAOUL GIROUARD.

Witnesses:
ROBERT CUSHMAN,
E. F. GROLL.