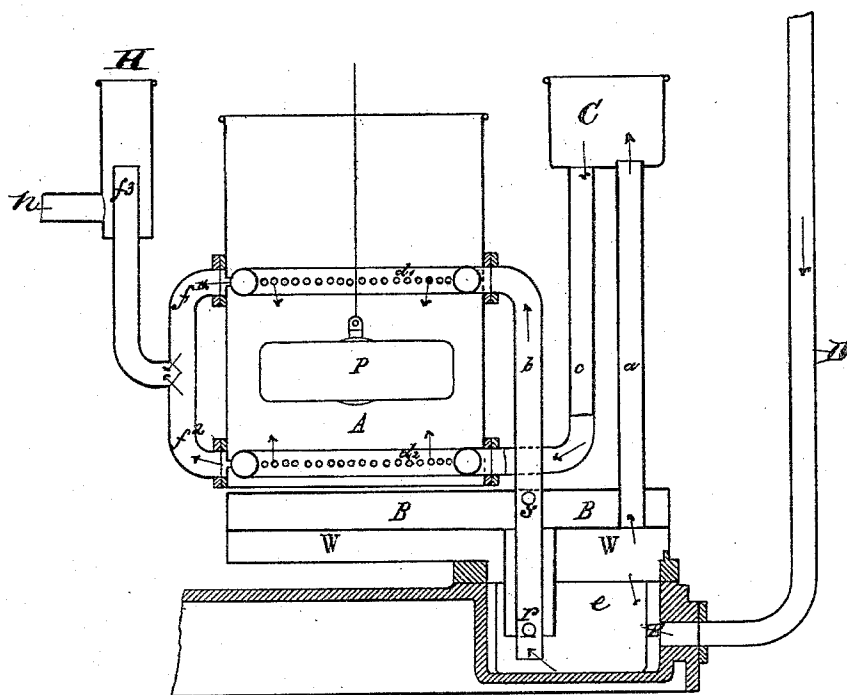


(No Model.)

L. SIEMENS.
SPECIFIC GRAVITY APPARATUS.

No. 380,533.

Patented Apr. 3, 1888.



Witnesses:

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UNITED STATES PATENT OFFICE.

LOUIS SIEMENS, OF CHARLOTTENBURG, PRUSSIA, GERMANY, ASSIGNOR TO
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SPECIFIC-GRAVITY APPARATUS.

SPECIFICATION forming part of Letters Patent No. 380,533, dated April 3, 1888.

Application filed May 6, 1886. Serial No. 201,406. (No model.)

To all whom it may concern:

Be it known that I, LOUIS SIEMENS, of Charlottenburg, in the Kingdom of Prussia, Germany, have invented certain new Improvements in Apparatus for Determining the Specific Gravities of Continuously-Flowing Liquids, of which the following is a specification.

The object of my invention is to provide a new and simplified construction in apparatus for determining specific gravities; and it consists in so constructing the same as to cause it to correctly register at any moment the specific gravity of the liquid then passing through it.

Referring to the accompanying drawing, which is a vertical section of my invention, and in which corresponding parts are designated by similar letters, A represents a cylinder, having suspended therein between two perforated hollow rings, d' and d'' , a float, P, the stem of which is attached to a marker or other graduated indicator, by means of which may be determined at any time the specific gravity of the liquid then in the cylinder. The hollow ring d' is connected with the inflow-pipe b , which communicates with the basin B, situated below the level of the cylinder A, by two holes, r and s , and which terminates within the vessel e , placed within the chamber E. The lower hollow ring, d'' , is connected with the inflow-pipe a by means of inflow-pipe c and reservoir C, the top of which is above the level of the hollow ring d' . The lower end of pipe a terminates in an enlargement or inverted basin, W, which may be situated either above or below the basin B, and either wholly or in part below the cylinder A and above and forming the top of the receiving-chamber E. Outflow-pipes f' and f'' start from the cylinder A—one about the height of the upper hollow ring, d' , the other at about the height of the lower hollow ring, d'' —and unite, forming the pipe f^3 , which terminates within and projects above the bottom of the cylinder H, and also above the level of the hollow ring d' . Below the top of said pipe an outlet-pipe, h , is connected with the cylinder H. The lower end of pipe f^3 is so placed as to be equidistant from the level of the two hollow rings. The inlet-pipe D, through which pass all the liquids supplied to the apparatus, is connected with the chamber E.

For the correct registration of specific gravities by this apparatus it is necessary that the specific gravity of the liquid between the hollow rings d' and d'' corresponds from above downward in an arithmetical progression, as the natural numbers 1, 2, 3, 4, &c. This result is accomplished by the hereinbefore-described apparatus in the following manner:

The inflowing liquid, on entering the chamber E through the pipe D, separates by the action of gravity into two parts, the heavier flowing into the vessel e , and thence through the pipe b (filling the basin B with a liquid of the same density as that in the pipe) and upper hollow ring, d' , into the cylinder A, where it flows downwardly toward the bottom. The lighter portion rises into the enlargement or inverted basin W, and thence through the pipes a and c , reservoir C, and lower hollow ring, d'' , into the cylinder A, where it flows upwardly toward the top, mixing with the downward-flowing stream of greater gravity, and forming the stratification above mentioned as necessary for the correct working of my invention. This is the action of the apparatus when a liquid of practically uniform specific gravity is introduced into the chamber E; but when a very light liquid is followed by a slowly-flowing liquid of a very high specific gravity, and when thereafter a slowly-flowing liquid of a decreasing specific gravity is led in, the action is somewhat different. In this case, when the liquid of a high specific gravity is introduced into the apparatus, a specifically-light liquid will remain in the upper part of the inlet-pipes a and c and reservoir C, which would thus cause the inflowing liquid of high specific gravity to flow into the cylinder A through the tube b , and would also oblige the succeeding liquid of a decreasing specific gravity to follow the same course if means were not taken to prevent such result, which would prevent the correct registration of the specific gravity by the apparatus, as the latter liquid should flow through the pipes a and c as soon as its specific gravity is less than that in the cylinder A between the two hollow rings.

These means have already been described, and their operation is as follows: When after a liquid of a low specific gravity a liquid of a high specific gravity is introduced, the latter

liquid is prevented from immediately passing into the cylinder A through the pipe *b*, as the liquid of a low specific gravity in the basin B is forced through the upper hole, *s*, into the pipe *b* and thence into the cylinder A by the inflowing heavy liquid flowing into the said basin W through the lower hole, *r*; but the said liquid of a high specific gravity mixes with the contents of the inverted basin W, which are of a low specific gravity, and forms therewith a mixture, the weight of which is less than that of the inflowing liquid, but greater than that of the liquid originally within the same, and is forced by the pressure of the inflowing liquid into the cylinder A through the pipes *a* and *c*, reservoir C, and hollow ring *d*²; but as this flow lasts only while the basin W is being emptied of its light contents it does not interfere in any considerable degree with the apparatus, as the said basin is soon filled with the heavier inflowing liquid, which then passes into the chamber A through the pipe *b*, leaving a heavy liquid in the pipes *a* and *c* and reservoir C, the light originally therein having been absorbed by the inflow of the heavy one and carried into the cylinder A therewith. When this liquid of a high specific gravity is followed by a liquid of a decreasing specific gravity, the latter will then take its proper course through the pipes *a* and *c* and reservoir C, as it is not prevented by any liquid of a lower specific gravity lodged in the upper part of the pipes or the reservoir through which it passes on its way to the cylinder A. It will be seen that I am able by the means above described to so mix the liquid within the cylinder A that the density thereof will increase from top to bottom in an arithmetical progression, excepting a layer of liquid in the cylinder, the thickness of which is equal to the difference of height between the mouth of the outlet-pipe *f*¹ and of the top of the pipe *f*³. This layer is composed of very light liquid, but in no way interferes with the correct working of the apparatus, as it lies entirely above the upper hollow ring, *d*¹. The specific gravity of the said stratified liquid is now easily

read by means of any suitable indicator attached to the float P. After passing through the cylinder A the liquid leaves the apparatus by the pipes *f*¹, *f*², *f*³, and *h*. The pipe *f*³, projecting above the level of the upper hollow ring, *d*¹, serves to keep the liquid in the cylinder A at a certain height.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is as follows:

1. In an apparatus for determining specific gravities, the combination of a cylinder, a float suspended therein between two hollow rings, the upper hollow ring connected with a receiving-chamber, the lower hollow ring connected with an inverted basin situated above the said chamber, and a basin situated below the level of the said cylinder and communicating with the said upper ring, substantially as and for the purpose described.

2. In an apparatus for determining specific gravities, the combination of a cylinder, a float suspended therein between two hollow rings, the upper hollow ring connected with a receiving-chamber, the lower hollow ring connected with a pipe terminating above such receiving-chamber, and a basin situated below the level of the said cylinder and communicating with the said upper ring, substantially as and for the purpose described.

3. In an apparatus for determining specific gravities, the combination of a cylinder, a float suspended therein between two hollow rings, the upper hollow ring connected with a pipe terminating in a receiving-chamber, the lower hollow ring connected with an inverted basin, and a basin situated below the level of the said cylinder and communicating with the said pipe, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LOUIS SIEMENS.

Witnesses:

L. GLASER,
B. ROI.