No. 890,844. PATENTED JUNE 16, 1908.

F. N. CONNET.

RECORDING MANOMETER.

APPLICATION FILED FEB. 2, 1907.

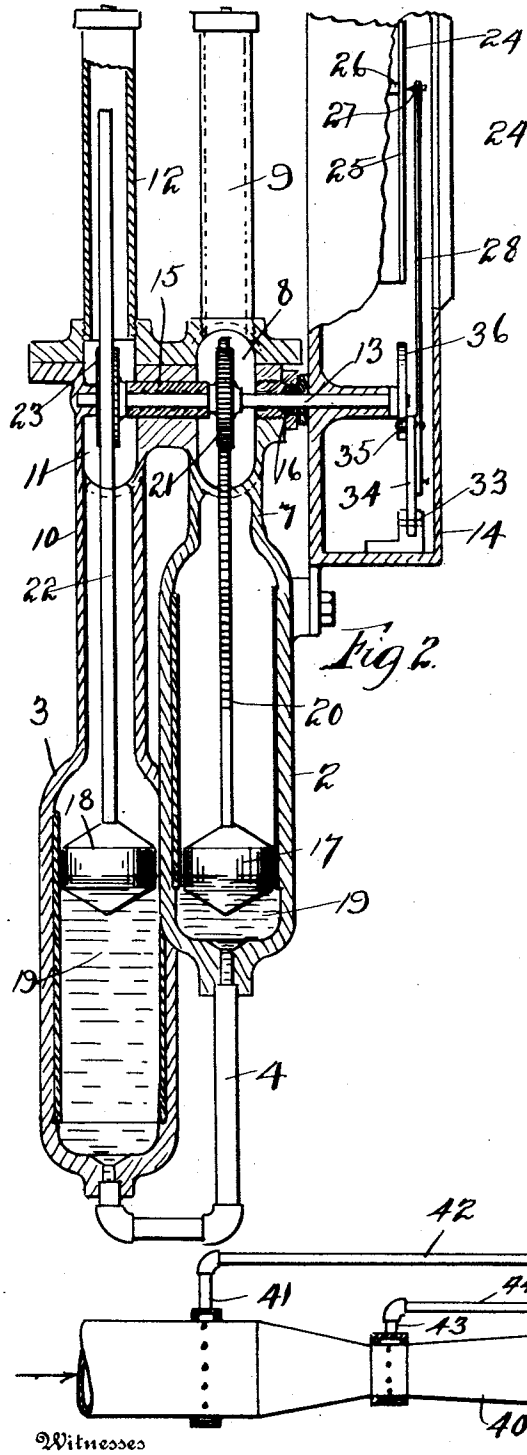


Fig 2.

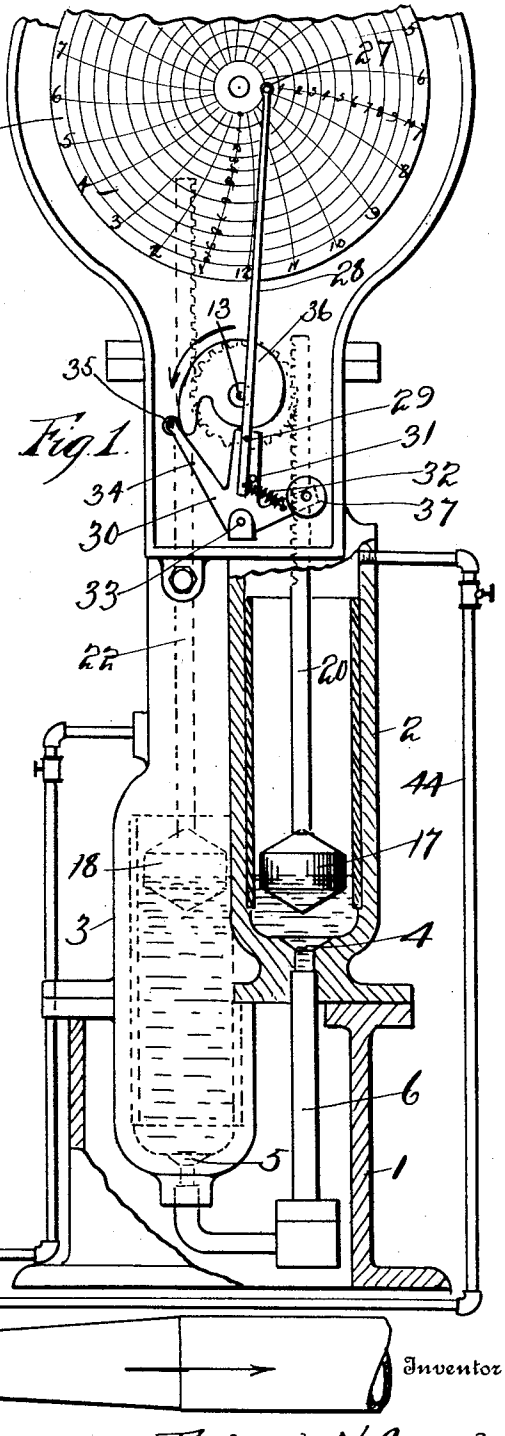


Fig 1.

Witnesses

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RECORDING-MANOMETER.

No. 890,844. Specification of Letters Patent. Patented June 16, 1908.

Application filed February 2, 1907. Serial No. 355,417.

To all whom it may concern:

Be it known that I, FREDERICK N. CONNET, a citizen of the United States, residing at the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Recording-Manometers, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to a recording manometer and has for its object to provide a simple and practical instrument for indicating and automatically recording the flow of liquids or gases through a given aperture, said instrument being controlled in its action by the difference in pressures at two distinct points in the main supply tube. To accomplish this purpose I have adopted a pipe or tube similar in construction to that commonly known as the "Venturi tube", described in United States Patent No. 381,373, April 17, 1888, and have connected to said tube two chambers one communicating with the up-stream or high pressure side of the tube, and the second chamber communicating with the throat or reduced portion of said tube. These chambers communicate with each other, and in each is a float supported on a column of mercury, said floats being connected through suitable mechanism to operate a recording pen and move the same over the face of a continuously rotating record sheet. This device may be operated to continuously record the amount of flow passing through the pipe so that the quantity passing through at any period may be readily ascertained.

This invention is fully set forth in this specification and more particularly pointed out in the appended claims.

In the drawings: Figure 1—is a front elevation of my manometer connected up to a Venturi tube with the front plate removed, showing the recording sheet and the recording pen operating mechanism, also showing a portion of one of the chambers in section. Fig. 2—is a side elevation of the instrument partly in section.

Referring to the drawings at 1 is the base or frame of the manometer on which is supported a pair of cylinders 2 and 3, cylinder 2 being set somewhat higher than cylinder 3. At the lower end of each of these cylinders is the tapered aperture 4 and 5 communicating with the pipe 6 by which pipe the two cylinders are connected together. The upper end of cylinder 2 is provided with a short neck 7 communicating with the circular opening 8 and a stand-pipe 9 extends upward from said opening in line with its neck 7, making the whole cylinder self-contained and water-tight. The cylinder 3 is provided with a long neck 10 communicating with a circular chamber 11 corresponding to and in line horizontally with the circular chamber 8, and a stand-pipe 12 extends upward from the opening 11 in line with its neck 10, making this cylinder also tight against a pressure of water.

At 13 is a horizontal shaft extending from the circular chamber 11 through the circular chamber 8 and into the record casing 14. This shaft is provided with a suitable bearing 15 between the two chambers and a stuffing box 16 as it passes from the circular chamber 8 into the record casing. A gear 21 located in this chamber 8 is mounted on and fixed to this shaft, and a similar gear 23 located in chamber 11 is also mounted on and fixed to this same shaft.

At 17 and 18 are two floats adapted to rest on and be moved vertically by the change in the levels of the mercury in both of the cylinders. To the upper end of float 17 is connected a long rack 20 adapted to engage one side of the gear 21, while to the float 18 is also connected a similar rack 22 adapted to engage the opposite side of the gear 23. When either of the floats is way up the rack extends into its stand-pipe and when the float is way down the bottom of the same rests upon the lower end of its cylinder.

The record sheet 24 may be ruled or arranged in any convenient manner, the one shown is divided up into twenty-four equal parts by radial lines, representing the twenty-four hours of the day. It is also marked with a plurality of concentric circles representing a definite number of gallons or any other units of measure which may be adpoted. This record sheet is secured in any convenient way to a disk 25 which disk is mounted on the shaft 26 to be continuously rotated by clock mechanism, not shown. The recording pen 27 is mounted in the upper end of a long finger 28, which finger is pivoted at 29 a short distance above its lower end to the rocker arm 30 and is held up into position against the stop pin 31 by means of the light coil spring 32. By

this construction the finger may be easily drawn to one side to allow the ready replenishing of the record sheet and will automatically return to its operative position when released. This rocker arm 30 is pivoted at 33 and has an upward extension 34 carrying a contact roll 35 which engages and is held against the face of the actuating cam 36 by means of the weight 37. This actuating cam is mounted on the shaft 13 and is rotated by the movement of the floats.

Another feature of the invention is that the communication between the two cylinders is automatically shut off by either of the floats when they are in their lowest position. Any suitable valve may be used for this purpose but I have preferably tapered the bottom portion of the floats whereby the same are adapted to fit into the corresponding recess at 4 or 5 in the bottom of the float chambers effectually sealing the passageway so as to prevent a further action of the pressure on the mercury after the floats have reached the limit of their stroke.

It is found in practice to be very difficult to form the cylinders of a regular size throughout their length and to make both of exactly the same diameter. This difference, which may be due to faulty workmanship or otherwise, may be compensated for in the formation of the cam that controls the movement of the recording finger.

In the operation of this device the liquids or gases flow through the tube 40 in the direction of the arrow the up-stream side of the tube is connected at 41 by means of pipe 42 to the cylinder 3, while the throat is connected at 43 by the pipe 44 to the cylinder 2. When there is no flow through the tube the pressure at all points of the tube is, of course, equal and the floats in both cylinders are at the same height. As soon as the flow begins the pressure in the throat is decreased and becomes less than that at the point 41, therefore the mercury in chamber 3 is forced downward by the excess of pressure on this side, raising the mercury and float in the opposite chamber 2 a corresponding amount. As these floats move one up and one down they act with corresponding force through their respective racks and gears on the shaft to rotate the actuating cam in proportion to their movement, and as this cam revolves in the direction indicated by the arrow the contact roll is caused by the weight 37 to follow the face of said cam and so control the outward movement of the recording finger across the face of the record sheet. The reverse action of the finger takes place when the cam is rotated in the opposite direction. The greater the amount of water flowing through the tube the greater the difference in the height of the floats and consequently the greater the movement of the cam and the recording finger from the center of the disk. The quantity, whether constant or varying, is clearly and accurately recorded on each record sheet for a predetermined period. These sheets, when operated by the mechanism described, should be removed and replaced by a fresh one every twenty-four hours, the one removed containing the record being filed away for reference.

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

1. In a device of the character described, the combination of a main pipe, a pair of adjacent receptacles, a rotatable shaft adapted to pass from one receptacle into the other, and means in both of said receptacles adapted to act upon said shaft to rotate the same, said means being actuated by the difference in pressure at two points in said main.

2. In a device of the character described, the combination of a main pipe, a pair of adjacent receptacles, a dividing wall between said receptacles, a rotatable shaft adapted to pass through said wall to communicate with each of said receptacles, and means in both of said receptacles actuated by the difference in pressure at two points in said pipe adapted to act upon said shaft to rotate the same.

3. In a device of the character described, the combination of a main pipe, a pair of adjacent receptacles, a rotatable shaft adapted to pass from one receptacle into the other, and a float in each of said receptacles adapted to act upon said shaft to rotate the same, said floats being controlled in their action by the difference in pressure at two points in said main.

4. In a device of the character described, the combination of a main pipe, a pair of adjacent receptacles, a dividing wall between said receptacles, a rotatable shaft adapted to pass through said wall to communicate with each of said receptacles, means in both of said receptacles actuated by the difference in pressure at two points in said pipe adapted to act upon said shaft to rotate the same, and means actuated by said shaft for showing the amount of water which passes through said main.

5. In a device of the character described, the combination of a main pipe, a pair of adjacent receptacles adapted to retain fluids of different pressures, a float in each receptacle, a wall between said two receptacles to separate the pressures, and a rotatable shaft for transmitting the motion of said floats, said shaft being adapted to pass through said wall into each of said receptacles whereby both floats may engage and act upon it.

6. In a recording device, the combination of a rotatable record sheet, a tracer, a rotatable cam adapted to control the movement

of said tracer, a pair of cylinders, a float in each cylinder, and means including a rack and pinion for rotating said cam as said floats rise and fall.

7. In a recording device the combination of a main supply pipe, a continuously rotating record sheet, means for tracing on said sheet, a pair of pressure containing cylinders communicating with each other, a float in each cylinder positioned by the difference between the pressures at two points in the main pipe, means whereby the movement of said floats will move the tracer across the face of the record sheet, and means whereby the communication between said cylinder is automatically closed when one of the floats is in its extreme down position.

8. In a recording device, the combination of a main supply pipe, a pair of pressure containing cylinders communicating with each other at their lower ends, a float in each cylinder positioned by the difference between the pressures at two points in the main pipe, means actuated by said floats to continuously record the quantity passing through said main pipe, and means whereby the communication between said cylinders is automatically closed when one of the floats is in its down position.

9. In a recording device the combination of a rotatable record sheet, a tracer, a pair of pressure chambers, a shaft passing through both of said chambers, a pinion in each chamber mounted on said shaft, a float in each chamber positioned by the difference between the pressures at two points in the main pipe, a rack connected to each float, said racks engaging said pinions, and means including said rack and pinion whereby the movement of said floats will continuously record the quantity passing through said main pipe.

10. In a recording device the combination of a main supply pipe, a rotatable record sheet, a pivoted tracing finger, a pair of pressure chambers, a shaft passing through both of said chambers, a pinion in each chamber mounted on said shaft, a float in each chamber positioned by the difference between the pressures at two points in the main pipe, a rack connected to each float said racks engaging said pinions, and a cam also mounted on said shaft for controlling the movement of said tracer over the face of the record sheet whereby the flow through said main pipe is continuously recorded.

11. In a recording device the combination of a rotatable record sheet, a tracer, a pair of adjacent pressure chambers, a shaft passing from one chamber into the other, a pinion in each chamber mounted on said shaft, a float in each chamber positioned by the difference between the pressures at two points in the main pipe, a rack connected to each float, said racks engaging said pinions, and means including said rack and pinion whereby the movement of said floats will continuously record the quantity passing through said main pipe.

12. In a recording device, the combination of a main supply pipe, a rotatable record sheet, a pivoted tracing finger, a pair of adjacent pressure chambers, a shaft passing through from one chamber into the other, a pinion in each chamber mounted on said shaft, a float in each chamber positioned by the difference between the pressures at two points in the main pipe, a rack connected to each float said racks engaging said pinions, and a cam also mounted on said shaft for controlling the movement of said tracer over the face of the record sheet whereby the flow through said main pipe is continuously recorded.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK N. CONNET.

Witnesses:

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