

Feb. 14, 1950

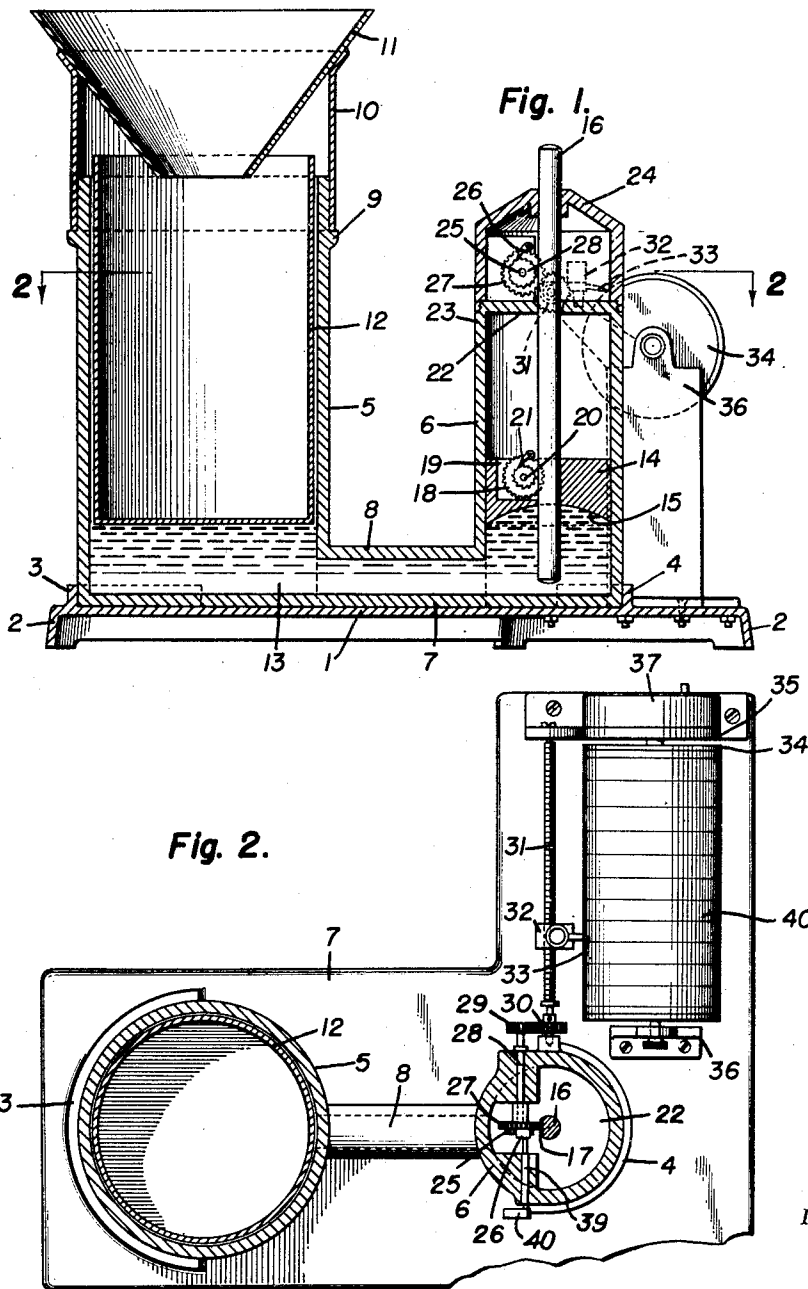
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2,497,759

RAIN OR SNOW GAUGE

Filed Dec. 2, 1946

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

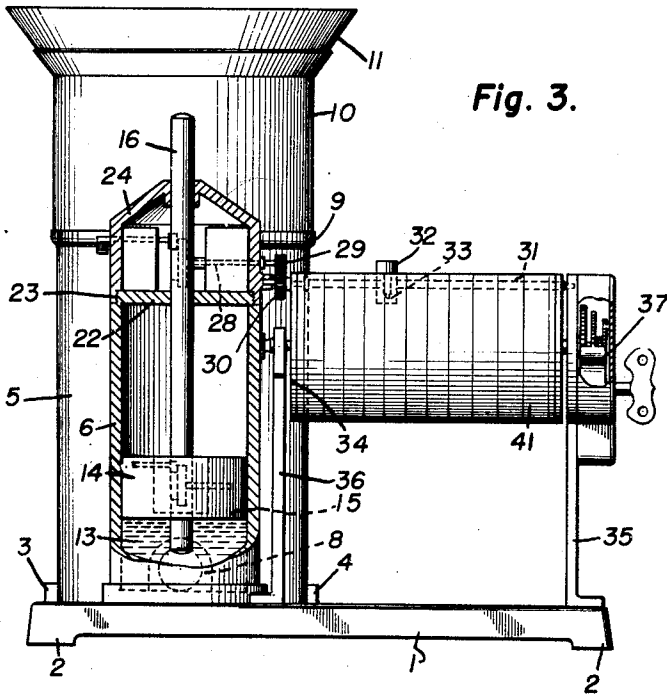


Fig. 3.

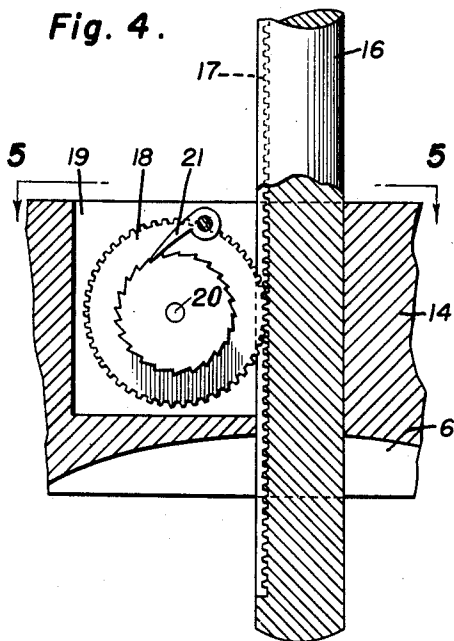


Fig. 4.

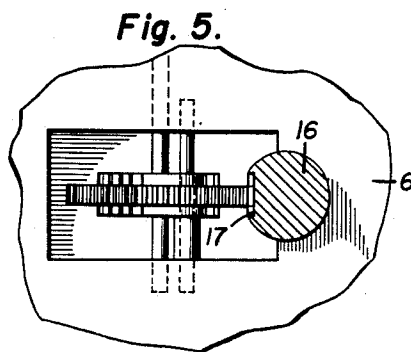


Fig. 5.

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UNITED STATES PATENT OFFICE

2,497,759

RAIN OR SNOW GAUGE

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Application December 2, 1946, Serial No. 713,562

8 Claims. (Cl. 73-171)

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This invention relates to improvements in rain or snow gauges.

An object of the invention is to provide an improved rain or snow gauge which will accurately measure and record the cumulative amount of rain fall or snow fall over a period of time, said gauge being in no manner effected by evaporation after the rain or snow has been measured and recorded.

Another object of the invention is to provide an improved rain or snow gauge including a collecting vessel supported upon a column of mercury in a chamber for forcing the column of mercury downward in said chamber when water or snow collects in said vessel, the mercury being forced into a smaller chamber beneath a piston which is provided with a one way ratchet clutch engageable with a rack on a vertically movable rod for moving said rod upwardly with said piston and the same is forced upwardly by the column of mercury, said ratchet clutch being automatically declutched from the rod when the piston moves downwardly in the smaller chamber; the rack on said rod also engaging a second or upper ratchet clutch which permits upward movement of the rod but checks any downward movement thereof, said second ratchet gear operating a longitudinally movable pen over a paper chart disposed on a rotatable drum suitably driven by a spring motor.

A further object of the invention is to provide an improved rain or snow gauge which will be highly efficient in operation, and relatively inexpensive to manufacture and produce.

Other objects will appear as the description proceeds.

In the accompanying drawings which form a part of this application,

Figure 1 is a vertical sectional view through the improved rain or snow gauge;

Figure 2 is a view partly in section taken on the line 2-2 of Figure 1;

Figure 3 is a front elevation of the improved rain or snow gauge being partly broken away and in section to show the ratchet clutch mechanisms and piston with rack rod in the smaller chamber;

Figure 4 is an enlarged detail sectional view through a portion of the piston with ratchet clutch and rack rod associated therewith, and

Figure 5 is a partial sectional view taken on the line 5-5 of Figure 4.

Like characters of reference are used throughout the following specification and the accom-

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panying drawings to designate corresponding parts.

In carrying out the invention, there is provided a suitable base or support 1 having depending supporting feet or flanges 2 at its corners, and formed with upwardly extending positioning flanges 3 and 4 at its upper surface.

A unit comprising a large vertically extending cylinder 5 and a smaller vertically extending cylinder 6 spaced therefrom is provided with a common base or bottom 7, and are connected by the tube 8 and adapted to be received and positioned between said flanges 3 and 4.

The large cylinder 5 is open at its top and is formed with an external annular shoulder 9 which supports the collar 10 and funnel 11 connected therewith. A cylindrical container or vessel 12 is slidably received in the large container 5, the same being open at its upper end to receive rain or snow which falls into and through the funnel 11.

Mercury 13 is placed in the cylinders 5 and 6 and completely fills the connecting tube 8 extending upwardly above the level of said tube in each of the cylinders 5 and 6 to provide mercury columns, said vessel 12 resting upon the mercury column in the large chamber or cylinder 5.

A piston 14 having a concave lower surface 15 is disposed in the smaller cylinder 6 and is centrally apertured to slide upon the vertically and axially disposed rack bar 16 in said cylinder 6, and is formed with a rack 17 on one side thereof.

A ratchet clutch 18 is supported in a well 19 in the piston 14 upon the cross pin 20, the gear of the same being in engagement with the rack 17 and controlled by the pivoted pawl or dog 21, whereby when the column of mercury 13 in the small cylinder 6 raises, due to rain or snow accumulating in the vessel 12 and by its weight forcing the mercury from the large cylinder 5 into the smaller cylinder 6, the ratchet clutch will engage and lock itself to the rack 17 of the rack bar 16 to raise the bar upwardly.

The upper end of the smaller cylinder 6 is closed as at 22 and is externally threaded as at 23 on its upper end, the bar 16 extends upwardly through a central aperture in the closed head 22 and through the cap closure member 24 threaded on the upper end of the cylinder 6.

A second clutch 25 is controlled by the pivoted pawl or dog 26 and is supported in the cap member 24 with its gear 27 engaging the rack 17 on the rack bar 16, to permit the bar to move upwardly in a succession of separate steps, but to

check and prevent its downward movement when the piston 14 drops downwardly upon the mercury moving to its normal position when the rain or snow has evaporated or has been dumped from the vessel 12.

A shaft 28 will extend through the cap member 24, being connected with the gear 27 and to a gear 29, which in turn connects with gear 30 on the horizontally disposed screw shaft 31 upon which a holder 32 for a pen 33 is supported for longitudinal movement as the shaft 31 is rotated by the upward movement of the rack bar 16.

A cylinder 34 is suitably supported in the brackets 35 and 36 at its opposite ends, and supports a replaceable paper recording sheet 41 upon which the pen 33 marks its record as the cylinder 34 is rotated by the spring motor 37.

From the foregoing description, it will be apparent that the mode of operation of the rain or snow gauge will be as follows: The gauge is placed out of doors on a level support, and when it rains or snows, the same will enter the funnel 11 into the vessel 12 increasing the weight on the column of mercury in the large cylinder 5 forcing the mercury downward in said cylinder and through the tube 8 into the smaller cylinder 6 to raise the column of mercury therein and the piston 14 which will raise the rack rod or bar 16 to operate the pen mechanism hereinbefore described. Each time there is a rain fall or snow fall, the rod or bar 16 will be moved further upward to move the pen along the spring rotated cylinder and graph sheet.

After the precipitation has been measured and recorded, the liquid in the vessel 12 can be siphoned out or the vessel removed and inverted to release the captured liquid. The pawl 26 is then disengaged from the ratchet gear to allow the same to rotate freely and permit the rack rod to move downwardly to its normal position. In this respect, a transverse shaft or rod 39 is disposed through the cap closure 24, its inner reduced end carrying the pawl 26. A lever 40 is disposed on the outer end of the rod and responsive to manual pressure rotates the inner end of the rod and functions to disengage the pawl. Of course, the ratchet assembly mounted in the piston freely rotates to allow the rack bar to slide downwardly, the pawl 21 functioning only to enable the ratchet gear 18 to move the rod upwardly, responsive to an upward movement of the piston, upon an increase of pressure.

While the preferred embodiment of the instant invention has been illustrated and described, it will be understood that it is not intended to limit the scope of the invention thereto, as many minor changes in detail of construction may be resorted to without departing from the spirit of the invention.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. A rain or snow gauge including a supporting base, spaced vertical open top cylinders seated thereon a connecting means between said cylinders, mercury in said connecting means and in the cylinders above the connecting means, an open vessel in one cylinder supported on the mercury therein, a piston in the other cylinder and actuated by the mercury therein, a rack rod slidably disposed through said piston, a ratchet gear supported by said piston and engaged with said rack rod means for preventing downward movement of the rack rod, and a recording device

operable by the movement of the last mentioned means.

2. A rain or snow gauge including a supporting base, spaced interconnected cylinders thereon, mercury in said cylinders above the connection therebetween, an open vessel in one cylinder supported on the mercury therein, a piston in the other cylinder supported on the mercury therein, an apertured cap closure on said second cylinder, a rack rod slidably mounted through said piston and extending through said cap closure, a ratchet gear supported by said piston and engaged with said rack rod for connecting said piston and rod for simultaneous upward movement, a ratchet gear in said cap member engageable with said rack rod to prevent downward movement of the same, and a recording device operable by the movement of said last mentioned ratchet gear.

3. The subject matter as claimed in claim 2, a rotatable screw operated by the last mentioned ratchet gear, a pen supported thereon for longitudinal movement, and a rotatable graph supporting cylinder engaged by said pen.

4. The combination of claim 2, wherein said last mentioned ratchet gear is rotatably mounted in the cap closure, a shaft transversely disposed through the cap member, and operatively associated with said gear, a rotatable screw actuated by said shaft, drive transmitting means connected between said shaft and screw, an inscribed carriage longitudinally moved by said screw and a graph disposed adjacent said carriage engaged thereby.

5. A rain and snow recording gauge comprising a supporting base, a first open top cylinder mounted on said base, a second cylinder mounted on said base and spaced from said first cylinder, a horizontally disposed connecting means between the said cylinders, fluid pressure means disposed in said connecting means and in the lower portion of the cylinders, a vessel slidably disposed in the first cylinder and supported by the fluid pressure means, a piston slidably mounted in the second cylinder in response to an external pressure in said vessel, a rack rod slidably disposed in said piston, locking means carried by the piston and engaged with the rack rod effecting an upward movement of the piston and rod, means for preventing free downward movement of the rack rod, and actuating means operatively associated with said rack rod, a rotatable screw operated by said actuating means, a longitudinal movable carriage mounted on said screw, an inscribing needle carried by said carriage, and a graph disposed adjacent said carriage and engaged by said needle.

6. A rain and snow recording gauge comprising a supporting base, spaced interconnected vertically disposed cylinders seated on said base, fluid pressure means communicated between the lower portions of said cylinders, an open top vessel slidably disposed in one cylinder, a piston slidably mounted in the other cylinder and actuated by the fluid pressure means, responsive to an external pressure in said vessel, an operating rod slidably mounted in said piston, means in said piston engaging said rod for moving the same upwardly upon upward movement of the piston, a ratchet gear actuated by said rod, a rotatable screw operatively associated with said ratchet gear, an inscribing instrument supported on said screw for longitudinal movement, and a rotatable graph supporting cylinder engaged by said instrument.

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7. The combination of claim 6 wherein said piston engaging means include a ratchet gear journaled in said piston and engaged with said operating rod.

8. The combination of claim 6, wherein means is provided for preventing free downward movement of the rod upon downward movement of the piston, said means including a pawl engaged in said ratchet gear and means for disengaging said pawl.

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