S. KOŹMINSKI.

DRUM GAS METER.

APPLICATION FILED MAR. 1, 1909.

974,079. Patented Oct. 25, 1910.

Fig. 1

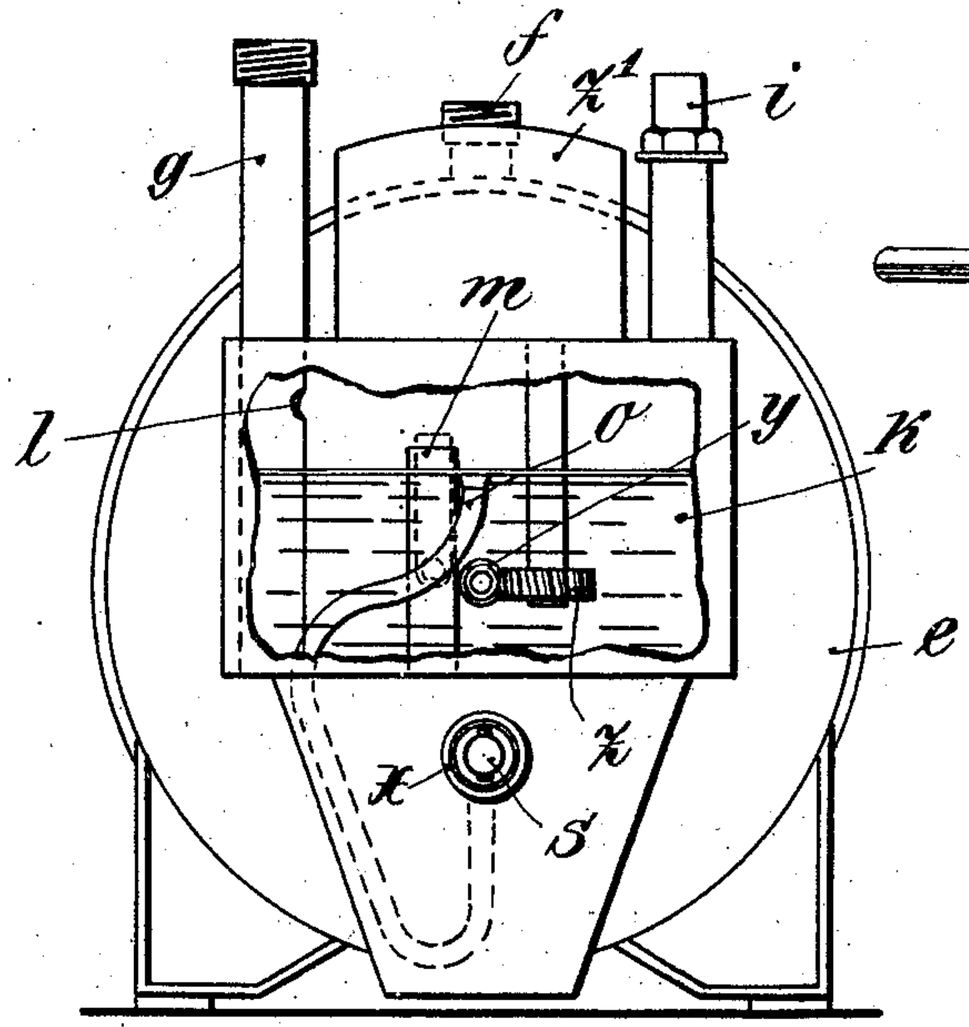


Fig 5

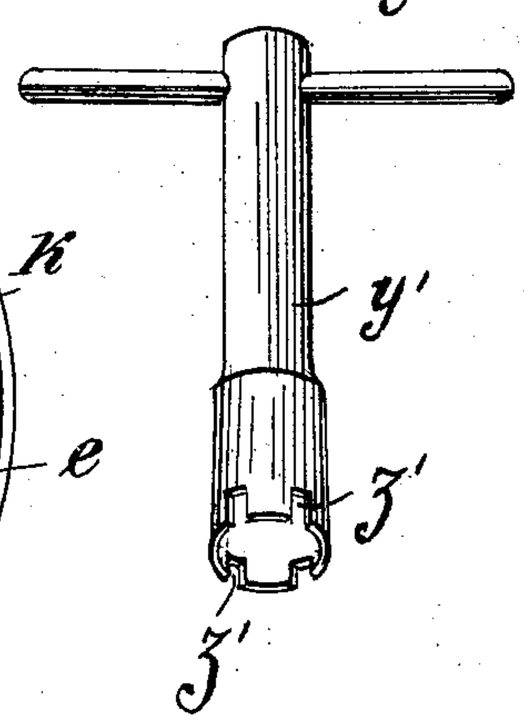


Fig. 2

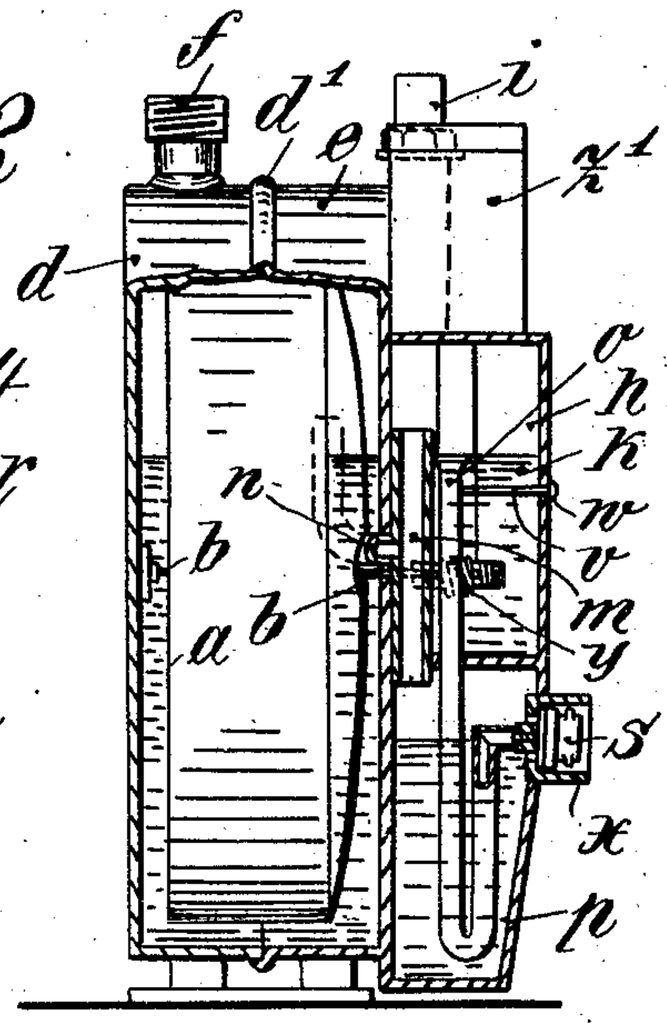


Fig. 4

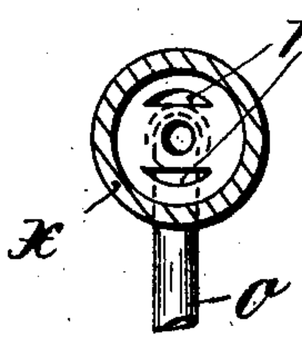
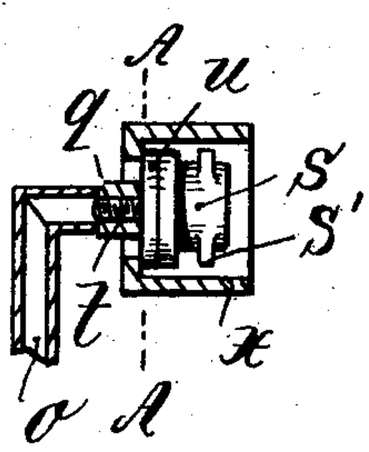


Fig. 3



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UNITED STATES PATENT OFFICE.

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DRUM GAS-METER.

974,079. Specification of Letters Patent. **Patented Oct. 25, 1910.**

Application filed March 1, 1909. Serial No. 480,618.

To all whom it may concern:

Be it known that I, SAMUEL KOŹMINSKI, chemist, citizen of Germany, subject of the King of Prussia and Emperor of Germany, residing at Charlottenburg, near Berlin, in the Kingdom of Prussia and Empire of Germany, have invented new and useful Improvements in Drum Gas-Meters, of which the following is a specification.

The subject-matter of this invention is a wet drum gasmeter, in which light mineral oil of the nature of so-called solar oils, spindle oils and the like is employed as the sealing liquid. Preferably light, non-freezing mineral oil free from paraffin is employed, which is on the dividing line between petroleum and the light lubricating oil distillate, namely so-called solar oil of the viscosity according to Engler of 1.2 to 2.0 at 20° centigrade; less suitable, but nevertheless quite usable, are, on the one hand, petroleum and, on the other hand, thin mineral oils having somewhat higher boiling points and of the viscosity of at most 2.0 at 20° C.

Heretofore water, salt-solutions or glycerin have been employed as the liquid for wet drum gas-meters. All these liquids have certain definite disadvantages in working. Water freezes at low temperature and, on account of its evaporating readily, constantly requires to be replenished. Salt-solutions attack the metal of the case so that the same is rusted through in a short time. Also, like water, they have the disadvantage of evaporating. Glycerin constantly withdraws moisture from the gas so that it constantly becomes more diluted in use and then likewise evaporates. The light mineral oils of the kind described and proposed above are free from all the above mentioned defects of the sealing liquids employed heretofore. They do not freeze at the lowest temperatures which occur in practice and are such thin liquids that the gas pressure is not diminished to a greater extent by the motion of the drum than in the case of other liquids. The oils are not changed by the gas either physically or chemically and also they do not attack the gas in any manner; they neither dry up nor do they contain acids; they do not resinify, nor can they become rancid, which is the case with the ordinary oils, *i. e.* vegetable oils proposed as sealing liquids for gasmeters with oscillating bell. Also they do not attack the materials of the case and drum, so that these metal parts can be made much lighter and thinner than heretofore. The price of these oils is low as they are but little used for other purposes. Of special importance, however, is the property of these oils that they do not evaporate at all nor do they diminish in volume. After the gas has passed through for a very short time the volume of the oil becomes perfectly constant, so that no physical or chemical changes at all take place in these oils when the gas is continually passed through them. This state of equilibrium occurs in spindle oil, for example, after it has absorbed 2.3 to 2.7 per cent. by weight of illuminating gas, and in the case of solar oil after it has absorbed 1.7 to 2.0 per cent. by weight of the same. As soon as these small quantities are absorbed by the oil the state of equilibrium occurs and then measurements are obtained of an accuracy which has never been obtained heretofore, almost all supervision or refilling of the sealing liquid being done away with.

The construction of the gas-meter, for which this new sealing liquid is to be employed, may be that of any known wet drum gas-meter. Consequently it is possible, when employing this sealing liquid, to make the drum of thinner material than was possible heretofore, because all attacking of the metal by rusting is done away with, and consequently the drum can be made substantially lighter and a thin steel needle can be employed as the axle. As the bearing friction, which is dependent on the weight of the drum and the diameter of the axle, is diminished, the driving resistance is also reduced correspondingly. This being so it is possible to arrange a high-speed drum and to make a substantially smaller gas-meter. This was not possible with the liquids employed heretofore, particularly because, when the drum moved quickly, the liquid was evaporated more, so that the attendance costs of the gas-meter became greater. I have been able to solve this problem by employing a liquid which does not evaporate at all in illuminating gas and, in addition, has the above described properties. For example, whereas an ordinary five-flame gas-meter containing water, passing 750 liters of gas per hour at a gas pressure of 40 mm. of water and a loss of pressure of 4 mm. of

water, has a drum 1.9 kilograms in weight running at a speed of 105 revolutions per hour, so that each revolution conveys about 7 liters of gas, when using light mineral oil as the liquid, the drum for the same passage of gas per hour has a weight of only 840 grams, is 315 mm. broad and 100 mm. deep, and the axle may consist of a steel wire 5 mm. diameter, the revolutions amounting to 187½ per hour, so that the drum conveys only 4 liters at each revolution without the loss of pressure increasing. On account of the property of the liquid, that it does not vary in volume during a long period, it is also possible to do away with the floating valve employed in wet gas-meters known heretofore which only serves the purpose of limiting the fall in level of the liquid up to a certain point. Lastly, the employment of light mineral oil as the sealing liquid results in additional constructional advantages which are pointed out in the following description of one example of the constructional form of such a gas-meter.

The accompanying drawing represents by way of example one constructional form of the subject-matter of the invention, Figure 1 showing a front elevation with part of the front wall of the front box being broken away, Fig. 2 a side elevation partly in section, Fig. 3 a sectional elevation of part of the adjusting pipe, and Fig. 4 the latter in front sectional elevation in the plane A—A in Fig. 3. Fig. 5 is a perspective view of the key.

Referring to the drawing, the drum *a* is of the usual construction with the difference that sheet metal less than 0.35 mm. thick is employed which is possible owing to the exceedingly small dimensions of the drum both in diameter and in breadth. Owing to this light weight a thin steel needle *b* suffices as an axle and this likewise conduces toward making the running of the drum very light. The axle *b* is provided in known manner inside the front box *h* with a worm *y* which imparts the motion of the drum by means of the worm wheel *z* to the counting mechanism inclosed in the box *z'*. The drum *a* is inclosed in known manner in a case consisting of two halves *d* and *e* which abut in a joint running around the exterior of the case and are connected here by a narrow roll-shaped ring *d'*, as clearly shown. In consequence of the small breadth of the drum it is possible to make the outer case correspondingly narrow. But in order to be able nevertheless to employ the gas-meter for the pipe-line connections with the standard distance between the connecting sockets, the one pipe connection *g*, *i. e.* the gas supply pipe of the gas-meter, is not located, as is customary, at the rear end of the front box *h*, but is placed at the front end of the same. The second pipe connection *f*, *i. e.* the gas delivery pipe, is arranged at the rear end of the case *d e*. The drum-case is filled, for example by means of the inlet closed by the screw *i* which can be removed only by a special key such as shown in Fig. 5, with a thin liquid mineral oil *k*, such as solar oil, spindle oil, etc., as the sealing liquid.

In the constructional example shown in the drawing there is no floating valve. The gas enters through the admission pipe *g*, passes through the hole *l* into the front box *h* without passing a floating valve into the gas-pipe *m* whence it passes through the bent pipe *n* into the interior of the drum *a*.

The adjusting device by which, before the gas-meter is started, the definite level of the sealing liquid *k* is adjusted and which simultaneously provides that this level is never exceeded, even when adding liquid, is likewise improved in the illustrated constructional form, having regard to the sealing liquid employed, which, as mentioned above, has the property of never evaporating or becoming diminished in volume and therefore makes almost all supervision unnecessary. Now in order to avoid some of the sealing liquid flowing away through the gas supply pipe *m* when the pressure fluctuates, as occurs for example when the main stop-cock is opened and closed, a special, relatively narrow adjusting pipe *o* is arranged so that when the level fluctuates, only the small quantity of liquid which pipe *o* can still hold enters the pipe. At the same time the gas supply pipe *m* is so arranged that its mouth is located somewhat higher than that of the adjusting pipe *o*, so that the fluctuations in level of the liquid cannot reach the gas supply pipe *m*. The bottom end of this pipe *m* is connected with the vessel *p* for receiving the liquid. The adjusting pipe or tube *o* passes in the form of a U through this vessel *p* and opens in the upper part of the same into an outlet *q* provided with internal screw-threads. Close to this outlet *q* the wall of the receptacle *p* is provided with segment-like incisions *r* which form the discharge for the liquid in the receptacle *p*. The orifices *q* and *r* are arranged concentrically so that they can be closed simultaneously with one and the same screwed closure *s*. As clearly shown in Fig. 3, this screw *s* consists of a cap-screw having a screwed body *t* carrying a packing disk *u*. This packing disk may consist of lead or other suitable packing material and, when the screw is tightened, serves to close the outlet *q* for the pipe *o* and the outlets *r* of the receptacle *p*, whereas the screwed stem *t* closes the pipe *o* at its mouth *q*.

Before the gas-meter is started working it can be adjusted with the aid of a wire *v* which is soldered to the pipe *o* and passes through a hole *w* in the wall of the front box *h* and when moved moves the flexible

tube *o*. When the adjustment is finished the wire *v* is soldered to the wall of the box *h* and the hole *w* in the same is closed. The cap-screw *s* is protected by the socket *x* from being opened unauthorizedly and, like the screw *i*, can only be opened with a hollow key *y'* having spaced notches or recesses *z'* in its outer end designed to engage the lugs as *s'* on the screw *s*.

It is to be understood that the constructional details may be varied in many respects and, without departing from the spirit and scope of the invention if it is not wished to utilize the advantages connected with these improvements, these constructional parts may be done away with and be substituted by known means. The construction of the drum, counting mechanism, dials and all other parts of the gas-meter not described in detail here is the customary and generally well-known one in the ordinary wet drum gas-meters.

I claim as my invention—

1. In combination with a wet drum gas-meter, of a sealing liquid consisting of light mineral oil of the nature of solar and spindle oils.

2. In combination with a wet drum gas-meter, of a sealing liquid having substantially a constant level and comprising a mineral oil having a specific weight of 0.8 to 0.9, a freezing point of below minus 25° Celsius and a viscosity according to Engler of 1.2 to 2.0 at 20° centigrade.

3. A gas-meter comprising in combination a case, an axle mounted revolubly in said case, a drum on said axle, counting mechanism driven by said axle, a sealing liquid consisting of light mineral oil of the nature of solar and spindle oils, a box arranged on the front of said case, a receptacle arranged under said box, and an adjusting pipe opening within said box at the level of the sealing liquid and passing U-shaped through the front box and the receptacle located under the latter and opening at the front wall of said receptacle.

4. A gas-meter comprising in combination a case, an axle mounted in the latter, a drum on said axle, counting mechanism driven by the axle, a sealing liquid consisting of light mineral oil of the nature of solar and spindle oils, a front box arranged on the front wall of said case, a receptacle located under said box, an adjusting pipe opening within said box at the level of the sealing liquid and passing U-shaped through the front box and the receptacle located under the latter and opening at the front wall of said receptacle, said adjusting pipe consisting of flexible metal, and a wire soldered to the upper part of said pipe, said wire being soldered to the wall of the front box at a suitable height after the gas-meter has been adjusted.

5. A gas-meter comprising in combination a case, an axle mounted in the latter, a drum on said axle, counting mechanism driven by the axle, a sealing liquid consisting of light mineral oil of the nature of solar and spindle oils, a front box arranged on the front wall of said case, a receptacle located under said box, an adjusting pipe opening within said box at the level of the sealing liquid and passing U-shaped through the front box and the receptacle located under the latter and opening at the front wall of said receptacle, said receptacle having an outlet close to the outlet of said adjusting pipe, and a detachable closure for closing both outlets in common.

6. A gas-meter comprising in combination a case, an axle mounted in the latter, a drum on said axle, counting mechanism driven by the axle, a sealing liquid consisting of light mineral oil of the nature of solar and spindle oils, a front box arranged on the front wall of said case, a receptacle located under said box, an adjusting pipe opening within said box at the level of the sealing liquid and passing U-shaped through the front box and the receptacle located under the latter and opening at the front wall of said receptacle, said receptacle having an outlet close to the outlet of said adjusting pipe, a short open pipe and a detachable closure for closing both outlets in common, said closure consisting of a screw whose head is arranged sunk in said short open pipe and is adapted to be opened only with a special key.

7. A gas-meter comprising in combination a case, an axle mounted in the latter, a drum on said axle, counting mechanism driven by the axle, a sealing liquid consisting of light mineral oil of the nature of solar and spindle oils, a front box arranged on the front wall of said case, a receptacle located under said box, a specially narrow adjusting pipe and a tube open above and below connecting the upper part of said receptacle with the upper part of said front box and provided at the side turned toward the drum with a socket leading into the interior of the drum, the upper end of this tube being located higher in said front box than the upper end of said adjusting pipe.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

SAMUEL KOŹMINSKI.

Witnesses:

HENRY HASPER,

WOLDEMAR HAUPT.