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METHOD IN MEASURING HEAT CONSUMPTION

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The consumption of heat from radiators and hot-water-cocks in heating plants is ordinarily measured by evaporation of a liquid from containers disclosed in meters, which are arranged at each individual heat delivering member of the heating plant so as to be heated from the said member in question.

Ordinarily the said liquid is tetraline, because the boiling point of this liquid is sufficiently high and because the evaporaton characteristic of tetraline has a form which within the ranges of temperatures coming into consideration by measuring heat delivered, for instance from radiators, corresponds nearly to the form of the characteristic curve of heat delivery of a radiator.

Now heat measuring meters of the said kind have a considerable non-load evaporation, which means that even if no heat is delivered from the heating plant the meters would nevertheless record a consumption, viz. the said non-load evaporation, due to the fact that at ordinary room-temperature a considerable amount of the measuring liquid, viz. tetraline, would evaporate. This causes an incorrectness of the result of the measure, and this incorrectness is rather considerable and may amount to 25–50% of the recorded consumption. For this reason the recorded amount of heat cannot be relied upon as a base for the calculation of the share of the individual consumers in the total heat consumption from the heating plant.

It has been proposed to remedy this drawback by fitting the measuring scale of the meter with means for compensating the non-load evaporation in dependence of the time in which the meter has been in use before the registration is read. In this way it is however not possible to secure a sufficient correctness of the measuring, because the properties of the tetraline, and specially the speed of evaporation of tetraline change gradually due to the influence of air and heat, and probably also due to the influence of the light, so that gradually the speed of evaporation of tetraline decreases and this influences the registration of the consumption of heat to a detrimental degree.

One object of the present invention is to avoid the incorrectness of the measured consumption due to non-load evaporation of the measuring liquid, and a further object of the invention is to avoid the incorrectness of the registered consumptions, which is due to changes of property of the measuring liquid. To this end there is according to the invention used measuring liquids other than tetraline, decaline and similar liquids.

According to the present invention the purpose aimed at may be obtained by the use of a measuring liquid, having a speed of evaporation, which is very slow at ordinary room-temperature, or by use of a measuring liquid, which from the air slowly absorbs humidity to such a degree, that the amount of humidity absorbed in the course of a certain interval of time by the measuring liquid is less than twice the amount of the said liquid, which at ordinary room-temperature would evaporate in the course of a corresponding interval of time.

A measuring liquid of the first mentioned kind is according to the invention an octylic alcohol, for instance normal secondary octylic alcohol, and a proper measuring liquid absorbing humidity from the air is according to the invention a higher, absolute alcohol.

If the measuring liquid absorbs from the air an amount of humidity less than twice the amount of liquid, which simultaneously disappears due to non-load evaporation, then this absorption would cause a relative increase of the volume of the liquid contained in the meter, so that the observed descent of the surface of the liquid in the container of the meter would correspond not to the amount of liquid, which has evaporated, but to the difference between this amount of liquid and the volume of humidity absorbed from the air.

It would be obvious that, if this amount of liquid is less than twice the amount of the measuring liquid evaporating at ordinary room-temperature, say about 68° F., the deviation of the registered consumption read on the measuring scale of the meter from the correct consumption would numerically be less than the incorrectness caused by the non-load evaporation.

Hitherto experts in the art have been of opinion that hygroscopic liquids are not applicable as measuring liquids in meters for measuring heat consumption by evaporation of a liquid, but this consideration may now be considered to be incorrect, because a hygroscopic liquid, which fulfills the above mentioned requirement with respect to the amount of humidity absorbed from the air, and further has a boiling point of a proper high value, for instance 300 to 400° F. and a proper characteristic curve of evaporation would be applicable for the said purpose. Such liquids are certain higher absolute alcohols and especially hexaline.

Hexaline would, when used as a measuring liq-

uid in methods of the above mentioned kind absorb humidity from the air independently of the temperature and the degree of humidity of the air, so that in a certain period of time hexaline would always absorb a constant amount of humidity, substantially independently of the air condition.

It has been observed that the evaporation of hexaline when influenced by the heat to be recorded would not vary to any considerable degree with the contents of humidity in the hexaline, and further the amount of humidity absorbed for instance in the course of a measuring season would be less than the amount of hexaline, which in the course of the measuring season would evaporate at ordinary room-temperature. The absorbed humidity would therefore partly compensate the incorrectness, which is due to the non-load evaporation, since the absorption would cause an apparent reduction of above 50% or the more of the non-load evaporation. For this reason more correct registrations are read on the measuring scale of the meter. Preferably hygroscopic liquids should be used, which besides of fulfilling the above conditions have a melting point, which lies between the lowest temperature at which the heat delivery member in question should operate and the lowest room-temperature, viz. 50°F. at which radiators are ordinarily not taken into use.

Hexaline has this property, since hexaline is a solid material at ordinary room-temperature and would maintain its solid state as long as hexaline has not had the occasion to absorb humidity. Hereby the advantage is obtained that by the use of hexaline as a measuring liquid in meters of evaporation fitted with a wick the hexaline would not be able to ascend the wick to the top end of same, from which the evaporation takes place, before the hexaline has been exerted to influence of heat. Therefore, a meter, which is supplied with hexaline a shorter or longer time before the commence of the heating season would practically not have a non-load evaporation and would not absorb humidity—which might cause an elevation of the surface of the hexalin in the meter, in which event the later registrations would not be correct—before the hexaline is heated.

In a heating plant comprising radiators as well as hot-water-cocks it would be advisable to measure the heat consumption by way of meters of the above mentioned kind by using hexaline as measuring liquid in the meters arranged to measure the delivery of heat at the hot-water-cocks, whilst normal secondary octylic alcohols are used as measuring liquids in the meter arranged at the radiators. If so the advantage is obtained that on all of the said meters there may be used measuring scales of the same species and of the same length, and if the meters are fitted with wicks the dimensions of the wicks in all of the meters may be equal. It would be obvious that this is advantageous.

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