No. 835,484. PATENTED NOV. 6, 1906.

L. WILSON.

DEMAND INDICATOR.

APPLICATION FILED SEPT. 18, 1905.

Fig. 1.

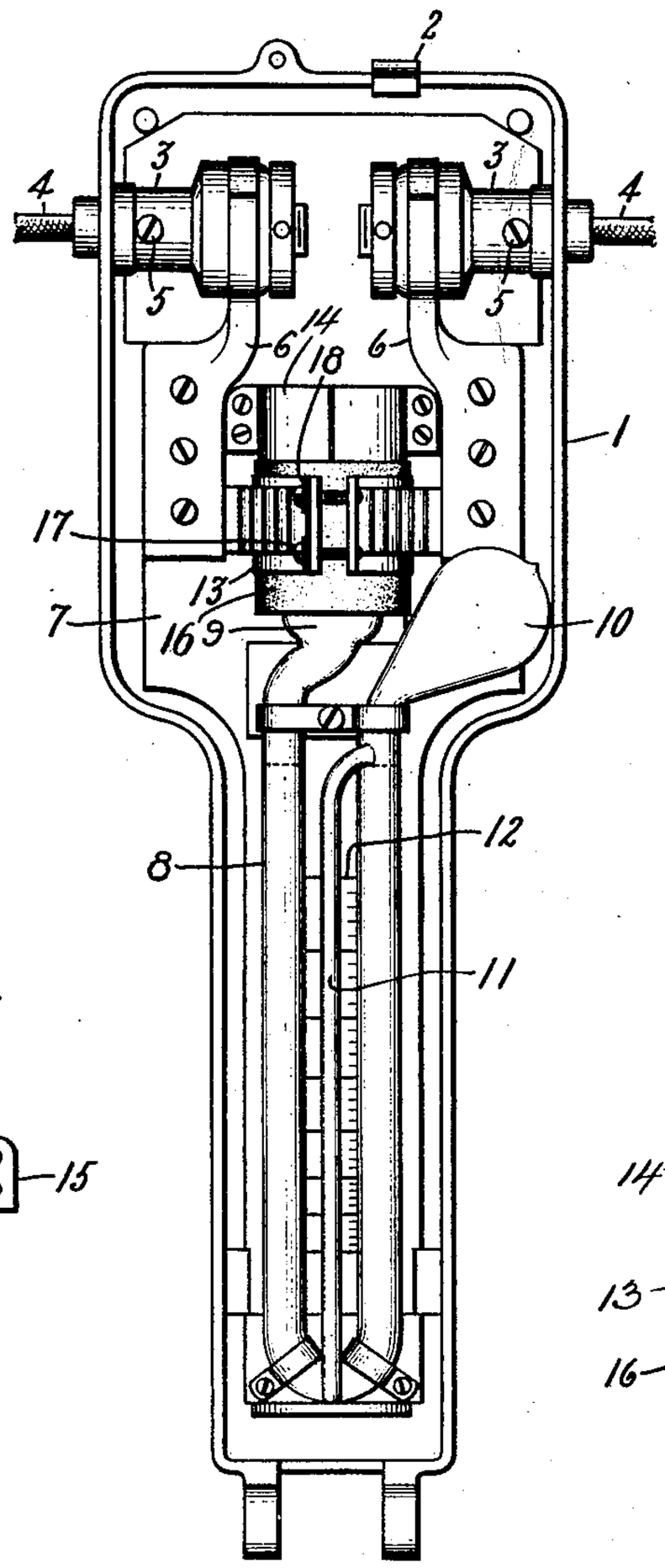


Fig. 2.

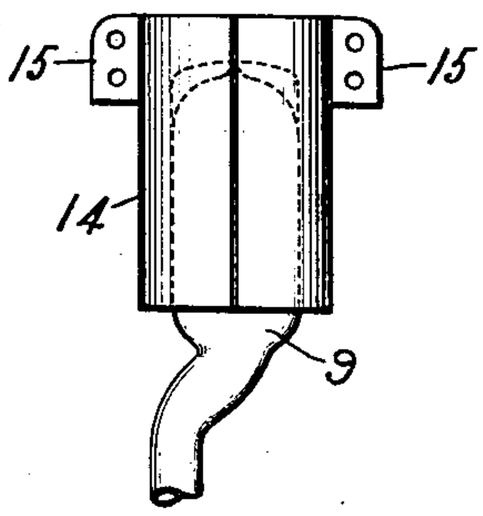
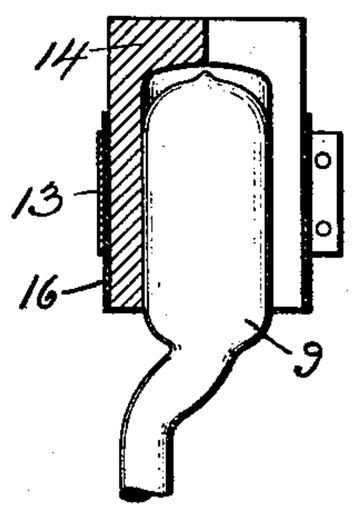


Fig. 3.



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UNITED STATES PATENT OFFICE.

LEONARD WILSON, OF PITTSFIELD, MASSACHUSETTS, ASSIGNOR TO STANLEY G. I. ELECTRIC MFG. CO., A CORPORATION OF MASSACHUSETTS.

DEMAND-INDICATOR.

No. 835,484. Specification of Letters Patent. Patented Nov. 6, 1906.

Application filed September 18, 1905. Serial No. 279,018.

To all whom it may concern:

Be it known that I, LEONARD WILSON, a subject of the King of Great Britain, residing at Pittsfield, county of Berkshire, State of Massachusetts, have invented certain new and useful Improvements in Demand-Indicators, of which the following is a specification.

This invention relates to an instrument for indicating the maximum demand of electric energy, and refers particularly to a maximum-demand indicator of the "Wright" type, in which the current to be measured, or a definite portion thereof, is passed through a heating-strip arranged in close proximity to a bulb at one end of a U-shaped tube containing a liquid and which when heated by the current expands the air or gas in the bulb, and thus causes the liquid in the tube to overflow into a receptacle, where it indicates by the height to which it rises therein the demand on the system.

The object of my invention is to provide an instrument of this type which will not respond to fluctuations of the current of short duration, but will only give indications of demands continuing over considerable periods. I accomplish this by separating the heating-strip and the expansion-bulb instead of winding the strip directly upon the bulb, as has been the practice heretofore, and in the space between the strip and the bulb I place a body of material having a high capacity for storing heat—such, for instance, as cast-iron—so that the heat of the strip is not communicated immediately to the air or gas in the expansion-bulb, but only after the lapse of an interval of time during which the strip has been storing heat in the body of iron. With the instrument constructed in this manner the passage of current through the heating-strip heats it and the expansion-bulb.

The invention further comprises other novel features, which will be more definitely indicated in the claims appended hereto.

The details of the construction and the method of operation of my improved maximum-demand indicator will be better understood by reference to the following description, taken in connection with the accompanying drawings, which illustrate the preferred embodiment of my invention, and in which—

Figure 1 is a front view of the indicator having the cover removed. Fig. 2 is an elevation of the expansion-bulb with the jacket thereon, and Fig. 3 is a central section through the expansion-bulb.

Referring to the drawings, the parts of the instrument are inclosed within a casing consisting of a back 1 and a cover (not shown in the drawings) which is hinged to the back 1 at the bottom and secured by a spring-catch 2 or other suitable means at the top. Extending through openings in the sides and secured thereto are two binding-posts 3 3, having openings therein into which leads 4 4 may be inserted and secured by set-screws 5 5. Rotatable on these binding-posts are metallic members 6 6, to which is secured a support 7. Mounted on this support is a U-shaped glass tube 8, filled with a suitable liquid. At the ends of tube 8 are enlarged portions forming an expansion-bulb 9 and a compression-bulb 10, each of which is filled with air or gas. Sealed into the right-hand limb of the U-shaped tube 8 is an indicator-tube 11, closed at its lower end, and mounted on the support 7 behind this tube is a scale 12, by which the height of the liquid in the tube 11 can be read. The heating-strip 13 surrounds the expansion-bulb 9 and is connected at its ends to the metallic members; but the temperature of the air or gas in the expansion-bulb is not raised immediately, as the heat of the strip is not given off to the bulb immediately. Instead the heat of the strip is communicated to the iron body or jacket and stored therein, and quite a difference of temperature exists between the outside and inside of the jacket. However, if the same amount of current continues to flow through the heating-strip for a considerable period the heat-storing capacity of the jacket will be reached, the jacket will give off heat more rapidly to the air or gas in the expansion-bulb, and the temperature of the latter will be raised to a point commensurate with the quantity of the current flowing in the heating-strip. In order that the instrument may be used interchangeably on alternating-current and direct-current circuits, I provide an air-gap in the iron jacket, so as to

prevent the flow of Foucault or eddy currents therein, which would heat up the jacket, and thus impair the accuracy of the instrument when used on alternating-current circuits.

My invention therefore comprises a demand-indicator having a vessel containing a liquid, a receptacle connected thereto containing an expansible fluid which by its expansion displaces the liquid to effect an indication, and a heating-strip for effecting the expansion of the fluid mounted in proximity to but separated from the receptacle containing the expansible fluid, so that the instrument will not respond to fluctuations of the current of short duration.

My invention also comprises such a demand-indicator having a jacket of iron or other material having a high heat-storing capacity mounted between the heating-strips 6 6, which are in electrical connection with the binding-posts 3 3. It will be seen that when a current is passed through the strip 13 the strip will be heated by the current, and the air or gas in the bulb 9 will be heated thereby and will expand. This expansion of the air or gas in bulb 9 causes the liquid in the right-hand limb of the U-shaped tube 8 to rise, and the amount of the liquid that overflows into the tube 11 is a measure of the maximum current which has passed through the heating-strip 13.

A more detailed description of these parts of the instrument is not considered necessary, as they form no part of my invention and are well known to those skilled in the art.

Surrounding the expansion-bulb 9 is a jacket 14, made of a material having a high capacity for storing heat. I have found cast-iron best for this use, as its heat-storing capacity is very great and also as cast-iron jackets can be readily made at small cost. The jacket 14 fits down over the top of the bulb 9 and is preferably provided with ears 15, by which it is secured to the support 7.

The heating-strip 13 encircles the jacket 14, but is insulated therefrom by a thin sheet 16 of asbestos or other suitable insulating material. Strip 13 is held securely in position by the screws 17, which are insulated from one end of the strip by the insulating-washers 18. With the instrument constructed in this manner a rise in the temperature of the heating-strip 13, due to an increase of the current flowing therethrough, does not immediately affect the temperature of the air or gas within the expansion-bulb 9 to a material extent, but heats up the jacket 14 and stores heat therein. If the same current-flow continues for a considerable period, the heat-storing capacity of the jacket will be reached and the jacket will give off heat more rapidly to the expansion-bulb 9, thus raising the temperature within the bulb and causing the air or gas therein to expand and effect the indication. For this reason momentary fluctuations of the current flowing through the heating-strip and increases in the current-flow which continue only for a short period do not cause an overflow of the liquid in the U-tube 8 into the indicator-tube 11; but if the increase in the current continues for a considerable period the proper expansion of the air or gas in bulb 9 and the corresponding overflow of liquid into tube 11 will be obtained.

When the instrument is to be used on alternating-current circuits, it is necessary that provision be made to prevent the circulation of Foucault or eddy currents in the jacket 14, since such currents would assist in heating the jacket and expanding the air or gas in bulb 9, and thus impair the accuracy of the instrument. I have found that by slotting the jacket 14, as clearly shown in Fig. 3, the flow of eddy-currents in the jacket is prevented and the instrument may be used on alternating or direct current circuits interchangeably.

I do not wish to be understood as limited to the exact construction which I have shown, as modifications can be made therein which I consider within the scope of my invention and which I aim to cover by the terms of the claims appended hereto.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A demand-indicator comprising a vessel containing a liquid and an expansible fluid which, by its expansion, displaces said liquid to effect an indication, a receptacle for receiving and measuring the liquid displaced, a heating-strip mounted in proximity to but separated from said vessel, and means for connecting the heating-strip in circuit.

2. A demand-indicator comprising a vessel containing a liquid, a receptacle connected thereto containing an expansible fluid which by its expansion displaces said liquid to effect an indication, a vessel for receiving and measuring the liquid displaced, a heating-strip mounted in proximity to but separated from said receptacle, and means for connecting the heating-strip in circuit.

3. A demand-indicator comprising a vessel containing a liquid, a receptacle connected thereto containing an expansible fluid, means for trapping the liquid displaced by the expansion of said fluid, a heating-strip mounted in proximity to said receptacle, a body of material having a high capacity for storing heat mounted in juxtaposition to said strip and receptacle, and means for connecting the strip in circuit.

4. A demand-indicator comprising a vessel containing a liquid, a receptacle connected thereto containing an expansible fluid, means for trapping the liquid displaced when

said fluid expands, a heating-strip mounted in proximity to said receptacle, a body of material having a high capacity for storing heat mounted between said strip and receptacle, and means for connecting the strip in circuit.

5. A demand-indicator comprising a tube, a liquid contained therein, a receptacle connected thereto containing an expansible fluid which by its expansion causes said liquid to overflow, a second tube connected to the first tube to receive the liquid which overflows, an iron jacket inclosing the receptacle, a heating-strip wound on the jacket but insulated therefrom, and means for connecting the strip in circuit.

6. In a demand-indicator, a receptacle containing an expansible fluid, a heating-strip in proximity to the receptacle, a body of metal mounted between the receptacle and strip, said body being formed to prevent the circulation of eddy-currents therein, and means to connect the strip in circuit.

7. In a demand-indicator, a receptacle containing an expansible fluid, an iron jacket partially inclosing the same, a heating-strip wound around but insulated from the jacket, and means to connect the strip in circuit.

In witness whereof I have hereunto set my hand this 16th day of September, 1905.

LEONARD WILSON.

Witnesses:

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