Sept. 29, 1953

H. W. MERTENS

2,654,068

COMBINED FUSE AND DEMAND METER

Filed Nov. 1, 1947

2 Sheets-Sheet 1

Fig. 1

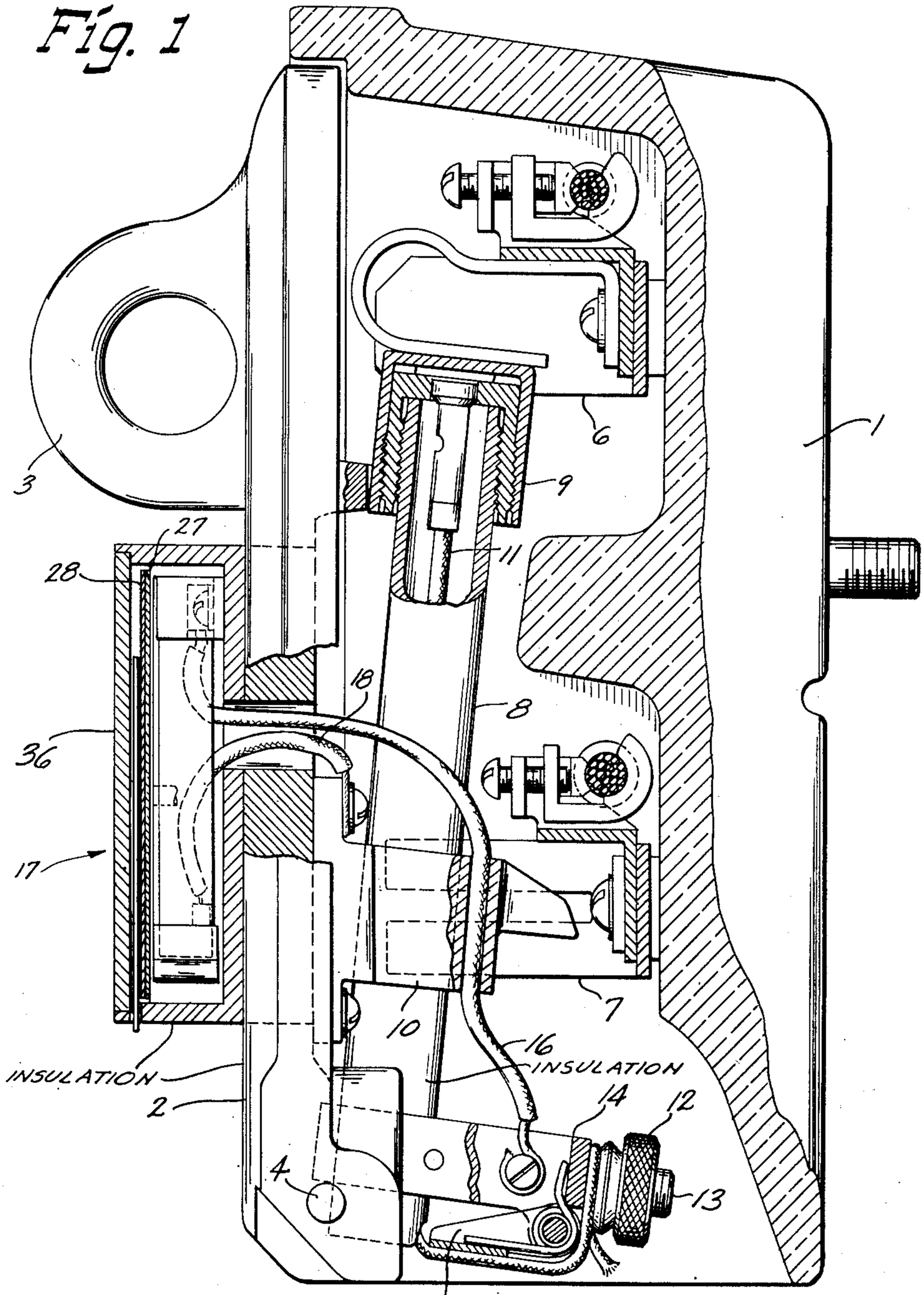

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Fig. 2

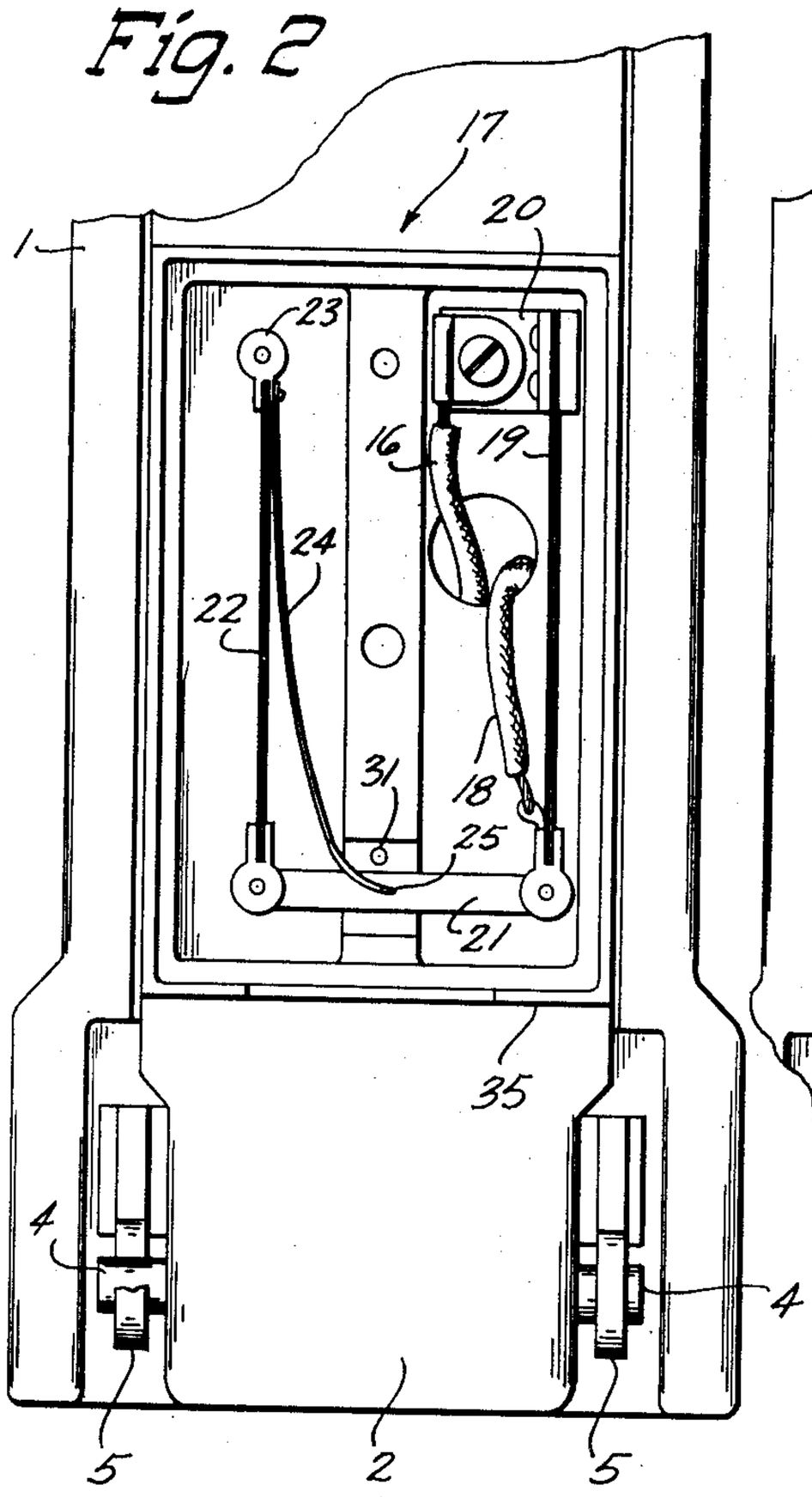
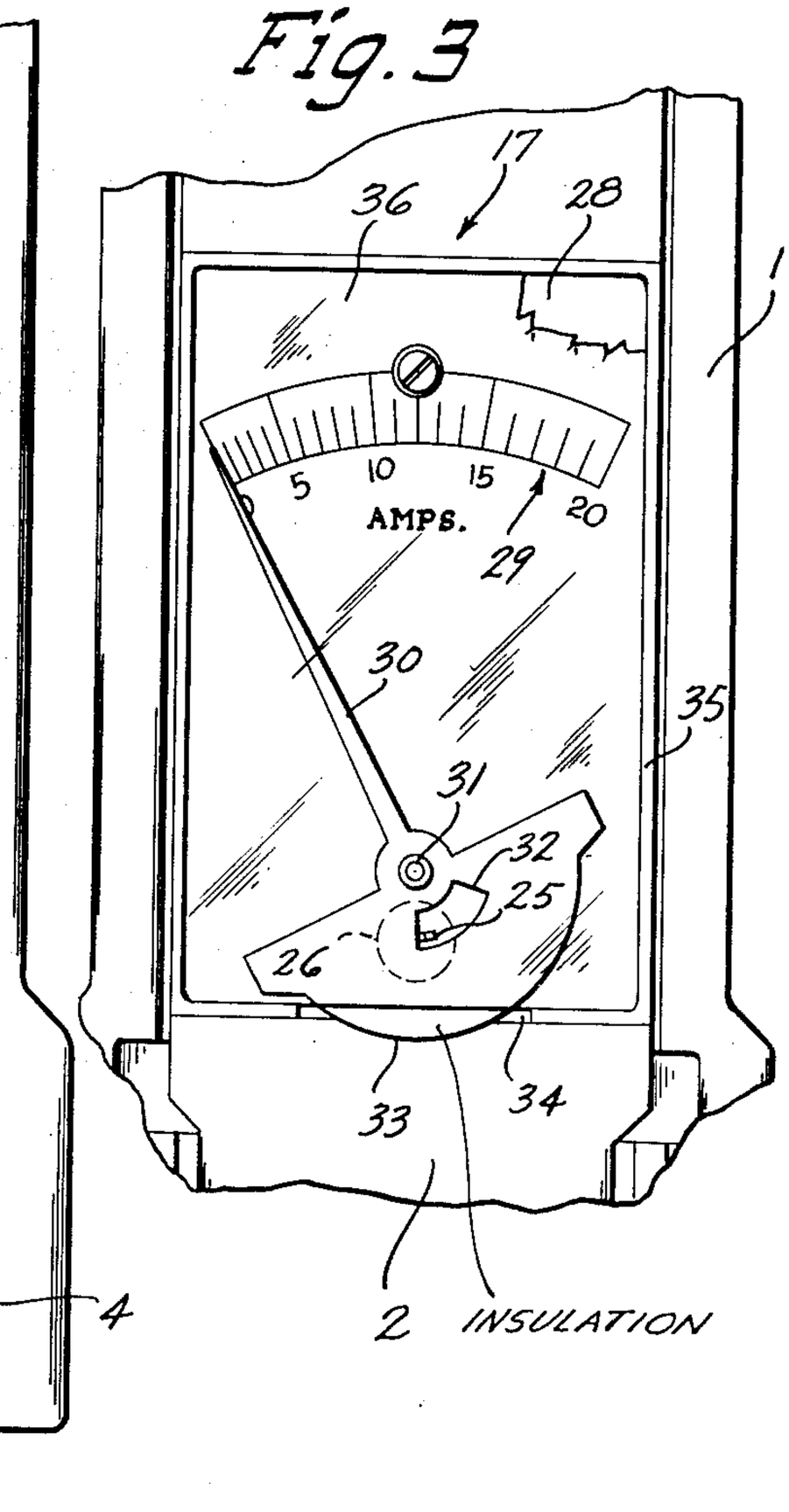


Fig. 3



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COMBINED FUSE AND DEMAND METER

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1 Claim. (Cl. 324—103)

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In distribution systems it is desirable to know the load being carried by a transformer, particularly the maximum load. Heretofore it was necessary to open the line and insert what is known as a demand meter in the circuit as a temporary installation. This caused interruption of the service. Another method that has been followed was to employ a so-called clip-on ammeter which usually had a split core transformer which could be opened up and hooked around the line conductor. This transformer had a secondary connected to a meter to indicate the maximum current flowing. Neither of these methods were wholly satisfactory and each required a considerable amount of work to make the temporary installation and to later remove it.

This invention is designed to provide a means of utilizing a portion of the fuse structure which is almost always found on the primary side of the transformer so that it is not necessary to open the line and disrupt the service or to do any material amount of work but which merely requires the operator to substantially instantly substitute a combined fuse and demand meter for the conventional fuse and thus maintain the protection afforded by the fuse and at the same time have a demand meter in the line to register the peak load on the transformer.

In greater detail, further objects are to provide a fuse door assembly for a housed fuse construction in which a demand meter is carried by the door on its outer side and connected in series with a fuse link located within a fuse tube carried on the inner side of the door and arranged so that the fuse tube, demand meter and door assembly can be substantially instantly substituted for the conventional fuse tube and door assembly.

An embodiment of the invention is shown in the accompanying drawings, in which:

Figure 1 is a vertical sectional view through the device.

Figure 2 is a fragmentary view of the lower portion thereof with the cover and intermediate partition of the demand meter removed.

Figure 3 is a fragmentary face view of the lower portion of the device showing the demand meter as it normally appears.

Referring the drawings, it will be seen that the device comprises a porcelain or other insulating housing 1 provided with an insulating door 2 which may have a manipulating handle or eyelet portion 3. The door 2 is provided with trunnions 4 which fit within hook-like brackets 5 so that the door may be freely removed in the usual manner. The housing 1 is provided with an upper terminal 6 and a lower terminal 7 adapted to receive the line and load wires, respectively. A fuse tube 8 is carried by the door and is provided with an upper contact 9 and an intermediate contact 10, respectively, normally engaged with the upper and lower stationary terminals 6 and 7. A fuse link indicated generally at 11 extends through the fuse tube and out through its open bottom end and its lower end is clamped in place by means of the thumb screw 12 carried by a threaded stud 13 on the bottom contact 14 of the fuse tube. The bottom contact 14 may be provided with a flip-out lever or throw-out lever 15 which is spring urged downwardly and arranged to extract any remaining portion of the fuse link on rupture thereof.

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It is to be noted that the lower contact 14 of the fuse tube 8 is not directly electrically connected to the intermediate contact 10 of the fuse tube. Instead a conductor 16 leads from the lower contact 14 to a demand meter indicated generally by the reference character 17 and the return conductor from the demand meter indicated at 18 leads to the intermediate contact 10 of the fuse tube. It will be seen, therefor, that the current passes from the upper stationary terminal 6 through the fuse link to the lower contact 14 of the fuse tube. From this point current passes through the demand meter and back to the intermediate contact 10 of the fuse tube and from there to the stationary terminal 7. The conductors 16 and 18 are connected to opposite ends of a bi-metal strip 19 anchored at its upper end as indicated at 20 and free at its lower end. The conductor 18 is necessarily made flexible to accommodate the slight motion of the bi-metal member 19 when it is heated by the current.

The free end of the bi-metal strip 19 is pivoted to a transversely extending insulating link 21. The other end of the insulating link 21 is pivoted to the free end of a second bi-metal member 22 which does not carry any current but corrects for the ambient temperature. The bi-metal member 22 is rigidly carried at its upper end by means of a pivotally mounted hub 23. The hub also rigidly carries a light, elongated finger 24 which has an outwardly projecting end 25. The finger or end 25 passes through an opening 26 in the intermediate partition 27 and in the scale plate 28. The scale plate or insignia bearing plate 28, see Figure 3, is provided with a scale and graduations indicated generally by the reference character 29 to show the amount of current passing. A pointer 30 is pivoted on the pin 31 and is provided with

a cut-out portion 32 into which the finger 25 projects. It is apparent that when the bi-metal member 19 heats up due to the current passing therethrough, that the finger 25 will move to the left as viewed in Figure 3 and consequently will move the pointer 30 to the right, thus indicating the current flowing through the apparatus. It is apparent that the amount of deflection will depend also on the ambient temperature. Therefore, the second bi-metal member 22 is provided and is so arranged that it tends to rotate the hub 23 a slight amount so as to move the finger 25 to the right, as viewed in Figures 2 and 3, an amount sufficient to correct for ambient temperature.

It is to be distinctly understood that the housing 1 with its stationary terminals is a conventional fuse housing and normally receives a door and fuse assembly. When it is desired to employ the demand meter to indicate the maximum load on a transformer, for instance, all that is necessary is for the lineman to remove the conventional door from the housing 1 and substitute the door, fuse tube and demand meter assembly hereinabove described. This change can be made substantially instantaneously with only a very brief interruption of the service. Also it is to be noted that the circuit does not have to be opened up in order to place the demand meter in the circuit, as all that is necessary is merely to substitute the door, fuse tube and demand meter assembly for the conventional door and fuse tube assembly. Obviously the maximum load in amperes will be indicated by the demand meter and the lineman can thereby ascertain the exact load carried by the transformer or other device with which the demand meter is in series. It is to be noted also that the insulating pointer 30 is provided with a rounded portion 33 which projects through a slot 34 formed in the casing 35 of the demand meter. This rounded portion can be engaged by the thumb of the operator or lineman and the demand meter can, therefore, be reset. It is preferable to make the pointer 30 with its rounded portion 33 of insulating material.

The casing 35 of the demand meter is provided with a transparent front plate 36 to allow a view of the scale and pointer and to protect the parts of the demand meter from the weather. The only opening into the demand meter is the slot 34 and this is located in its bottom wall.

Although this invention has been described in considerable detail it is to be understood that such description is intended as illustrative rather than limiting, as the invention may be variously embodied and is to be interpreted as claimed.

I claim:

In a device of the class described, a housing having an upper and a lower stationary contact, said housing having means for removably receiving doors provided with fuses, a door arranged to be received by said housing, a fuse structure carried on the inner side of said door and including a fuse tube having three distinct and separate contacts including an upper, a lower, and an intermediate contact with the upper and intermediate contacts arranged to respectively engage the upper and lower stationary contacts of said housing when said door is in closed position, a fuse link within said tube electrically connecting the upper and lower contacts of said fuse tube, and a meter connected between the intermediate and lower contacts of said fuse tube.

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