

Feb. 17, 1942.

C. F. MITCHELL

2,273,534

SPLIT CORE TRANSFORMER

Filed Feb. 10, 1939

2 Sheets-Sheet 1

Fig. 1

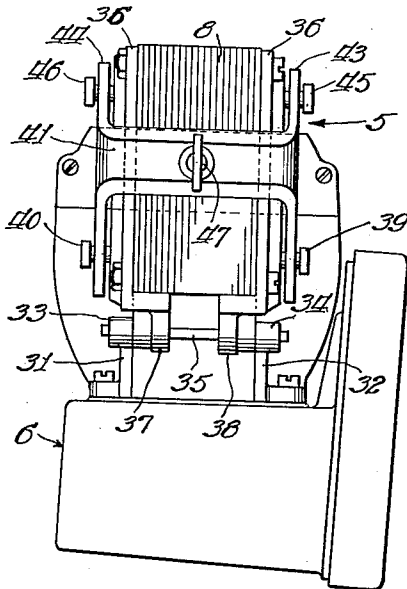


Fig. 4

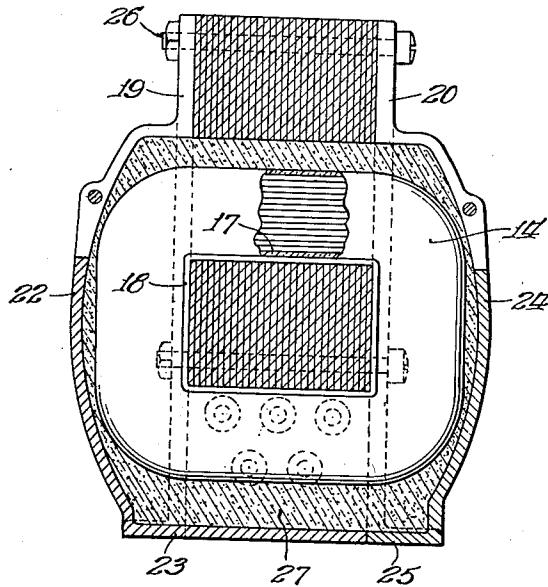
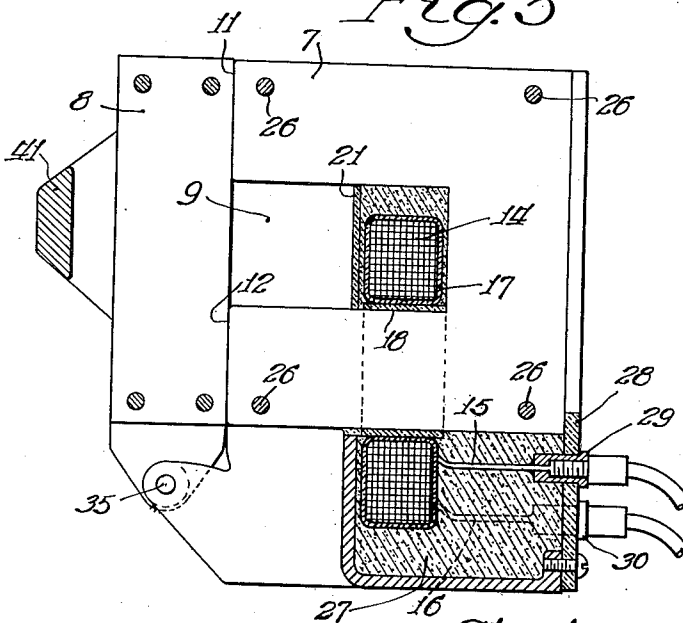


Fig. 5



Inventor:
By: *Chester F. Mitchell*
Jacob Gordon Higginbotham & Wells
Attys.

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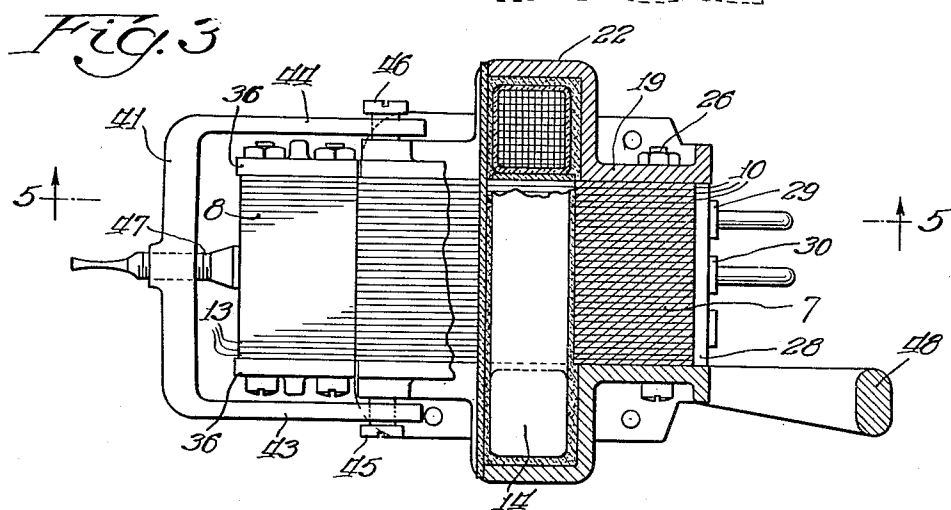
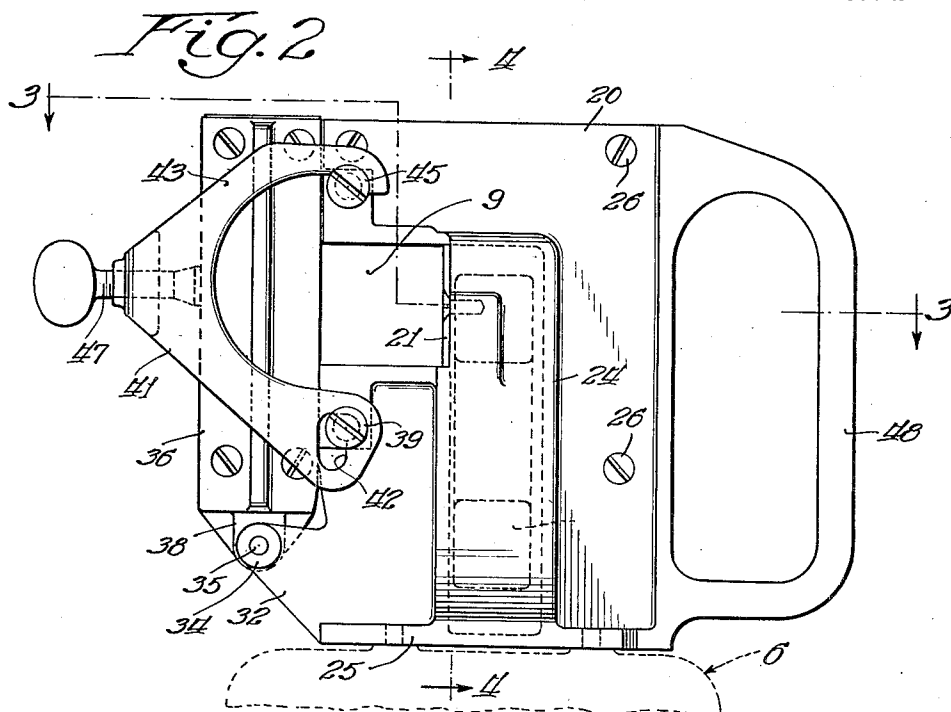
C. F. MITCHELL

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SPLIT CORE TRANSFORMER

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2 Sheets-Sheet 2



Inventor:
Chester F. Mitchell
 By: *John Carlson Kirtland Wells*
Attys

UNITED STATES PATENT OFFICE

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SPLIT CORE TRANSFORMER

Chester F. Mitchell, Wheaton, Ill., assignor to
H D Electric Company, Chicago, Ill., a corpora-
tion of Illinois

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8 Claims. (Cl. 175—358)

The present invention relates to split core current transformers, and is particularly directed to improvements in devices of this character to make them better able to withstand the rough usage and exposure to weather encountered in their use for testing line currents in the open.

It is the purpose of the present invention to provide in a split core current transformer a novel housing for enclosing the secondary coil of the transformer.

It is also a purpose of the invention to so construct the housing that it shall be of corrosion resisting material and arranged to hold the laminations of the transformer together. The preferable construction involves complementary metal housing portions that enclose all the coil except that part which is adapted to extend alongside the conductor in which the current is being measured. In this portion of the housing a suitable non-conducting material provides a break in the electrical circuit which the housing would otherwise form around the core of the transformer.

The invention contemplates a device of this character wherein the secondary coil of the transformer is completely enclosed, and the housing which encloses it is filled with an insulating compound of a fluid, semi-solid or solid type.

The features and advantages of the present invention will appear more fully as the description proceeds, reference being had to the accompanying drawings wherein a preferred form of the invention is shown. It is to be understood, however, that the drawings and description are illustrative only, and are not to be taken as limiting the invention except insofar as it is limited by the claims.

In the drawings,

Fig. 1 is a view in front elevation of a device embodying the present invention;

Fig. 2 is a view in side elevation of the transformer;

Fig. 3 is a plan sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a vertical sectional view taken on the line 4—4 of Fig. 2, and

Fig. 5 is a vertical sectional view taken on the line 5—5 of Fig. 3.

Referring now to the drawings, the present invention is embodied in a split core current transformer 5 which is adapted to be used in connection with a suitable meter 6, such as a maximum demand ammeter for measuring the maximum of current that flows through a conductor. The transformer comprises a core made up of 55

a main section 7 and a second section 8 movable toward and away from the main section to permit the insertion of a conductor into the space 9. The core 7 is made up of a plurality of substantially U-shaped laminations 10 terminating in faces 11 and 12 which are adapted to abut the section 8. The section 8 is also made up of a plurality of laminations 13. A coil 14 is wound about the main section 7 and has terminals such as 15 and 16 by which the coil may be connected to the meter 6. It will be readily appreciated that the coil 14 may have several taps for including a different number of turns in its circuit, depending upon the measurement to be made. The coil 14 is normally wrapped in a suitable insulating paper 17 and is protected from the core 7 by a fibre tube 18 or similar insulation.

The present invention concerns itself with a housing which cooperates with the core of the transformer to completely enclose the coil 14 and protect it from the effects of moisture, rough handling and changes in atmospheric conditions which are encountered in its normal use. The housing comprises two housing sections 19 and 20. These housing sections are preferably constructed of a non-rusting material such as aluminum. The two sections 19 and 20 cooperate with the core section 7 to completely house the coil 14 except for that portion of the coil which passes through the opening 9. If the housing were to cover this part of the coil, it would establish a complete electrical circuit around the core 7 in the space between the coil 14 and a conductor inserted in the opening 9. Such a circuit would, of course, effectively prevent coil 14 from carrying an electrical current, when a circuit is completed between its terminals 29 and 30, which would have a definite relation to the current in conductor 9. The side of the coil 14 which is exposed in the opening 9 is covered by a plate 21 of insulating material which is fastened to the housing portions 19 and 20.

The housing portion 19 is bulged out at 22 to receive the coil 14, and it extends inwardly beneath the coil, as indicated at 23. Similarly, the housing portion 20 is bulged outwardly at 24 and meets the portion 23 by means of a flange 25. The portions 19 and 20 form side plates covering the opposite sides of the main core 7. They are secured together by a plurality of bolts 26 which extend through the laminations 10 and clamp the housing and the laminations together into a single unit.

The housing portions 19 and 20 cooperate to

form a chamber 27 beneath the main section 7 of the core. This chamber is utilized for taking out the leads such as 15 and 16 from the coil 14. A terminal plate 28 of insulating material extends across the back of the chamber 27 and is provided with a plurality of terminal connections such as 29 and 30.

The housing portions 19 and 20 have brackets 31 and 32 extending outwardly beneath the movable core section 8. These brackets are provided with bosses 33 and 34 for mounting a shaft 35. The core section 8 is secured between two side plates 36. These side plates have depending lugs 37 and 38 which are pivoted on the shaft 35.

The transformer is provided with means whereby to clamp the section 8 of the core against the section 7. Pivot pins 39 and 40 are mounted in extensions of the housing portions 19 and 20 that cover the lower portion of the main core section 7 adjacent to the section 8. A yoke 41 has L-shaped slots 42, only one of which is illustrated in Fig. 2, to receive the pins 39 and 40. This yoke has fingers 43 and 44 which are adapted to hook over studs 45 and 46 mounted in the housing portions 19 and 20 adjacent the upper end of the section 8 of the core. The operation of the yoke 41 is as follows: Normally the pins 39 and 40 will ride in the upper parts of the L-shaped slots 42. However, by lifting up upon the yoke 41, the pins can be moved down into the lower portion of the slots 42. This will enable the fingers 43 and 44 to hook over the studs 45 and 46, after which the yoke can be dropped down so as to bring the pins 39 and 40 into the upper portions of the slots 42. The yoke 41 carries an adjustable clamping member 47 which is screw-threaded in the yoke so that it may be advanced against the section 8 of the core to press it tightly against the section 7.

For convenience in handling the housing portion 20 is provided with a handle 48 formed integrally therewith and consisting of a loop large enough to readily receive the hand of the operator. Said handle 48 may be either at the side as shown or at the top as may be most suitable for particular uses.

When the housing portions 19 and 20 and the rest of the transformer, with the exception of the plate 21, have been assembled, the space around the coil 14 may be filled with a plastic insulating compound of any suitable type, after which the plate 21 may be mounted in position, to complete the enclosure of the coil 14. Alternatively, the plate 21 may be mounted in position and the plastic composition filled in by leaving off the terminal plate 28. Also the assembly may be filled through a suitable hole in the base of the portion 23 which is later closed with a suitable plug. It will readily be seen that when the assembly is completed and the insulating compound is placed around the coil 14, this coil will be sealed effectively against the entrance of moisture and will be protected against damage by the housing portions 19 and 20. The reliability of the instrument under all weather conditions is therefore assured.

From the above description it is believed that the construction and operation of my invention will be readily apparent to those skilled in this art.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A split core current transformer compris-

ing a core having two separable sections cooperating to provide a conductor receiving passage through an annular magnetic circuit when held together, means to hold said sections together, a secondary coil wound about one section, a protective housing for said coil cooperating with said section to completely enclose said coil, said housing including a portion of non-conducting material extending through the core and separating the coil from a conductor in said passage, the other portions thereof being of metal.

2. A split core current transformer comprising a core having two separable sections cooperating to provide a conductor receiving passage through an annular magnetic circuit when held together, means to hold said sections together, a secondary coil wound about one section, a housing for said coil cooperating with said section to completely enclose said coil, said housing including a portion of non-conducting material extending through the core and separating the coil from a conductor in said passage, said housing including plate portions extending over the opposite sides of said core section and clamping said section between them.

3. A split core transformer comprising a laminated core comprising a main section having a coil thereon, a second section movable with respect to the first named section to permit a conductor to be inserted alongside said coil, means to hold said second section against the main section, a coil housing comprising two complementary metal housing portions clamping said main section between them and encircling said coil, and a plate of non-conducting material extending through the core and separating the coil from an inserted conductor.

4. A split core transformer comprising a laminated core comprising a main section having a coil thereon, a second section movable with respect to the first named section to permit a conductor to be inserted alongside said coil, means to hold said second section against the main section, a coil housing comprising two complementary metal housing portions clamping said main section between them and encircling said coil, and a plate of non-conducting material extending through the core and separating the coil from an inserted conductor, said housing also comprising a terminal plate beneath the main section.

5. A split core current transformer comprising a core having two separable sections, one of said sections having a secondary coil thereon and a metal housing for said coil cooperating with said core to completely enclose said coil, said housing having a portion of non-conducting material providing a break in the electrical circuit which the housing would otherwise form around the core, said housing having brackets to which the other section is pivoted.

6. A split core current transformer comprising a core having two separable sections cooperating to provide a conductor receiving passage through an annular magnetic circuit when held together, means to hold said sections together, a secondary coil wound about one section, a housing for said coil cooperating with said section to completely enclose said coil, said housing including a portion of non-conducting material extending through the core and separating the coil from a conductor in said passage, said housing having brackets to which the other section is pivoted.

7. A split core transformer comprising a lam-

inated core comprising a main section having a coil thereon, a second section movable with respect to the first named section to permit a conductor to be inserted alongside said coil, means to hold said second section against the main section, a coil housing comprising two complementary metal housing portions clamping said main section between them and encircling said coil, and a plate of non-conducting material extending through the core and separating the coil from an inserted conductor, said complementary portions each having a bracket thereon, a shaft mounted on said brackets, and side plates on said second section mounted on said shaft.

8. A split core transformer comprising a laminated core comprising a main section hav-

ing a coil thereon, a second section movable with respect to the first named section to permit a conductor to be inserted alongside said coil, means to hold said second section against the main section, a coil housing comprising two complementary metal housing portions clamping said main section between them and encircling said coil, and a plate of non-conducting material extending through the core and separating the coil from an inserted conductor, and a yoke journalled on said housing portions, said yoke extending around said second section, means to fix said yoke against swinging movement away from the main section, and means on the yoke to press the second section toward the main section.

CHESTER F. MITCHELL.