

April 22, 1952

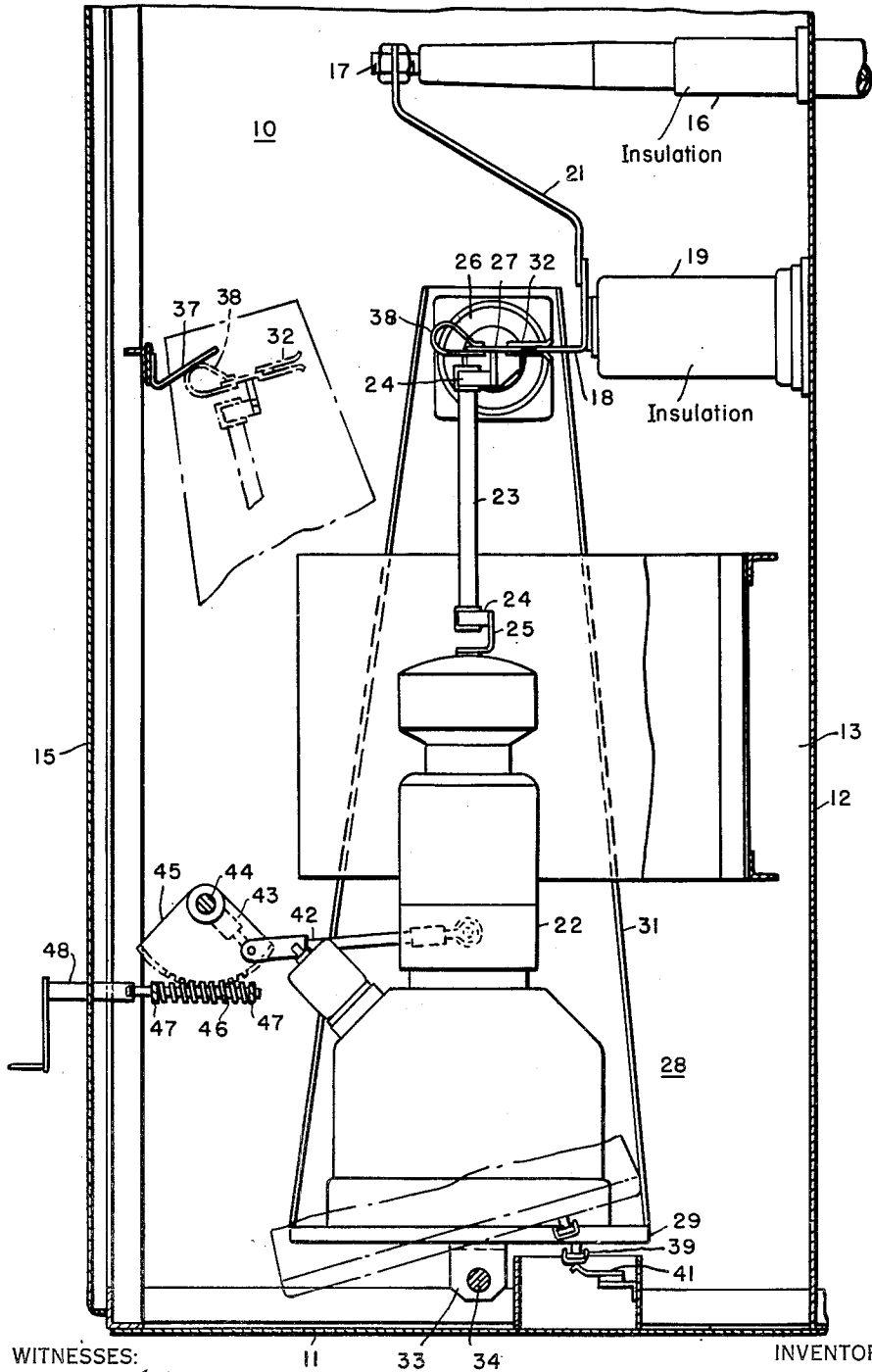
H. H. RUGG

2,594,075

METAL ENCLOSED SWITCHGEAR

Filed July 9, 1949

2 SHEETS—SHEET 1



WITNESSES:

E. A. M. Lasky
H. H. Rugg

Fig. 1.

INVENTOR

Harold H. Rugg.

BY *G. W. Crawford*
ATTORNEY

April 22, 1952

H. H. RUGG

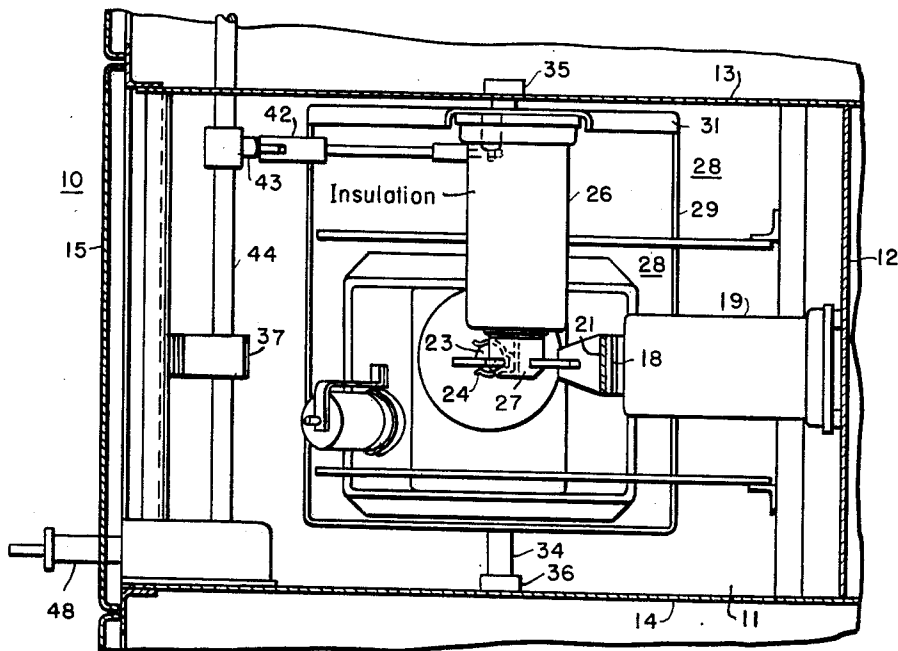
2,594,075

METAL ENCLOSED SWITCHGEAR

Filed July 9, 1949

2 SHEETS—SHEET 2

Fig.2.



WITNESSES:

E. A. M. Moskey
H. B. Blumenthal

INVENTOR

Harold H. Rugg.

G. M. Crawford
ATTORNEY

UNITED STATES PATENT OFFICE

2,594,075

METAL ENCLOSED SWITCHGEAR

Harold H. Rugg, Pittsburgh, Pa., assignor to
Westinghouse Electric Corporation, East Pitts-
burgh, Pa., a corporation of Pennsylvania

Application July 9, 1949, Serial No. 103,828

7 Claims. (Cl. 175-298)

1

My invention relates, generally, to switchgear apparatus and, more particularly, to metal enclosed switchgear having disconnectable high voltage potential transformers disposed within metal housings.

Heretofore, potential transformers of the disconnectable type have been mounted on carriages which were withdrawable horizontally from the switchgear housing. Such a mechanism is suitable for relatively small transformers but is not suitable for handling large high voltage transformers.

An object of my invention is to provide for safely disconnecting a large high voltage potential transformer for inspection or replacement of fuses.

Another object of my invention is to ground the transformer when it is disconnected from the high voltage terminal.

A more general object of my invention is to provide a disconnecting mechanism for a potential transformer which shall be simple and efficient in operation and which may be economically manufactured and installed.

Other objects of my invention will be explained fully hereinafter or will be apparent to those skilled in the art.

According to my invention, a potential transformer and its fuse mounting are mounted on a pivoted frame which can be tipped by a mechanism operated from without the switchgear housing to disconnect the primary winding from the high voltage circuit and connect it to ground. The door to the housing may be interlocked with the tipping mechanism to permit access to the transformer and fuse only after they have been grounded.

For a better understanding of the nature and objects of my invention, reference may be had to the following detailed description, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a view, partly in section and partly in side elevation, of a portion of a switchgear unit housing containing a potential transformer mounted on a tipping mechanism embodying the principal features of my invention, and

Fig. 2 is a view, partly in section and partly in plan, of the structure shown in Fig. 1.

Referring to the drawings the structure shown therein comprises a portion of a sheet metal housing 10 having a bottom 11, a rear wall 12, side walls 13 and 14, and a hinged door 15. An insulating terminal 16 extends through the rear wall 12 and contains a power conductor 17 which may be connected to a high voltage power source.

2

A contact member 18 is mounted on an insulating support 19 which is attached to the rear wall 12 of the housing 10. The contact member 18 is connected to the power conductor 17 by a conductor 21.

In accordance with the usual practice in high voltage installations, a potential transformer 22 is provided for reducing the voltage applied to the instruments and relays associated with the switching equipment. A fuse 23 is provided for the protection of the potential transformer 22. The fuse 23 is of the removable type and is mounted in fuse clips 24, one of which is mounted on top of the potential transformer 22 by means of a bracket 25 and the other of which is mounted on an insulating member 26 by means of a T-shaped bracket 27. The insulating member 26 is supported by a metal frame 28 having a bottom or pan portion 29 and a vertical portion 31.

As shown, the contact member 18 is engaged by a pair of spaced contact members 32 which are attached to the cross member of the T-shaped bracket 27. Thus, the transformer 22 is connected to the power conductor 17 by an electrical circuit which extends through the fuse 23, the contact members 32 and 18 and the conductor 21.

In order that the fuse clips 24 may be readily deenergized when it is necessary to remove the fuse 23 for inspecting or replacement and also that the transformer 22 may be inspected without danger to the inspector, the frame 28, which supports the transformer 22, the fuse 23 and the insulating member 26, which, in turn, supports the upper fuse clip 24, is pivotally mounted in the housing 10. As shown, brackets 33 are attached to the bottom 29 of the frame 28 and are mounted on a shaft 34 which is mounted in bearings 35 and 36 attached to the side walls 13 and 14, respectively.

As shown most clearly in Fig. 1, the frame 28 and the transformer 22 may be tilted from the upright or operating position to an inclined position shown by the broken lines. When the transformer is in its inclined position the contact members 32 are disengaged from the contact member 18 and are grounded through a contact member 37 which is attached to the metal housing 10 and is engaged by a contact member 38 which is attached to the top portion of the T-shaped bracket 27. Thus, the transformer 22 and the fuse 23 are disconnected from the high potential source and are grounded through the contact member 37, thereby making it safe for the fuse 23 to be removed.

Secondary contact members 39, which are

connected to the secondary winding of the transformer 22, are also disengaged from contact members 41 located at the bottom of the housing 10 when the transformer is tilted to its inclined position. Thus, the transformer is completely disconnected from all electrical circuits when in its inclined position.

In order to actuate the transformer 22 between its inclined and upright positions, the vertical portion 31 of the frame 28 is connected by a link 42 and an arm 43 to a shaft 44 which is rotatably mounted in the housing 10. The shaft 44 may be rotated by a gear sector 45 which may be driven by a worm 46 mounted in bearings 47 which are supported by the housing 10. The worm 46 may be operated by a hand crank 48 which extends through the door 15 of the housing 10. Thus, the shaft 44 may be operated from without the housing to actuate the frame 28 and the transformer 22 from its upright position to its inclined position and vice versa.

As shown, the shaft 34 which supports the frame 28 and the transformer 22 may be located off center with respect to the transformer 22, thereby causing the transformer to be moved to its inclined position by gravity in the event that the actuating mechanism should become broken or disconnected. In this manner the transformer will be disconnected from the high potential source and grounded in the event that the actuating mechanism becomes disabled, thereby making it safe to inspect the transformer and the mechanism.

If desired, the door 15 and the actuating mechanism may be so interlocked by means of key interlocks, which are well known in the art, that the door 15 can be opened only after the actuating mechanism has been operated to tilt the transformer from its upright to its inclined position. Thus, access can be had to the interior of the housing 10 only when the transformer is disengaged from the high potential source.

As shown in Figure 2, the shaft 44 may be extended into adjacent housings, thereby operating more than one transformer by means of one actuating mechanism. Since two or more potential transformers are usually required on three-phase power systems, additional transformer units, similar to the one herein shown, may be operated by one actuating mechanism.

From the foregoing description it is apparent that I have provided a means for safely disconnecting large high voltage potential transformers for inspection or replacement of the fuses. The present structure is so constructed that the transformer is automatically disconnected from the high voltage source in the event of failure of the actuating mechanism.

Since numerous changes may be made in the above described construction and different embodiments of the invention may be made without departing from the spirit and scope thereof, it is intended that all matter contained in the foregoing description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. In switchgear apparatus, in combination, a housing, a frame pivotally mounted in the housing, a transformer mounted in said frame and having a high potential terminal, a power conductor disposed in the housing, contact means carried by the frame for engaging the power conductor when the transformer is in its operating position, a fuse connecting the terminal on

the transformer to the contact means on the frame, mechanical means operable from without the housing for actuating said frame and transformer about their pivotal support to connect the transformer to the power conductor through said fuse and said contact member, and a ground contact member in the housing, said frame and transformer being so mounted on the pivotal support that they are actuated by gravity to disconnect the fuse and the transformer from the power conductor and connect them to the ground contact member in the event that the mechanical means becomes disconnected.

2. In switchgear apparatus, in combination, a housing, a frame pivotally mounted in the housing, a transformer mounted in said frame and having a high potential terminal, a power conductor disposed in the housing, contact means carried by the frame for engaging the power conductor when the transformer is in its operating position, a fuse connecting the terminal on the transformer to the contact means on the frame, gear driven means for actuating the frame about its pivotal support to raise the transformer to its operating position to connect the transformer to the power conductor through said fuse and said contact member, and a ground contact member in the housing, said frame and transformer being so mounted on the pivotal support that they are tilted by gravity to disconnect the fuse and the transformer from the power conductor and connect them to the ground contact member in the event that the gear driven means becomes disconnected.

3. In switchgear apparatus, in combination, a housing which is at ground potential, a frame pivotally mounted in the housing at ground potential, a transformer mounted in the frame and having a high potential terminal, a high potential power conductor disposed in the housing and insulated therefrom, contact means carried by the frame and insulated therefrom and disposed to be connected to the power conductor when the transformer is in a substantially upright position, a fuse connecting the terminal on the transformer to the contact means on the frame, mechanical means for actuating the frame and the transformer from an inclined position to the upright position, and a ground contact member connected to the housing, said contact means on the frame engaging said ground contact member when the transformer is in the inclined position thereby grounding said fuse, said frame and transformer being so mounted on the pivotal support that they are actuated by gravity to disconnect the fuse and the transformer from the power conductor and connect them to the ground contact member in the event that the mechanical means becomes disconnected.

4. In switchgear apparatus, in combination, a housing having a door, a frame pivotally mounted in the housing at ground potential, a transformer mounted in the frame and having a high potential terminal, a high potential power conductor disposed in the housing and insulated therefrom, contact means carried by the frame and insulated therefrom and disposed to be connected to the power conductor when the transformer is in a substantially upright position, a fuse connecting the terminal on the transformer to the contact means on the frame, ground contact means disposed in the housing to be connected to the fuse when the transformer is in an inclined position thereby grounding said fuse, the pivotal support for the frame being so offset

5

with respect to the center of gravity of the transformer that gravity tends to actuate the transformer to the inclined position to ground the fuse, and mechanical means connected to the frame and operable from without the housing when the door is closed to actuate the transformer to the upright position to connect the transformer to the power conductor through said fuse and said contact member.

5. In switchgear apparatus, in combination, a housing having a door, a frame pivotally mounted in the housing, a transformer mounted in the frame and having a high potential terminal, a high potential power conductor disposed in the housing, contact means carried by the frame and disposed to be connected to the power conductor when the transformer is in a substantially upright position, a fuse connecting the terminal on the transformer to the contact means on the frame, ground contact means disposed in the housing to be engaged by the contact means on the frame when the transformer is actuated from the upright position toward the door to an inclined position thereby grounding the fuse and making it readily accessible when the door is opened, and mechanical means connected to the frame and operable from without the housing to actuate the transformer between the inclined and the upright positions.

6. In switchgear apparatus, in combination, a housing having a door, a frame pivotally mounted in the housing, a transformer mounted in the frame and having a high potential terminal, a high potential power conductor disposed in the housing, contact means carried by the frame and disposed to be connected to the power conductor when the transformer is in a substantially upright position, a fuse connecting the terminal on the transformer to the contact means on the frame, ground contact means disposed in the housing to be engaged by the contact means on the frame when the transformer is actuated from the upright position toward the door to an inclined position thereby grounding the fuse and making it readily accessible when the door is opened, the pivotal support for the

6

frame being so offset with respect to the center of gravity of the transformer that the transformer has a tendency to tilt to the inclined position, and mechanical means operable from without the housing to actuate the transformer from the inclined position to the upright position.

7. In switchgear apparatus, in combination, a housing having a door, a frame pivotally mounted in the housing at ground potential, a transformer mounted in the frame and having a high potential terminal, a high potential power conductor disposed in the housing, contact means carried by the frame and disposed to be connected to the power conductor when the transformer is in a substantially upright position, a fuse connecting the terminal on the transformer to the contact means on the frame, ground contact means disposed in the housing near the door to be engaged by the contact means on the frame when the transformer is actuated from the upright position toward the door to an inclined position thereby grounding the fuse and making it readily accessible when the door is opened, and gear driven means connected to the frame and operable from without the housing when the door is closed to actuate the transformer between the inclined and the upright positions.

HAROLD H. RUGG.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,039,395	Hewlett	Sept. 24, 1912
1,782,594	Allan	Nov. 25, 1930
1,851,731	Sandin	Mar. 29, 1932
2,080,226	Paxton	May 11, 1937
2,306,186	Rankin	Dec. 22, 1942
2,427,940	Ayres	Sept. 23, 1947

FOREIGN PATENTS

Number	Country	Date
411,194	Great Britain	June 7, 1934