March 31, 1936. C. THUMIM 2,035,771

ELECTRICAL SWITCH GEAR

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Fig. 1.

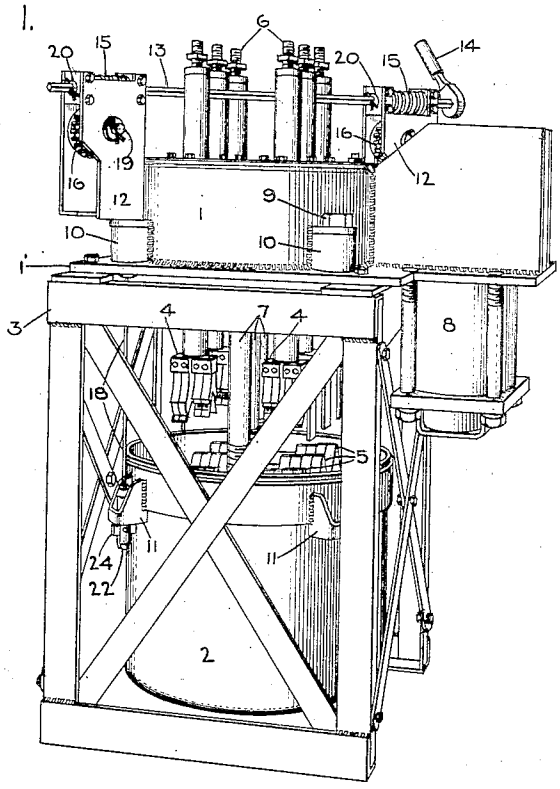
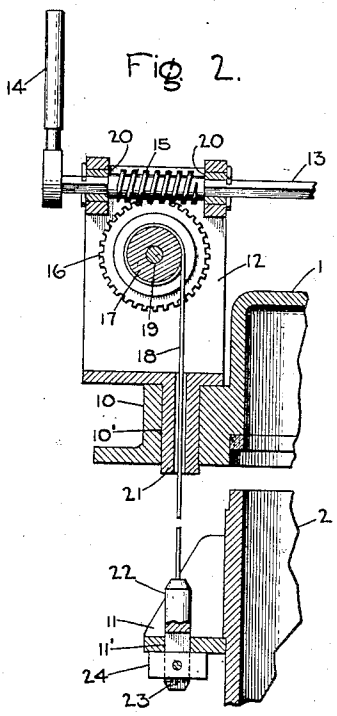


Fig. 2.



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ELECTRICAL SWITCH GEAR

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7 Claims. (Cl. 200—150)

My invention relates to electrical switchgear, more particularly to apparatus for lowering and elevating the oil-containing tanks of oil circuit breakers.

Inspection of oil circuit breakers of conventional design is frequently accomplished by dropping of the oil tank, thereby exposing the contact structure which is generally mounted with respect to the relatively fixed cover structure of the breaker. In the case of large installations, the tank lifting apparatus is often permanently incorporated in the switchgear design and may comprise flexible cables with specially provided pulleys, etc.

A principal object of my invention is the provision of an improved tank lifting apparatus which is simple and compact in design and particularly adapted for immediate application to oil circuit breakers of the polyphase single-tank type after removal of a part of the securing means, such as fastening bolts, which normally support the tank in depending relation to the cover structure.

My invention will be more fully set forth in the following description referring to the accompanying drawing, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

Referring to the drawing, Fig. 1 is an elevational view in perspective of an oil circuit breaker with the tank dropped and a tank lifting apparatus embodying my invention, and Fig. 2 is a detailed fragmentary view, partly in section, of apparatus shown in Fig. 1.

The polyphase oil circuit breaker illustrated by Fig. 1 comprises a relatively fixed dome-like cover structure 1 and an oil-containing tank 2 which is normally supported from the cover structure 1. The cover structure 1 which is suitably mounted by means of a horizontal flange 1' on a frame 3 supports the breaker contact structure, which includes for each phase stationary contacts 4 and a coating movable bridging contact 5. The stationary contacts 4 are connected to the lower ends of the lead-in bushings 6 which extend through the top of the cover structure and the bridging contacts 5 are connected to vertically movable operating rods 7, which are in turn connected through an operating linkage (not shown) to operating mechanism, such as the solenoid operating mechanism 8 which is supported by and forms a part of the cover structure.

As illustrated, the circuit breaker is in the open circuit position and the oil tank 2 is lowered so as to permit inspection of the contacts. The tank 2 is normally held in its upper position by a plurality of fastening bolts 9 extending through alined apertures in lugs 10 and 11, which are secured to the cover structure and tank, respectively. In the present instance, four fastening bolts, equally spaced, are employed for supporting the tank in depending relation to the cover structure.

When the tank 2 is to be lowered, two of the diametrically positioned bolts are unfastened and removed and the tank lifting apparatus is mounted on the cover structure at those points. As best illustrated by Fig. 2, the tank lifting apparatus comprises a windlass arrangement including a pair of separate supporting frames 12, the frames being interconnected by a common operating shaft 13 which is in turn connected to an operating handle 14.

Each windlass device comprises a worm gear 15 connected to the operating shaft and mounted in frame 12 and a coacting gear 16 which is connected to a drum 17 on which a flexible cable 18 is wound. The gear 16 and the drum 17 are mounted on a common shaft 19 which is journaled in opposite sides of the frame 12. The operating shaft 13 is likewise suitably journaled at 20 at the upper part of the frame 12.

For the purpose of rigidly mounting for operation the frame 12 and for properly alining the cable 18 with respect to the tank, the frame 12 is provided with a tubular extension 21 arranged to register with the bolt hole 10' of the cover lug 10.

The cable 18 which extends through the tubular extension 21 is arranged to be detachably connected to the bolt lug 11 of the tank. To this end the free end of the cable is provided with a button device or its equivalent comprising in the present instance a plug 22 which is secured to the cable 18 at one end and bifurcated at 23 at its other end. A button 24 is pivotally mounted in the plug 22 at the bifurcated portion. The plug 22 registers with the bolt openings 10' and 11' and the width of the button 24 is similar to that of the plug so that when the button is rotated to vertical position within the plug the same may be freely inserted through the bolt holes.

The operation of the device is as follows: When the tank 2 is to be lowered, two of the diametrically positioned bolts 9 are unfastened and removed and the windlass frames 12 are mounted and positioned on the corresponding bolt lugs

10 in the manner illustrated by Fig. 2. Previous to insertion of the frame extensions 21 in the bolt holes, the plugs 22 with the buttons 24 in vertical position are dropped through the alined bolt holes and the buttons 24 are turned so as to abut the lower side of the corresponding lugs 11. The frames are then positioned in the bolt holes 10' and the slack in the cables taken up. The remaining fastening bolts 9 are now unfastened with respect to the tank since the tank is now supported by the cables and windlass device. Rotation of the operating shaft 13, is therefore, effective to lower the tank evenly and without binding.

When the tank is raised to operative position, the two remaining bolts are fastened to secure the tank to the cover structure 7 and slack is made in the cables 18 for loosening the buttons 24. The entire tank lifting apparatus including the frames 12, cables and tank buttons may now be withdrawn vertically through the alined bolt holes and removed from the breaker. The other two bolts are then inserted and fastened for completing the tank support.

It will, therefore, be noted that my improved tank lifting apparatus utilizes the essential structure of the circuit breaker itself for not only simplifying the tank lifting apparatus but also for simplifying and greatly facilitating and speeding up the tank lowering and lifting operations without necessitating built-in apparatus.

It should be understood that my invention is not limited to specific details of construction and arrangement thereof herein illustrated, and that changes and modifications may occur to one skilled in the art without departing from the spirit of my invention.

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

1. The combination with an oil circuit breaker including a relatively fixed cover structure, an oil-containing tank, and detachable securing means for supporting said tank in depending relation to said cover structure at a plurality of peripheral positions, of means for lowering and elevating said tank with respect to said cover structure comprising a windlass and a cable arranged to be detachably connected to said tank, said cable in operation being positioned in the space normally occupied by a part of said securing means.

2. The combination with an oil circuit breaker including a relatively fixed cover structure, an oil-containing tank, and a plurality of separate detachable securing means for supporting said tank in depending relation to said cover structure at a plurality of peripheral positions, of means for lowering and elevating said tank with respect to said cover structure including a pair of flexible cables arranged at two of said positions to be detachably connected to said tank, said cables in operation extending through spaces normally occupied at said positions by the corresponding said securing means.

3. The combination with an oil circuit breaker including a relatively fixed cover structure, an oil-containing tank, and a detachable securing means for supporting said tank in depending relation to said cover structure, of means for lowering and elevating said tank with respect to said cover structure comprising a windlass detachably mounted on said cover structure, and a cable arranged to be detachably connected to said tank, said cable in operation occupying a position normally occupied by said detachable securing means.

4. The combination with an oil circuit breaker including a relatively fixed cover structure, an oil-containing tank, and a plurality of fastening bolts for supporting said tank in depending relation to said cover structure, of means for lowering and elevating said tank with respect to said cover structure comprising a windlass and a flexible cable arranged to be detachably connected to said tank, said cable arranged to extend through the apertures normally receiving said fastening bolts.

5. The combination with an oil circuit breaker including a relatively fixed cover structure, an oil-containing tank and a plurality of fastening bolts for supporting said tank in depending relation to said cover structure, said cover structure and tank having cooperating lugs provided with alined apertures for receiving said bolts, of means for lowering and elevating said tank with respect to said cover structure comprising a windlass, said windlass having a frame arranged to be positioned on one of the cover fastening lugs in predetermined relation to the bolt aperture in said lug, a flexible cable extending from said windlass through the aperture in said lug, and means connected to said cable arranged to engage the corresponding tank fastening lug for detachably securing the free end of said cable to said tank.

6. The combination with an oil circuit breaker including a relatively fixed cover structure, an oil-containing tank, and a plurality of fastening bolts for supporting said tank in depending relation to said cover structure, said bolts normally extending through apertures formed in cooperating lugs fixed to said cover structure and tank respectively, of means for lowering and elevating said tank with respect to said cover structure comprising two separate windlass frames interconnected by a common operating shaft and each mounted at diametrically opposite ends of said cover structure, each of said frames being mounted on a cover fastening lug and positioned by an extension registering with the aperture in said lug, a flexible cable extending from each windlass through the aforesaid lug apertures to the corresponding tank lug, and a fastening button secured to the free end of said cable, said button arranged to extend through the apertures in said cover and tank lugs for detachably connecting said cable to said tank.

7. The combination with an oil circuit breaker including a relatively fixed cover structure, a movable oil-containing tank and means for detachably supporting said tank in depending relation to said cover structure, of means for raising and lowering said tank when said detachable supporting means is released comprising a windlass having a flexible cable, said windlass having a supporting frame provided with a tubular extension, said fixed cover structure provided with a lug having a vertical bore in which said extension may be positioned so that said windlass frame may be rigidly and detachably mounted on said cover structure, said tank likewise provided with a lug having an aperture in vertical alinement with said bore, said cable extending vertically from said windlass frame through said tubular extension and lug bores for detachably connecting said cable to said tank.

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