This invention relates to a two pole circuit breaker having a locking mechanism to lock the breaker in either an "on" or "off" position. This invention relates more particularly to a relatively low amperage two pole circuit breaker having a locking attachment integrally secured to the breaker casing.

Circuit breakers which control many operating circuits must be protected against undesired switching which might occur either as a result of tampering or by accidental contact. Many industrial, residential and medical applications require the continuous and uninterrupted availability of electrical current, one important example of which is the necessity of having continuous electrical current during a surgical operation.

Also, there are other instances which require circuit breakers to be locked in an off position, such as the case in which repairs are being made to circuits or parts thereof which are controlled by the circuit breakers. Further, the ordinary home owner who leaves for a vacation may find it desirable to be able easily to lock his circuit breaker in an off position.

Previous attempts to provide locking mechanisms for circuit breakers have employed the use of boxes which enclose the circuit breaker as well as blocks which fit over operating handles of the circuit breakers, and even snap-locking attachments which fit in a recess in the breaker casing and are snapped in place. While the box arrangement is effective against accidental tampering, it is cumbersome and obviously expensive. The use of a block mounted on the handle is not satisfactory since the block must be removed from the handle for switching and may easily be misplaced.

The snap acting attachment takes two forms. In a first form, it extends from the top of the breaker housing between the two handles and tends to become an obstruction to normal handle operation. In other words, the user must be careful not to strike the attachment while moving the handles. In the second form, the attachment is moved linearly between two stops. Since the stops are formed in the housing, which is customarily plastic, the forward stop, against which a pulling force is exerted, is vulnerable to chipping or breakage. When such stop is broken away, the attachment becomes ineffective.

Accordingly, it is an object of this invention to provide a durable locking attachment integral with multipole circuit breaker which can lock the breaker in either an on or an off position.

A further object of this invention is to provide a simple and economical locking mechanism for a multipole circuit breaker which effectively prevents tampering with the handle as well as accidental switching.

Still another object of this invention is to provide a simple and readily accessible locking mechanism which does not require an enclosure to prevent tampering.

Still another object of this invention is to provide a locking mechanism for a two pole circuit breaker which does not require screws or holes to support a locking element which surrounds one or more handles of the breaker.

A still further object of this invention is to provide a locking mechanism for a two pole circuit breaker which is highly reliable, readily accessible and which is simply operated.

Briefly, my invention comprises a multipole circuit breaker consisting essentially of at least two single pole breakers mounted in side-by-side relationship and having an interlocking mechanism which trips one of the breakers when the other one trips. The actuating handles of the breakers are coupled by connecting means so that the handles are simultaneously moved. The breakers are of the trip free type since each can trip independently of the movement of the handles. Within the casing of the two pole breaker and between the two handles, a recess is provided to receive a rockable arm having a pivotal point offset from the pivot line of the handles. The arm is movable into two positions. In the first position, the head of the arm is intered in the path of movement of the handle connecting means. When in this position, the locking arm will lock the handles in either the on or the off position. The locking arm is held in this position by two stops, one of which may be formed by the bottom wall of the recess or a projection on the free end of the arm. A shackle of a padlock fits into the opening in the arm and the location of the shackle against the top surface of the breaker casing provides the other stop. When the padlock is removed, the arm may be pivoted out of the path of movement of the handle connecting means and hence the breaker can be switched. Thereafter, the locking arm may be pivoted back into the locking position and the padlock can be attached again.

The above mentioned and other features and objects of this invention and the manner of accomplishing them will become more apparent and the invention itself will be best understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings, wherein:

FIGURE 1 is a perspective view showing the breaker handles in a first locked position;

FIGURE 2 is a perspective view showing the breaker handles in the other locked position;

FIGURE 3 is a sectional view through the locking arm of FIGURE 1 showing the relative positions of the connecting means and of the rockable arm;

FIGURE 4 is a perspective view showing the locking arm in its bottom-most free position;

FIGURE 5 is a perspective view showing the recess which receives the arm formed in one of the breaker casings, and

FIGURE 6 is a view similar to FIGURE 5 showing the recess formed partly in the casings.

Referring now to FIGURE 1, there is shown a two pole circuit breaker comprising essentially two single pole breakers mounted adjacent to one another. The internal mechanism of each of these breakers as well as the connecting wires and bus bars will not be described since they may take conventional form, e.g., as shown in Patent No. 2,875,289 issued on February 24, 1959 for a Two Pole Circuit Breaker. Suffice it to say, that in the patent there is shown a mechanism which actuates the tripping member in either breaker upon the tripping of the other breaker. The handles of the two breakers are coupled together by connecting means in the same manner as in this invention.

Referring now to FIGURE 1, there are shown the insulative casings 1 and 2 of each of the circuit breakers connected together in side-by-side relationship. Each of the circuit breakers have actuating handles, indicated by 3 and 4 which are coupled together by a connecting means.
One form of the connecting means is illustrated and comprises a pin 5 passing through suitable openings formed in the handles over which a surrounding cylindrical spacer 6 is positioned.

As best seen in FIGURE 5, a recess 10 is formed within either or both of the casings and between the handles 3 and 4. The dimensions of the recess 10 are sufficient to accommodate a locker arm 11 which is pivotable between a locking position shown in FIGURES 1-3 and a free position shown in FIGURE 4. The locker arm has an opening provided to receive the shackle 26 of a padlock 25. As will be explained more fully later, when the padlock is in position, the locker arm 11 is held in locked position and the handle cannot be moved to switch the breaker since the head 14 of the locker arm is in the path of movement of the handle connecting means. This is true regardless of which position (i.e., on or off) the handle is in as shown also in FIGURE 2.

The locker arm is essentially a flat member and may be formed from sheet metal or plastic. The locker arm is slightly bowed so as to engage frictionally with the sides of the recess. In this way, the locker arm may be positioned normally, and simply by friction, in the operative position without the requirement of separate locking means. Positioned toward the rear of the locker arm is an opening 13 to receive pin 12 suitably secured to or formed in one of the walls of the recess 10 as indicated in FIGURE 5. The entire locker arm rotates about pin 12 from a free position illustrated in FIGURE 4 to the locking position illustrated in FIGURE 3 as well as FIGURES 1 and 2. The bottom 15 of the locker arm consists of a central section 15' which is flat and rests on the bottom wall of recess 10 when the locker arm is in the free position as illustrated in FIGURE 4. The front and rear sections 15'' and 15''' are formed at an angle to the base 15'. The section 15'' rests on the bottom wall 10 of recess 10 when the locker arm is in the locking position. Hence, bottom wall 10 acts as a stop and limits the clockwise rotation of locker arm 11.

The top part of the locker arm 16 has a central section 16' in which a lock receiving opening 17 is formed. The top of central section 16' is arcuate. The rear section 16'' of the locker arm is flat and is flush with the top surface of the casings 1 and 2 when the arm is in the inoperative position (see FIGURE 4). While the locker arm is in the inoperative position, the handles and connecting means are free to move over the head portion 14.

The handle connecting means 5 and 6 has a path defined by the dashed lines 20 in FIGURE 3. The path is such that the head 14 of the locker arm is pivoted from the locking position, which is within the path 20, to the free position without hitting the handle connecting means. In FIGURE 3, the locus or the path of movement of the outermost part of head 14 is illustrated by the dashed lines 21 and illustrates that suitable clearance exists between the path of the head 14 and the handle connecting means. The front edge 18 of head 14 is relatively steeply sloped and has substantially the shape of an arc of a circle drawn from the center of pin 12. The dimensions of the head are such that the back surface 19 is curved and smoothly joins the curvature of the arcuate edge of the central section 16' to form a cradle for the handle connecting means.

The shackle 26 should have a diameter which is slightly less than the diameter of the opening 17. If the diameter of the shackle 26 is slightly less than the diameter of the opening 17, then the locker arm would rest in the locking position as illustrated in FIGURE 3. In this position, the locker arm is retained in the outermost clockwise position.

In FIGURE 6, there is shown an alternative embodiment in which the recess is formed partly in each of the casings 1 and 2 instead of being formed solely in the casing 1 as shown in FIGURE 5.

Although the description has been specific to a multipole breaker having two physical handles, it is understood that the breakers may have only a single handle. The locker arm would then be mounted alongside the single handle, and the padlock shackle would produce the interference with the handle in accordance with the teachings of the invention. In a three-pole breaker, a single handle may be utilized with two locker arms located in the casing walls on opposite sides of the handle.

While the foregoing description sets forth the principles of the invention in connection with specific apparatus, it is to be understood that this description is made only by way of example and not as a limitation of the scope of the invention as set forth in the objects thereof and in the accompanying claims.

1. The combination comprising:
   a. A handle pivotally movable in said breaker from an ON to OFF position, the end of said handle describing an arcuate path between said positions;
   b. A handle pivotally mounted and substantially disposed in a recess in said breaker, one end of said arm describing an arcuate path out of said recess and parallel and adjacent the plane defined by the arcuate path of said handle, the rotational movement of said one end of said arm out of the breaker recess being limited by the coaction between a portion of said arm and said breaker, thereby defining an arm movement limit;
   c. Removable securing means connected to said arm between the end thereof and the arm pivot at a section of said arm extending out of said recess when said arm is at said movement limit for contacting said breaker and limiting the reverse movement of said arm;
   d. Said securing means having a portion thereof perpendicularly to the arcuate path of said arm and extending into the path of said handle for restricting the movement thereof.

2. The combination comprising:
   a. A multipole breaker having at least two handles;
   b. Each handle being pivotally movable in its associated breaker from an ON to OFF position, the end of each of said handles describing parallel arcuate paths between said positions;
   c. Means connecting said handles for simultaneous travel;
   d. A handle breaker arm pivotally mounted intermediate the ends thereof in a recess in at least one of said breakers, one end of said arm describing an arcuate path parallel and intermediate the planes defined by the arcuate paths of said handles, the rotational direction of said one end of said arm out of the breaker recess being limited by the coaction between a portion of said arm and at least one of said breakers;
   e. Said end of said arm being interposed in the path of said connecting means, for restricting the movement of said handles from either of said OFF and ON positions, when said end of said arm is in a predetermined position out of said recess;
   f. Removable securing means connected to said arm intermediate said end thereof and the arm pivot, for contacting at least one of said breakers and limiting the rotation of said one end of said arm in the reverse rotational direction, thereby locking said arm in said predetermined position;
   g. Whereby, upon removal of said removable securing means, said locking arm may be rotated opposite said first rotational direction and said end of said arm removed from its predetermined position and rotated into said recess.

3. The combination claimed in claim 1 in which said removable securing means is connected to said arm by passing through an aperture therein.

4. The combination claimed in claim 1, in which said arm is a substantially flat elongated member having a flat bottom edge at the end opposite said one end for contacting
with the recess and limiting the arm travel at said one end out of said recess, and an aperture at the top intermediate the pivot and said one end for receiving said removable securing means.

5. The combination claimed in claim 2 in which said removable securing means is connected to said arm by passing through an aperture therein.

6. The combination claimed in claim 2 in which said arm is a substantially flat elongated member having a recessed top edge at said one end for interposition in the connecting means path, a flat bottom edge at the other end for coacting with the recess and limiting the arm travel of said one end out of said recess, and an aperture at the top intermediate said one end and the pivot for receiving said removable securing means.

References Cited by the Examiner

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Date</th>
<th>Inventor</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,370,877</td>
<td>3/1945</td>
<td>Robbins</td>
<td>200-42</td>
</tr>
<tr>
<td>2,523,943</td>
<td>9/1950</td>
<td>Choppa</td>
<td>200-42</td>
</tr>
<tr>
<td>2,673,259</td>
<td>3/1954</td>
<td>Appleton et al.</td>
<td>200-44</td>
</tr>
<tr>
<td>2,752,440</td>
<td>6/1956</td>
<td>Robbins</td>
<td>200-44</td>
</tr>
<tr>
<td>2,850,587</td>
<td>9/1958</td>
<td>Nolden et al.</td>
<td>200-44</td>
</tr>
<tr>
<td>2,878,332</td>
<td>3/1959</td>
<td>Locher</td>
<td>200-50</td>
</tr>
<tr>
<td>2,943,162</td>
<td>6/1960</td>
<td>Norden</td>
<td>200-44</td>
</tr>
</tbody>
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