April 6, 1965 W. A. CARTER 3,177,323

GAS DEFLECTING PLATE AND OPERATING ROD

Filed Dec. 19, 1960 4 Sheets-Sheet 1

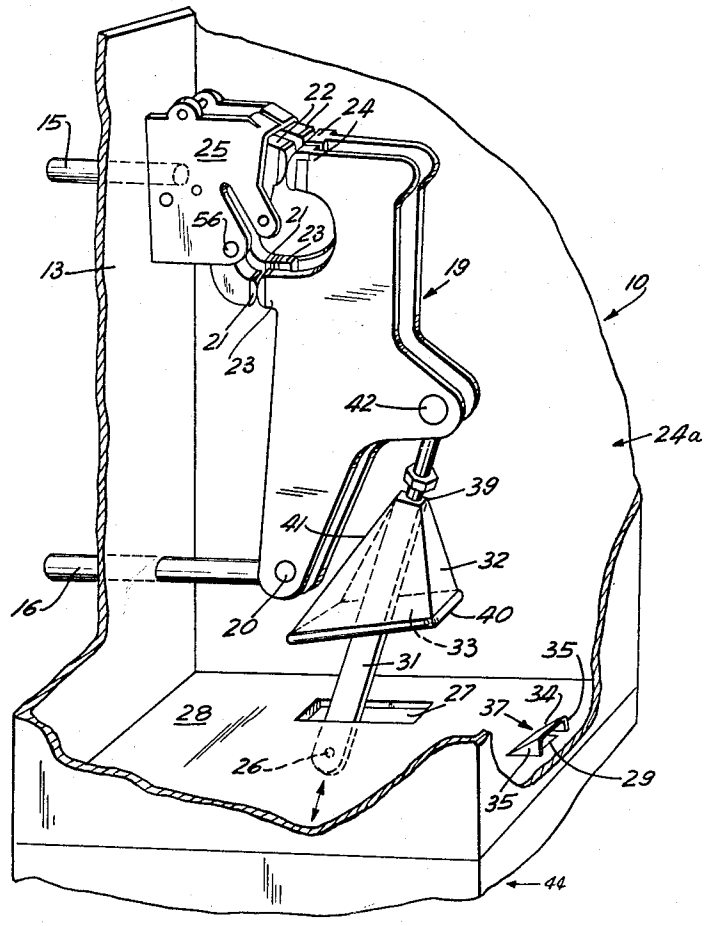


FIG. 1

INVENTOR.
WILLIAM A. CARTER

BY
OSTROLENK, FABER, GERB & SOFFEN

ATTORNEYS

April 6, 1965 W. A. CARTER 3,177,323

GAS DEFLECTING PLATE AND OPERATING ROD

Filed Dec. 19, 1960 4 Sheets-Sheet 2

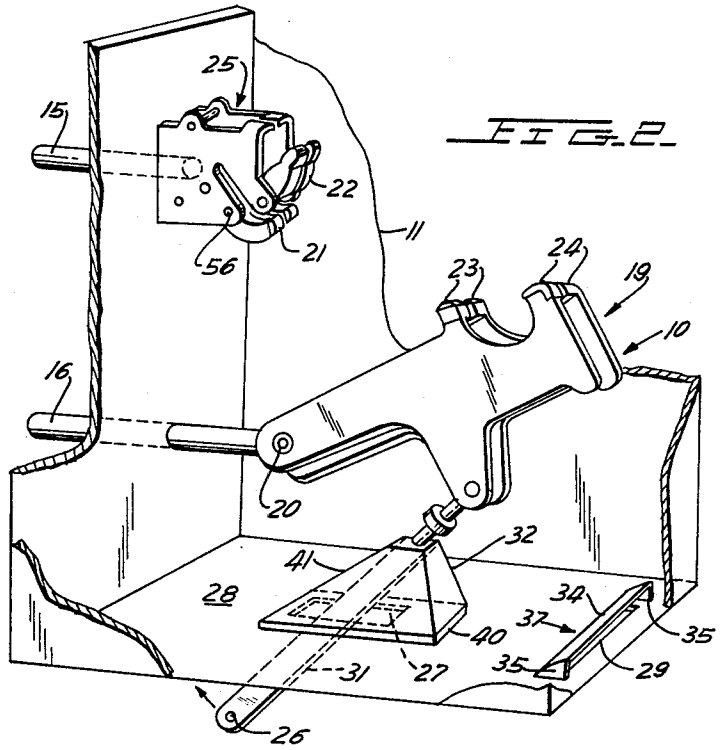


FIG. 2

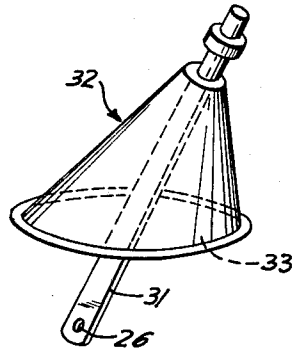


FIG. 5

INVENTOR.
WILLIAM A. CARTER

BY

OSTROLENK, FABER, GERB & SOFFEN

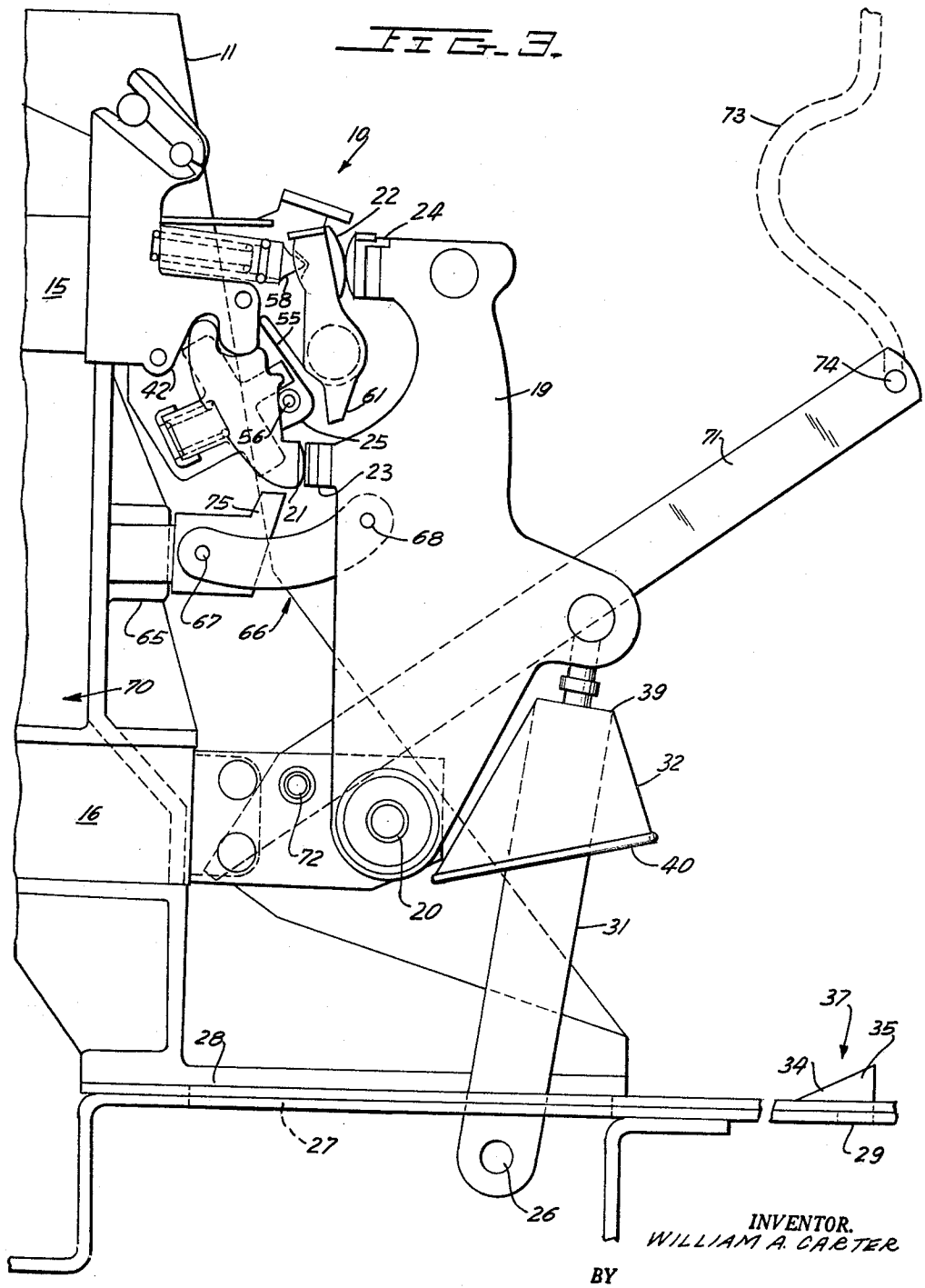
ATTORNEYS

April 6, 1965 W. A. CARTER 3,177,323

GAS DEFLECTING PLATE AND OPERATING ROD

Filed Dec. 19, 1960 4 Sheets-Sheet 3

FIG. 3.



INVENTOR.
WILLIAM A. CARTER

BY
OSTROLENK, FABER, GERB & SOFFEN

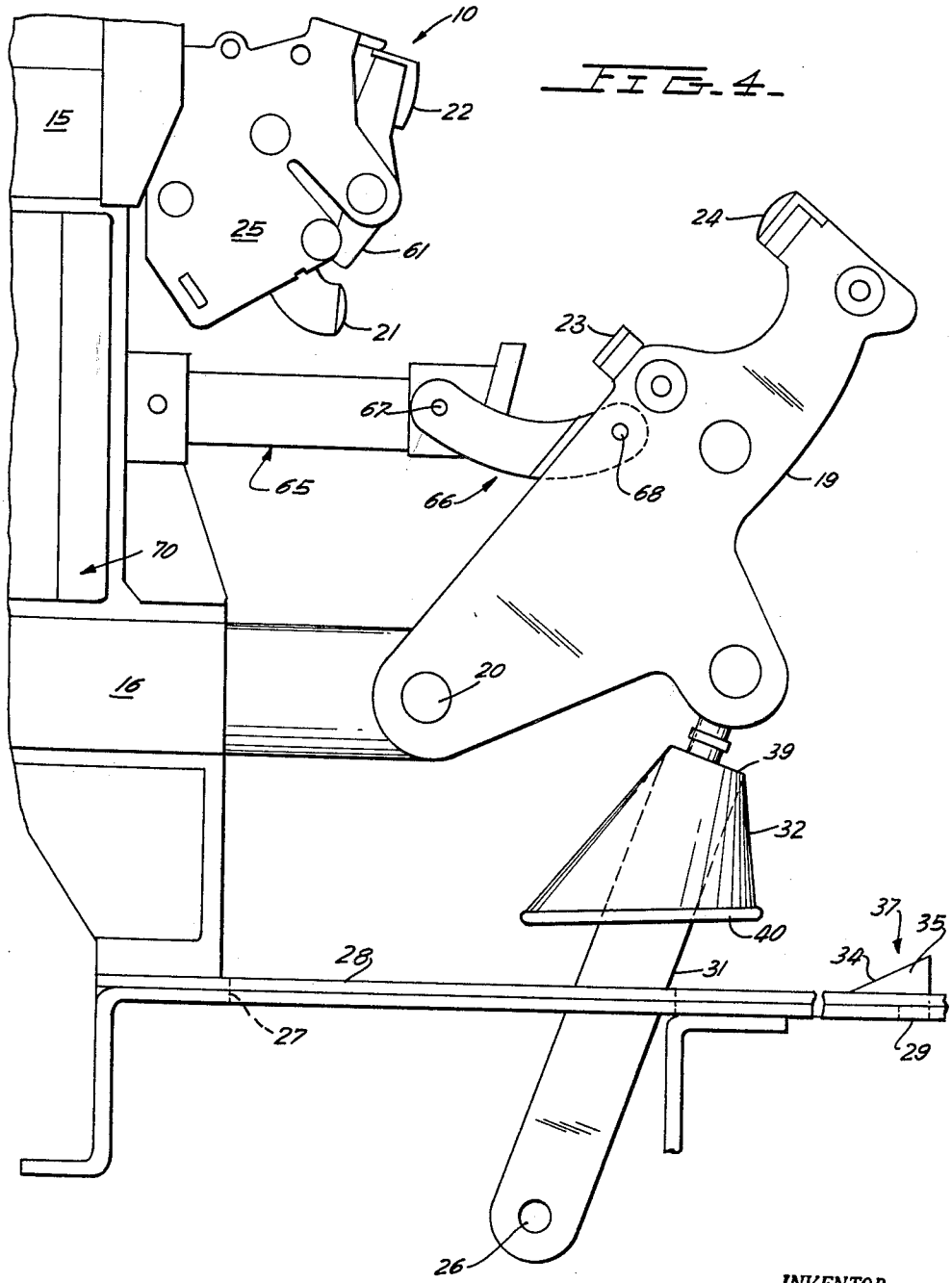
ATTORNEYS

April 6, 1965 W. A. CARTER 3,177,323

GAS DEFLECTING PLATE AND OPERATING ROD

Filed Dec. 19, 1960 4 Sheets-Sheet 4

FIG. 4



INVENTOR.
WILLIAM A. CARTER

BY
OSTROLENK, FABER, GERB & SOFFEN

ATTORNEYS

United States Patent Office 3,177,323 Patented Apr. 6, 1965

3,177,323

GAS DEFLECTING PLATE AND OPERATING ROD

William A. Carter, Devon, Pa., assignor to I-T-E Circuit Breaker Company, Philadelphia, Pa., a corporation of Pennsylvania

Filed Dec. 19, 1960, Ser. No. 76,688
11 Claims. (Cl. 200—144)

My invention relates to circuit breakers and more particularly to circuit breakers having novel shielding means for isolating ionized gases formed during the tripping operation from the breaker actuating mechanism and for the introduction of fresh air to the circuit breaker during normal operation.

It is important that circuit breakers have actuating mechanisms which are rapid in operation and which are sufficiently sturdy to withstand repeated use. In order to minimize deterioration of the actuating mechanism, circuit breakers have been designed to isolate the actuating mechanism from the region of the contacts of the circuit breaker. This is usually done by placing the circuit breaker in a compartment having a horizontal barrier interspersed between the contacts and the actuating mechanism. A structure of this nature is shown in U.S. Patent No. 2,813,950 entitled "Circuit Breaker Operating Mechanism," issued November 19, 1957, to G. A. Wilson and assigned to the same assignee as the instant invention.

When the contacts start to separate during automatic tripping operation of the circuit breaker, the potential difference existing between the contacts separating causes an arc to be drawn between the separated contacts. The ionization of the air generates a large amount of heat causing metallic parts in the immediate region of the arc and its associated gases to experience a small amount of vaporization. The initial creation of the arc is accompanied by an explosion caused by a tremendous increase in the temperature of the air immediately surrounding the arc. This explosion causes the ionized gases, the vaporized metallic particles and the heated air surrounding the blast area to be dispersed in every direction. A large majority of the contaminated gas mixture is accelerated upward into an arc chute, which is associated with the circuit breaker, due to the influence of the intense magnetic field. However, a large amount of the heated mixture follows a downward path into the region of the actuating mechanism. The heated gases can have a very harmful effect on the actuating mechanism.

Also, the presence of the heated gas mixture in the region of the actuating mechanism enhances the possibility of an arc being drawn between the lower terminal of the circuit breaker and any grounded part.

Since this heated gas mixture can have a harmful contaminating effect upon the acuating mechanism and can further create a favorable environment for flash over, the need to isolate the actuating mechanism from the breaker contacts is made readily apparent.

However, an opening must be placed in the barrier wall which separates the contacts from the actuating mechanism in order to provide a passageway for the connecting link or pushrod which links the movable arm of the circuit breaker with the actuating mechanism. The opening is also necessary since it permits fresh air to circulate through the cooperating contact compartment during normal operation in order to ventilate the breaker elements.

My invention provides a pushrod which has an umbrella structure mounted thereto and which moves along with the pushrod to deflect heated gases moving at a high velocity away from the opening in the isolating barrier. With my invention it is not necessary to eliminate the opening in the isolating barrier since the umbrella

structure is adapted to substantially cover the opening during the tripping operation in order to keep the heated gases from entering into the region of the actuating mechanism. The umbrella structure, however, does not form an air-tight seal around the opening but is spaced a predetermined distance above the surface of the isolating barrier. This enables the fresh air moving at a low velocity to pass upward through the opening into the breaker contact region to facilitate the upward movement of the contaminated gases into the region of the arc chute and to immediately start cooling the breaker contact elements.

The umbrella structure further serves as a barrier to arcing or flash overs by providing a tortuous path for an arc which may be drawn between the lower terminal of the circuit breaker and the grounded elements of the breaker actuating mechanism.

When the circuit breaker is in the closed position, the umbrella structure is located well above the opening to permit air to pass through the opening in the isolating barrier unimpeded by the umbrella-like shield. In addition, the umbrella structure, at the instant the tripping operation begins, is located near the breaker contact area. This permits a larger quantity of the heated gas mixture to be deflected away from the opening in the insulating barrier, thereby protecting the exposed elements of the breaker actuating mechanism. The umbrella structure continues to move in a downward direction until it reaches a position immediately above the opening in the insulating barrier, permitting fresh air moving at a slow velocity to enter the contact area substantially unimpeded while the heated gases moving at a high velocity are deflected away from the opening.

A vent is provided in combination with the umbrella structure to permit the introduction of an amount of fresh air, greater than the amount provided by the umbrella structure alone, to enter the region of the circuit breaker contacts substantially unimpeded during the opening or tripping operation. Although the umbrella does not engage the isolating barrier during the tripping operation, the amount of air which may flow in the space between the umbrella and the insulating barrier is limited. The cooperating vent is so constructed that fresh air moving at a low velocity enters through the vent into the contact region at the same time it is passing between the umbrella and the opening in the insulating barrier. The end of the vent which is located in the contact region is designed to permit slow moving fresh air to enter the contact region unimpeded while, at the same time, virtually all of the heated gas mixture which is blown into the direction of the vent at a high velocity is deflected so that none of the heated gas mixture can enter the region of the actuating mechanism.

It is, therefore, one object of this invention to provide a circuit breaker which is so arranged to protect the breaker actuating mechanism from the harmful effects of circuit interruption.

Another object of this invention is to provide a circuit breaker in which the breaker actuating mechanism is isolated from the circuit breaker during the tripping operation.

A further object of this invention is to provide a circuit breaker which is so arranged to provide ventilation of the circuit breaker during normal operation.

A still further object of this invention is to provide a circuit breaker which is so arranged to deflect high velocity gases formed during the tripping operation away from the breaker actuating mechanism and to permit fresh air moving at a low velocity to pass from the region of the breaker actuating mechanism to the region of the circuit breaker contacts.

Another object of this invention is to provide a circuit

breaker having vent means for permitting the flow of fresh air between the circuit breaker and the breaker actuating mechanism and to prevent the flow of high velocity gases from the region of the breaker contacts from entering the region of the breaker actuating mechanism.

These and other objects of the invention will be apparent from the following description and drawings in which:

FIGURE 1 is a perspective view of the novel circuit breaker of the invention showing the circuit breaker contacts in the closed position.

FIGURE 2 is a perspective view of a breaker corresponding to FIGURE 1 showing the breaker contacts in the disengaged position.

FIGURE 3 is a side view of the novel circuit breaker of FIGURES 1 and 2 showing the breaker contacts in the closed position.

FIGURE 4 is a side plan view of the breaker corresponding to FIGURE 1 showing the breaker contacts in the disengaged position.

FIGURE 5 is a perspective view of one embodiment of the novel deflector.

Referring now to the figures, I have here shown a novel circuit breaker 10 which is so arranged as to prevent gases in the region of the breaker contacts which are heated as a result of the tripping operation from entering the region of the breaker actuating mechanism. Fresh air, however, is permitted to move unimpeded from the region of the breaker actuating mechanism to the region of the breaker contacts. During normal operation adequate ventilation is provided to cool the breaker contacts.

FIGURE 1 shows a circuit breaker 10 mounted to the side wall 13 by upper 15 and lower 16 disconnect devices. Movable bridge 19 is mounted to lower terminal 16 by pivot 20. The opposite end of movable bridge 19 has two pairs of butt contacts 23 and 24 fixedly mounted thereto. Arcing contacts 22 mounted to upper terminal 15 by means of side plates 25 cooperate with butt contacts 24. Main contacts 21 also mounted to upper terminal 15 cooperate with butt contacts 23. Operating bridge 19 is moved between its open and closed position by means of pushrod 31. The upper end of pushrod 31 is connected to bridge 19 by pivot means 42. The lower end of pushrod 31 is pivotally connected at 26 to a breaker actuating mechanism (not shown). A barrier plate 28 connected to the side walls of housing 24*a* serves to isolate the circuit breaker 10 and the breaker actuating mechanism (not shown) into separate compartments. An opening 27 is provided in barrier plate 28 to permit pushrod 31 to be inserted therethrough. Deflecting means 32 for deflecting high velocity gases formed between arcing contact pairs 22 and 24 during the tripping operation of the circuit breaker is mounted at its upper end 39 to pushrod 31. Gas deflecting means 32 has a pyramidal shape which tapers outward in the direction of opening 27 and is hollow on its underside 33. A vent means 37 having a top plate 34 and side plates 35 is shown mounted along one edge of the barrier plate 28. The top plate 34 of vent means 35 is positioned at an angle to deflect high velocity gases formed in the region of arcing contacts 22 and 24 during the tripping operation in a direction away from barrier plate 34. Opening 29 in barrier plate 28 is positioned immediately beneath the top plate 34 of vent 37. However, due to the presence of top plate 34, high velocity gases moving in the direction of opening 29 will be prevented from passing through opening 29 into the compartment housing the breaker actuating mechanism (not shown).

FIGURE 2 shows the circuit breaker 10 shown in FIGURE 1 in the open position. At this time, deflecting means 32 which is fixedly mounted to pushrod 31 is positioned immediately above opening 27 in barrier plate 28. It should be noted, however, that deflecting means 32 does not create an air-tight seal between the lower edges 40 of deflecting means 32 and the surface of barrier plate 28 but that deflecting means 32 is spaced a predetermined distance above the surface of barrier plate 28. Positioning deflecting means 32 in this manner prevents high velocity gases originating from the region of arcing contacts 22 and 24 from entering opening 27 while permitting fresh air from the lower compartment 44 to pass through opening 27 and the space between barrier plate 28 and the lower edges 40 of deflecting means 32 upward into the region 24*a* of the breaker contacts 21 through 24.

The operation of deflecting means 32 and vent means 35 will now be described in connection with FIGURES 3 and 4. When a fault condition occurs, the breaker actuating means (not shown) which is connected to pushrod 31 causes movable bridge 19 to be rotated from the engaged position shown in FIGURE 1 in a clockwise direction around pivot 20. The contacts 22 and 21 which are operatively connected to upper terminal 15 are arranged in such a manner as to cause main contacts 21 to be disengaged from butt contacts 23 prior to the disengagement of arcing contacts 22 from butt contacts 24. At this point, all current flowing through the circuit breaker 10 is transferred to the engaged contacts 22 and 24. As bridge 19 is rotated further in the clockwise direction, arcing contacts 22 and 24 become disengaged. Due to the potential difference existing between movable arcing contacts 22 and cooperating butt contacts 24, the gases in the immediate area of contacts 22 and 24 become ionized, causing an arc to be drawn between contacts 22 and 24. The initial creation of the arc is accompanied by an explosion due to the very rapid increase in the temperature of the air immediately surrounding the arc. The heat developed in the immediate area of the arc causes a small amount of vaporization to occur on the surfaces of contacts 22 and 24. The explosion causes the ionized gas, the vaporized metallic particles from contacts 22 and 24 and the heated air to diverge from the region of the arc in all directions. A large majority of this contaminated gas mixture is urged upward into the direction of the arc chute under the influence of the magnetic field set up by the blow-off path of the circuit breaker 10.

However, a substantial amount of the contaminated gas mixture is impelled downward in the direction of barrier plate 28. It becomes necessary, therefore, to deflect the contaminated gas mixture in a direction away from the openings 27 and 29 of barrier plate 28 to prevent the mixture from entering into the compartment which houses the breaker actuating mechanism. This is provided for by deflection means 32 and vent 37.

At the instant an arc is drawn between arcing contacts 22 and butt contacts 24, it is noted that deflecting means 32 is positioned well above opening 27 in barrier plate 28. The majority of the contaminated gas mixture which is moving in the direction of opening 27 will strike plate 41 of deflection means 32 nearest arching contacts 22 and 24 and will be diverted in a direction away from opening 27. As the bridge 19 is rotated still further in the clockwise direction, it assumes the position shown in FIGURE 2. At this time, deflecting means 32 which is controlled by the movement of pushrod 31 is positioned immediately above opening 27 such that deflecting means 32 substantially covers opening 27.

After the initial explosion, the gas is still in a state of high temperature and will tend to move upward out of the circuit breaker compartment. Fresh air located in the region of the breaker actuating mechanism will then rise to replace the upward moving heated gas mixture. The fresh air enters the circuit breaker compartment through opening 27 in barrier plate 28 and passes around the lower edge 40 of deflection means 22. The incoming fresh air replaces heated gases moving upward out of the

circuit breaker chute and simultaneously cools the breaker elements. The deflecting means 32 does not prevent the fresh air from entering the breaker compartment since the fresh air is moving at a very low velocity. At no time during the tripping operation do the heated gases enter the compartment housing the breaker actuating mechanism. The actuating mechanism is, therefore, completely isolated from any harmful effects from the tripping operation and its effective operating life is greatly increased. The umbrella-like deflecting means 32 lies directly in the line between lower terminal 16 and the breaker actuating mechanism creating a tortuous path for any arc which might be formed between these elements.

Vent means 37 aids umbrella-like deflecting means 32 in the performance of its functions. Top plate 34 of vent 37 is so positioned relative to barrier plate 28 as to be directly between opening 29 in barrier plate 28 and the region of contacts 22 and 24. Heated gases blowing in the direction of vent 37 during the tripping operation of the breaker strike the surface 34 of the vent 37 and are deflected away from opening 29. After the initial downward movement of the heated gases, the gases move upward. Fresh air beneath barrier plate 28 rises to replace the upward moving gases. Since the spacing between opening 27 and the lower edge 40 of deflector 32 is rather small, the fresh air cannot move upward rapidly enough to replace the exiting gases. Opening 29, therefore, provides an additional path for the fresh air to permit the entrance of greater quantities of fresh air, hence, resulting in a more rapid cooling of the breaker elements, namely contacts 21 through 24.

During normal operation, that is, with the circuit breaker in the position shown in FIGURE 1, fresh air enters opening 29 to permit adequate ventilation of the upper compartment housing the circuit breaker contacts.

Deflector 32 may be formed in various shapes other than that shown in FIGURES 1 through 4. For example, the deflector 32 may have a conical shape as shown in FIGURE 5, which is just as effective in deflecting the heated gases away from the barrier plate opening 27 as the embodiment of FIGURES 1, 2 and 3.

Thus, it can be seen that I have provided a circuit breaker structure which shields the breaker actuating mechanism from the harmful effects of the tripping operation and which provides ample ventilation during normal operation of the circuit breaker.

In the foregoing, I have described my invention only in connection with preferred embodiments thereof. Many variations and modifications of the principles of my invention within the scope of the description herein are obvious. Accordingly, I prefer to be bound not by the specific disclosure herein but only by the appending claims.

I claim:

1. A circuit breaker mounted in an upper compartments; an actuating mechanism for said circuit breaker mounted in a lower compartment; barrier means separating said upper and lower compartments and having at least one opening therein; a connector for mechanically linking said circuit breaker to said actuating mechanism passing through said barrier opening; said connector comprising a push rod having one end pivotally mounted to said circuit breaker and the opposite end pivotally mounted to said actuating mechanism, a tapered shell having an opening at each end, one of said openings having a larger cross-sectional area than the other opening, said push rod being positioned along the longitudinal axis of said shell, the end of said shell having a smaller cross-sectional area being connected adjacent the end of said push rod connected to said movable arm, said shell deflecting gaseous matter formed during the tripping of said circuit breaker away from said actuating mechanism while enabling gases from said lower chamber to enter into said upper chamber.

2. A circuit breaker being comprised of an operating arm and an actuating mechanism, said operating arm being mounted within an upper compartment, said actuating mechanism being mounted within a lower compartment, said operating arm being movable between an open and a closed position, a push rod pivotally connected between said operating arm and said actuating mechanism, barrier means positioned between said upper and lower compartments for isolating said operating arm from said actuating mechanism, said barrier means having an opening to permit said push rod to extend therethrough, movable deflection means for deflecting contaminated gases formed during the operation of said circuit breaker away from the opening in said barrier means to protect said actuating mechanism from harmful effects of said gases, said deflection means being positioned within said upper compartment.

3. A circuit breaker being comprised of an operating arm and an actuating mechanism, said operating arm being positioned within an upper compartment, said actuating means being positioned within a lower compartment, said operating arm being moveable between an open and a closed position, a push rod pivotally connected between said moveable arm and said actuating mechanism, barrier means positioned between said upper and lower compartments for isolating said movable arm from said actuating mechanism, said barrier means having an opening to permit said push rod to be extended therethrough, first and second unilateral vent means permitting the movement through said opening of air from said lower compartment into said upper compartment and preventing the movement through said opening of air moving at a high velocity from said upper compartment to said lower compartment, whereby contaminating gases containing high velocity particles formed during the tripping operation of said circuit breaker are prevented from entering the region of said actuating mechanism.

4. In combination, a pair of cooperating contacts and an actuating mechanism, an operating arm movable between an open and a closed position operatively connected to said contacts, said cooperating contacts and said operating arm being housed within an upper compartment, said actuating mechanism being housed within a lower compartment, barrier means interposed between said contacts and said operating mechanism between said upper and lower compartments to isolate said contacts from said actuating mechanism, said barrier means having an opening, a push rod pivotally connected to said operating arm and said actuating mechanism, said push rod being inserted through said opening, deflection means connected adjacent the end of said push rod connected to said operating arm and being positioned to deflect high velocity particles of contaminating gases formed during the tripping operation of said contacts away from said opening, while permitting fresh air to pass through said opening, said deflection means including a canopy which substantially covers said opening when said operating arm is in said open position, unilateral flue means mounted to said barrier means for directing fresh air from said lower compartment to said upper compartment and for preventing the flow of high velocity particles of said gases from entering into said lower compartment.

5. In combination, cooperating contact means and an actuating mechanism, said contact means including an operating arm movable between an open and a closed position, said contact means and said operating arm being housed within an upper compartment, said actuating mechanism being housed within a lower compartment, a barrier plate interposed between said upper and lower compartments for isolating said contact means from said actuating mechanism, said barrier plate having an opening, push rod means pivotally connected at one end to said operating arm and at the other end to said actuating mechanism, the central portion of said push rod be-

ing inserted through said opening, deflection means mounted to said push rod for deflecting high velocity particles of heated gases formed during the tripping operation away from said opening, said deflection means permitting fresh air from said lower compartment to move into said upper compartment, auxiliary deflecting means connected to said barrier plate for preventing the high velocity particles of said heated gases to pass from said upper compartment to said lower compartment and for permitting fresh air from said lower compartment to enter into said upper compartment.

6. A circuit breaker being comprised of a housing, a barrier plate inserted within said housing to divide said housing into an upper and a lower compartment, a movable arm operable between an open and a closed position mounted in said upper compartment, an actuating mechanism mounted in said lower compartment, said barrier plate having a first and second opening, a pushrod pivotally connected between said movable arm and said actuating mechanism and inserted through said first opening, first deflection means being adapted to deflect high velocity particles of heated gases formed in said upper compartment during the tripping operation of said circuit breaker away from said first barrier plate opening and to permit fresh air to pass from said lower to said upper compartment, said first deflection means being adapted to substantially cover said first barrier plate opening when said circuit breaker is in said open position, auxiliary deflection means mounted above said second barrier plate opening, said auxiliary deflection means cooperating with said first deflection means to deflect the high velocity particles of said heated gases away from said lower compartment and to permit fresh air to pass from said lower to said upper compartment, said auxiliary deflection means having a deflection plate which is positioned at an angle to deflect the high velocity particles of said heated gases away from said second barrier plate opening and to permit fresh air in said lower compartment to enter said upper compartment through said second barrier plate opening.

7. In combination, a circuit breaker housing, a barrier plate inserted within said housing to divide said housing into an upper and lower compartment, a movable arm operable between an open and a closed position mounted in said upper compartment, an actuating mechanism mounted in said lower compartment, said barrier plate having a first and second opening, a pushrod pivotally connected between said circuit breaker and said actuating mechanism and inserted through said first opening, first deflection means mounted upon said pushrod for deflecting the high velocity particles of heated gases formed in said upper compartment during the tripping operation of said circuit breaker away from said barrier plate opening, said first deflection means including a pyramid-shaped shell having an opening at each end, the end of said shell having the smaller opening being connected to said pushrod, said first deflection means being adapted to substantially cover said first barrier plate opening when said circuit breaker is in said open position, auxiliary deflection means mounted above said second barrier plate opening, said auxiliary deflection means cooperating with said first deflection means to deflect the high velocity particles of said heated gases away from said lower compartment and to permit fresh air to pass from said lower to said upper compartment, said auxiliary deflection means having a deflection plate which is positioned at an angle to deflect the high velocity particles of said heated gases away from said second barrier plate opening and to permit fresh air in said lower compartment to enter said upper compartment through said second barrier plate opening.

8. A circuit breaker being comprised of a contact operating arm and an actuating mechanism; said contact operating arm being movable between an open and closed position for said circuit breaker; a push rod pivotally connected at each end between said contact operating arm and said actuating mechanism; barrier means positioned between said contact operating arm and said actuating mechanism; said barrier means having a first opening; said pushrod extending through said first opening; a first deflector means connected to said pushrod; said first deflector means being positioned along the longitudinal axis of said push rod between said barrier means and said contact operating arm; said first deflector means being adapted to deflect high velocity gaseous matter formed during the tripping of said circuit breaker away from said first opening onto said barrier means to thereby prevent said gaseous matter from reaching said actuating mechanism; said first opening and said first deflector means adapted to permit fresh air in the region of said actuating mechanism to enter the region of said contact operating arm; a second opening in said barrier means, a second deflector means connected to said barrier means adjacent said second opening and interposed in direct path from said contact operating means to said second opening; said second deflector means deflecting high velocity gaseous matter away from said second opening to thereby prevent said gaseous matter from reaching said actuating mechanism; said second deflector means being at an angle with respect to said barrier means; said second opening and said second deflector means permitting fresh air in the region of said actuating mechanism to pass through said barrier means into the region of said contact operating arm.

9. A circuit breaker being comprised of a contact operating arm and an actuating mechanism; said contact operating arm being movable between an open and closed position for said circuit breaker; a push rod pivotally connected at each end between said contact operating arm and said actuating mechanism; barrier means positioned between said contact operating arm and said actuating mechanism; said barrier means having a first opening; said push rod extending through said first opening; a first deflector means connected to said push rod; said deflector means having an opening at each end, one of said openings having a larger cross-sectional area than the other opening; said first deflector means being positioned along the longitudinal axis of said push rod between said barrier means and said contact operating arm; the end of said deflector means having the smaller cross-sectional area being connected adjacent the end of the push rod connected to said contact operating arm; the end of said deflector means having the larger cross-sectional area being larger than said first opening in said barrier means; said first deflector means being adapted to deflect high velocity gaseous matter formed during the tripping of said circuit breaker away from said first opening onto said barrier means to thereby prevent said gaseous matter from reaching said actuating mechanism; said first deflector means being spaced from said barrier means when said circuit breaker is in closed position; said first opening and said first deflector means adapted to permit fresh air in the region of said actuating mechanism to enter the region of said contact operating arm.

10. A circuit breaker being comprised of a contact operating arm and an actuating mechanism; said contact operating arm being movable between an open and closed position for said circuit breaker; a push rod pivotally connected at each end between said contact operating arm and said actuating mechanism; barrier means positioned between said contact operating arm and said actuating mechanism; said barrier means having a first opening; said push rod extending through said first opening; a first deflector means connected to said push rod; said deflector means having an opening at each end, one of said openings having a larger cross-sectional area than the other opening; said first deflector means being positioned along the longitudinal axis of said push rod between said barrier means and said contact operating arm; the end of said deflector means having the smaller cross-

sectional area being connected adjacent the end of the push rod connected to said contact operating arm; the end of said deflector means having the larger cross-sectional area being at least as large as said first opening in said barrier means; said first deflector means being spaced from said barrier means when said circuit breaker is in closed position; a second opening in said barrier means, a second deflector means connected to said barrier means adjacent said second opening and interposed in direct path from said contact operating means to said second opening; said second deflector means being at an angle with respect to said barrier means.

11. A circuit breaker being comprised of a contact operating arm and an actuating mechanism; said contact operating arm being movable between an open and closed position for said circuit breaker; a push rod pivotally connected at each end between said contact operating arm and said actuating mechanism; barrier means positioned between said contact operating arm and said actuating mechanism; said barrier means having a first opening; said push rod extending through said first opening; a first deflector means connected to said push rod; said deflector means being a tapered shell having an opening at each end, one of said openings having a larger cross-sectional area than the other opening; said first deflector means being positioned along the longitudinal axis of said push rod between said barrier means and said contact operating arm; the end of said deflector means having the smaller cross-sectional area being connected adjacent the end of the push rod connected to said contact operating arm; the end of said deflector means having the larger cross-sectional area being at least as large as said first opening in said barrier means; said first deflector means being adapted to deflect high velocity gaseous matter formed during the tripping of said circuit breaker away from said first opening onto said barrier means to

thereby prevent said gaseous matter from reaching said actuating mechanism; said first deflector means being spaced from said barrier means when said circuit breaker is in closed position; said first opening and said first deflector means adapted to permit fresh air in the region of said actuating mechanism to enter the region of said contact operating arm; a second opening in said barrier means, a second deflector means connected to said barrier means adjacent said second opening and interposed in direct path from said contact operating arm to said second opening; said second deflector means deflecting said gaseous matter away from said second opening to thereby prevent high velocity gaseous matter from reaching said actuating mechanism; said second deflector means being at an angle with respect to said barrier means; said second opening and said second deflector means permitting fresh air in the region of said actuating mechanism to pass through said barrier means into the region of said contact operating arm.

References Cited by the Examiner

UNITED STATES PATENTS

1,312,777	8/19	Burnham	200—168
1,784,302	12/30	Millikan et al.	200—144
2,892,911	6/59	Crouch	200—144
2,920,169	1/60	Jennings	200—144
3,021,407	2/62	Jennings	200—144
3,025,376	3/62	Yarrick	200—144
3,043,939	7/62	Gryctko et al.	200—144

FOREIGN PATENTS

763,228	12/56	Great Britain.

BERNARD A. GILHEANY, *Primary Examiner.*

MAX L. LEVY, ROBERT K. SCHAEFER, *Examiners.*