

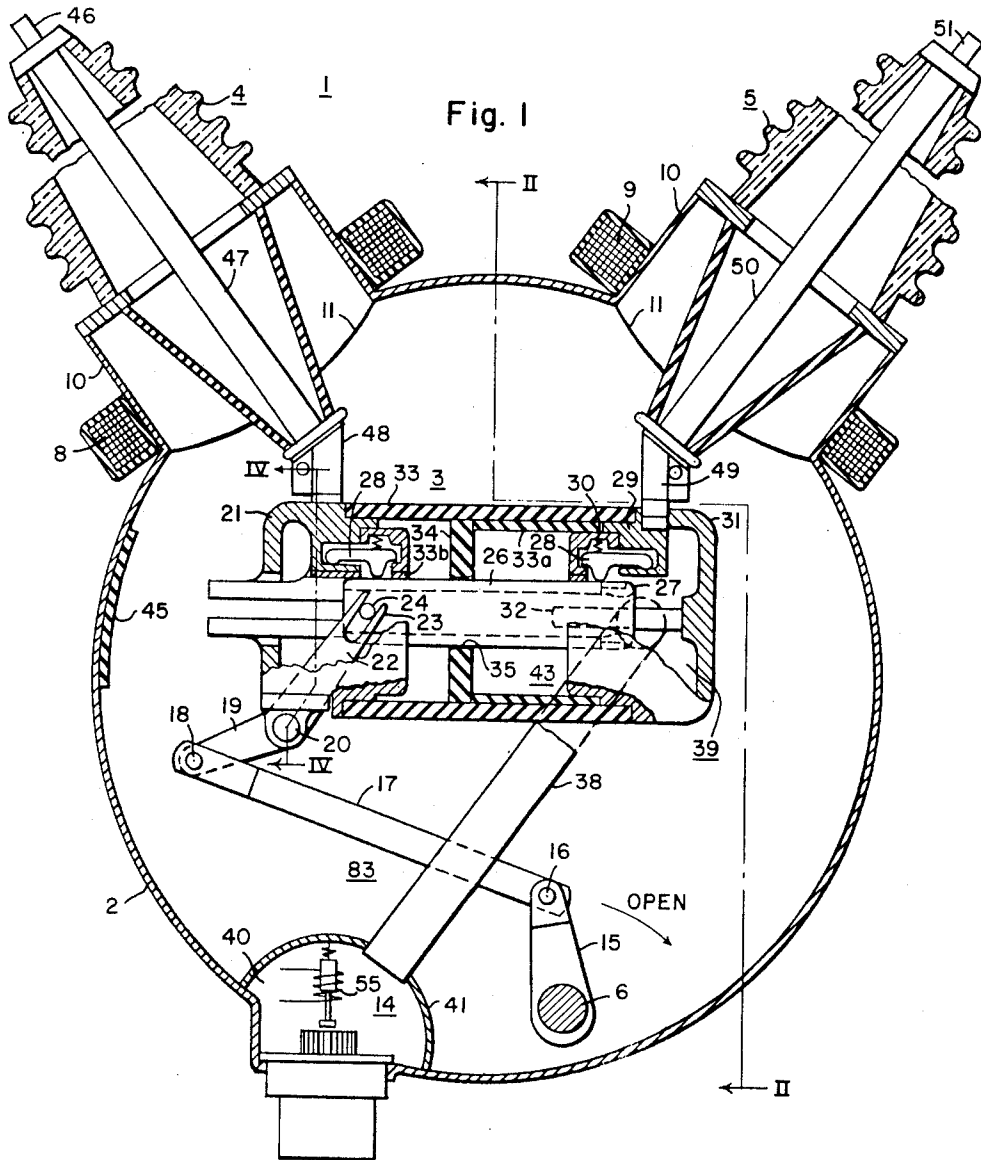
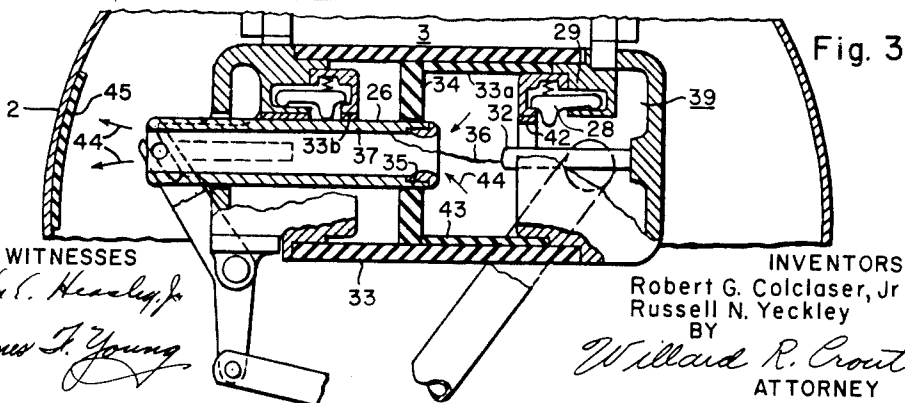
April 12, 1966

R. G. COLCLASER, JR., ET AL
ARC-EXTINGUISHING STRUCTURE AND TANK HOUSING
FOR A COMPRESSED-GAS CIRCUIT INTERRUPTER

3,246,108

Filed Feb. 15, 1961

3 Sheets-Sheet 1



WITNESSES

John C. Hensley, Jr.
James F. Young

INVENTORS

Robert G. Colclaser, Jr. &
Russell N. Yeckley

BY

Willard R. Croun
ATTORNEY

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3 Sheets-Sheet 2

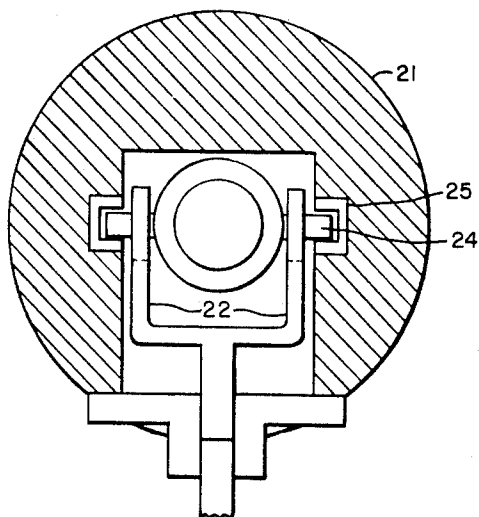


Fig. 4

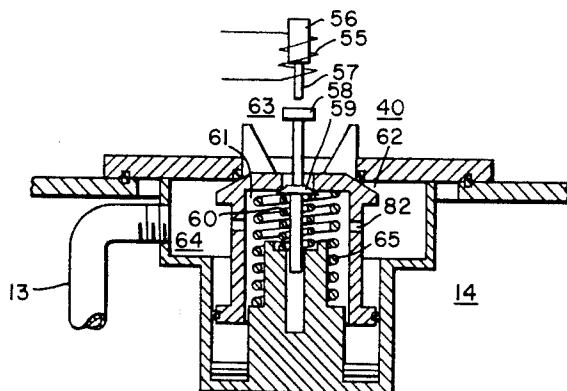


Fig. 5

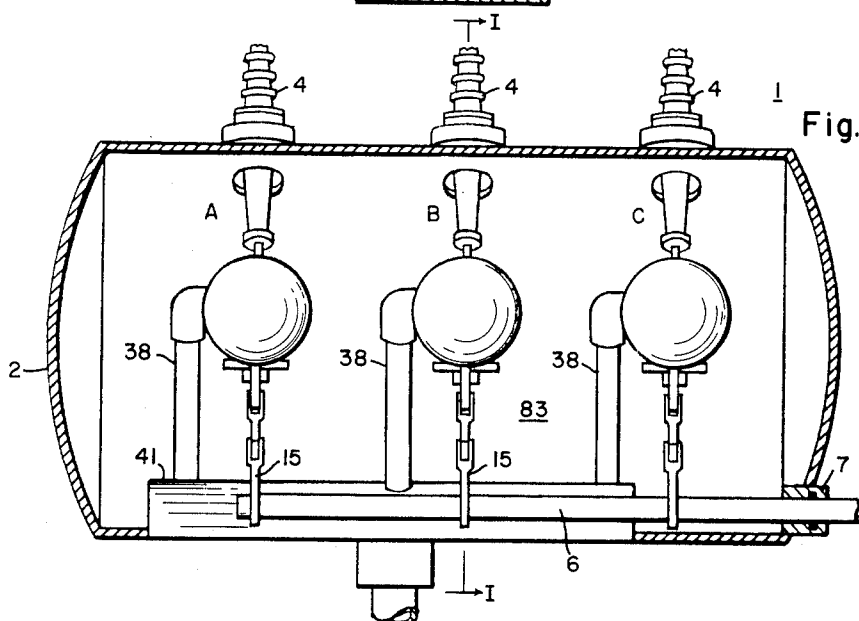


Fig. 2

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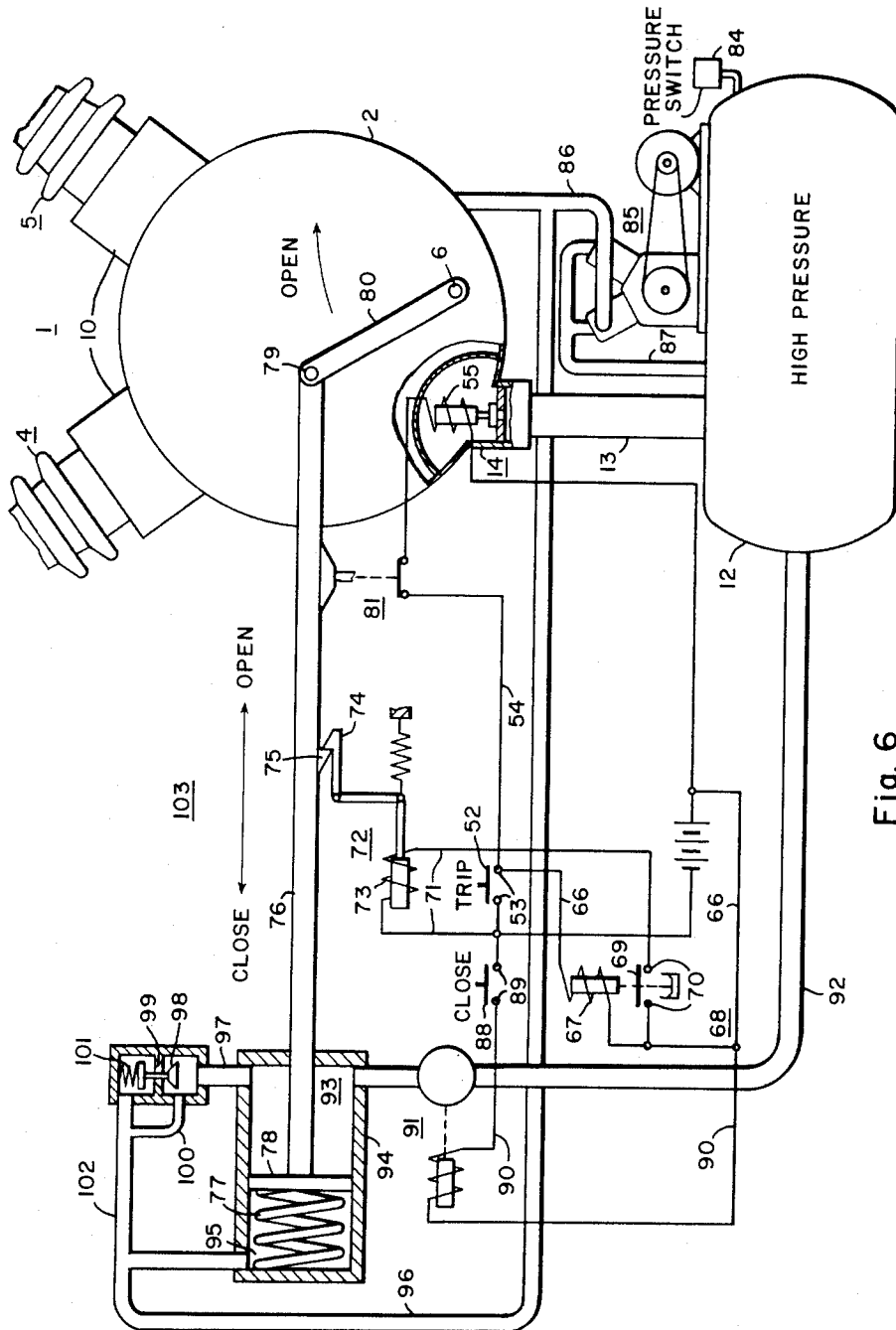


Fig. 6

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3,246,108

ARC-EXTINGUISHING STRUCTURE AND TANK HOUSING FOR A COMPRESSED-GAS CIRCUIT INTERRUPTER

Robert G. Colclaser, Jr., and Russell N. Yeckley, Monroeville, Pa., assignors to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

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15 Claims. (Cl. 200—148)

This invention relates to circuit interrupters in general and, more particularly, to arc-extinguishing structures and operating mechanisms therefor.

In the relatively low-voltage, high-current class of breakers, gas-filled structures offer several important advantages over conventional oil circuit breaker structures. At the present time, oil circuit breakers are generally of the self-generated pressure type, which are relatively ineffective at low currents, such as transformer magnetizing currents, or line-charging currents. As well known by those skilled in the art, whenever an interrupter depends upon self-generating action for the achievement of adequate interrupting pressure, difficulty is invariably encountered when interrupting low-amperage currents, when the self-generating pressure is low. The requisite pressure, necessary for interruption of such low currents, is, therefore, difficult to obtain. On the other hand, with a compressed-gas circuit interrupter, the pressure of the blasting action, and the duration of the blast is independent of the magnitude of the current being interrupted. Such compressed-gas circuit interrupters are, as a consequence, inherently more suitable for the interruption of low-current arcs than are oil-circuit interrupters, in which there exists the difficulty of obtaining adequate interrupting pressure by the aforesaid self-generating action.

It is, accordingly, a general object of the present invention to provide an improved circuit interrupter for relatively low voltages, say 34.5 kv., and suitable for interrupting a wide range of currents, in which relatively high-pressure gas, for example sulfur hexafluoride (SF_6) gas, at a pressure of, for example, 200 p.s.i.g. is used to extinguish the arc.

In the United States patent application filed October 7, 1960, Serial No. 61,284, now Patent No. 3,154,658, by Robert G. Colclaser, Jr. and Russell N. Yeckley, and assigned to the assignee of the instant application, there is disclosed and claimed a novel type of interrupting unit. In the patent application referred to, this interrupting unit is employed in conjunction with several other like units in a high-power, dual-pressure, tank-type circuit interrupter utilizing sulfur hexafluoride (SF_6) gas as the arc-extinguishing medium.

It is a further object of the present invention to provide an interrupting unit similar to the type set forth in the aforesaid patent application, which may be utilized for a lower-voltage rating in a circuit interrupter of a generally simplified type.

Still a further object of the present invention is to provide an improved quickly-operated blast-valve mechanism, which may be immediately opened, by a novel construction, at the beginning of the opening operation.

Still a further object of the present invention is to provide an improved operating mechanism particularly suitable for a circuit interrupter of the type set forth above.

Yet another object of the present invention is to provide an improved compressed-gas type of circuit interrupter of compact size and simple construction particularly suitable for multi-pole operation.

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Further objects and advantages will readily become apparent upon reading the following specification taken in conjunction with the drawings, in which:

FIGURE 1 is an enlarged vertical sectional view taken substantially along the line I—I of FIG. 2, taken through a tank-type circuit interrupter embodying features of the present invention, with the contact structure illustrated in the closed-circuit position;

FIG. 2 is a somewhat smaller longitudinal vertical sectional view taken through the tank-type circuit interrupter of FIG. 1, generally along the line II—II of FIG. 1, and illustrating the three pole-units disposed in the single tank structure;

FIG. 3 is a fragmentary view, somewhat similar to that of FIG. 1, but illustrating the position of the several contact parts in the fully open-circuit position;

FIG. 4 is an enlarged vertical sectional view taken along the line IV—IV of FIG. 1;

FIG. 5 is a vertical sectional view taken through the blast-valve mechanism of the present invention, the valve structure being illustrated in the closed position; and,

FIG. 6 is a somewhat diagrammatic view illustrating the operating mechanism for the circuit interrupter of the present invention, the several parts being shown in the closed-circuit position.

Referring to the drawings, and more particularly to FIGURE 1 thereof, the reference numeral 1 generally indicates a compressed-gas circuit interrupter. As shown, the interrupter 1 includes a grounded substantially cylindrical tank structure 2 enclosing an interrupting unit 3 supported from the lower interior ends of the pair of terminal bushings 4, 5. As shown in FIG. 2, a plurality of pole-units A, B and C are housed within the tank structure 2, and are simultaneously operated by a rotatable operating shaft 6, which extends through a seal 7 (FIG. 2) and is actuated externally of the tank structure 2 by means hereinafter described.

As shown in FIG. 1, a pair of current transformers 8, 9 may encircle the mounting supports 10, which are preferably welded, as at 11, to the tank structure 2. By having the current transformers 8, 9 encircle the terminal bushings 4, 5, differential protective relaying is obtained without any expensive complicated structure.

As shown in FIG. 6, a high-pressure reservoir tank 12 contains gas, such as sulfur hexafluoride (SF_6) gas at a relatively high pressure, say 200 p.s.i.g. A blast tube 13 extends upwardly from the high-pressure tank 12, and the blasting of high-pressure gas through the blast tube 13 is controlled by the operation of a blast valve, generally designated by the reference numeral 14, and shown more specifically in FIG. 5 of the drawings.

Returning to FIG. 1, rotation of the operating shaft 6 in a clockwise opening direction, rotates therewith a crank-arm 15, which is pivotally connected, as at 16, to an insulating operating rod 17, the latter being connected, by a pivot pin 18, to an operating crank 19. The operating crank 19 is journaled, by a pivot pin 20, to an end casting 21, constituting a portion of the interrupting unit 3.

The operating crank 19 has integrally formed therewith a pair of forked levers 22, as shown in FIG. 4. The ends of the forked levers 22 are bifurcated, as at 23, and straddle guide pins 24, secured to a movable contact 26. The guide pins 24 move in race tracks 25 integrally formed with the end casting 21.

It will be apparent from the foregoing, that clockwise rotation of the operating crank-arm 15 will, through the linkage 17, 19, effect leftward opening movement of the

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tubular movable contact 26. As shown in FIG. 1, the right-hand end 27 of the movable contact 26 makes contacting engagement with a pair of contact fingers 28, positioned within a contact support 29, and biased radially inwardly by compression springs 30. The contact support 29 is, as shown, a part of a second end casting or contact housing 31, which, additionally, supports an arcing horn 32, to which the arc is transferred in a manner more particularly brought out hereinafter.

Interconnecting the end castings 21, 31 is a substantially cylindrical insulating interrupter casing 33. As shown in FIG. 1, the cylindrical interrupter casing 33 may have associated therewith an internally-disposed liner 33a, which preferably is formed from polytetrafluoroethylene. Disposed intermediate the ends of the cylindrical interrupter casing 33 is a plate 34 having an orifice opening 35. As shown in FIG. 3, the movable tubular contact 26 moves longitudinally of the orifice opening 35 to a fully open-circuit position being guided by the opening 35 of plate 34 and also by a tetrafluoroethylene guide sleeve 33b. The plate 34 in combination with the liner 33a, forms an interrupting chamber 43.

To assist in effecting the extinction of the arc 36, which extends between the arcing horn 32 and the interior surface 37 of the movable contact 26, the present invention employs a blast of gas transmitted upwardly interiorly of the blast tube 38 interconnecting the region 39 within unit 3 with the region 40 interiorly of a manifold 41. The manifold 41 extends lengthwise of the tank structure 2, in a manner more clearly shown in FIG. 2 of the drawings. Thus, actuation of the blast-valve mechanism 14 will permit a blast of high-pressure gas from the tank 12 to flow upwardly through the blast tube 13, into the interior 40 of the manifold 41, and upwardly through the several blast tubes 38 (FIG. 2) and into the several regions 39 associated with the interrupting units 3 of the pole-units A, B and C.

This blast of gas, which is suitably timed, as more fully brought out hereinafter, is ejected from the region 39, through an orifice opening 42, and into the arcing chamber 43, defined by the interior liner 33a and the orifice plate 34. The blast of gas passes longitudinally through the interior of the tubular movable contact 26, and is exhausted externally of the interrupting unit 3 in a manner more clearly indicated by the arrows 44 in FIG. 3. To resist the possible corrosive action of these gases exhausting against the tank structure 2, preferably a polytetrafluoroethylene pad 45 is employed, as shown in FIG. 3.

The terminal bushings 4, 5 supporting the interrupting unit 3, preferably are of the gas-filled type, as more fully set forth in United States patent application filed December 2, 1959, Serial No. 856,775, now Patent No. 3,059,044, by Robert E. Friedrich and James H. Frakes, and assigned to the assignee of the instant application.

In the closed-circuit position of the circuit interrupter 1, as illustrated in FIG. 1, the electrical circuit there-through includes terminal connection 46, terminal stud 47, lower adapter 48, end casting 21, contact fingers 28, movable tubular contact 26, right-hand contact fingers 28, interrupter adapter 49, terminal stud 50, to line terminal connection 51.

During the opening operation, with reference being particularly had with respect to FIG. 6, the "open" or "trip" button 52 is manually pushed downwardly. Naturally, as well known by those skilled in the art, suitable electrically-actuated overload devices, responsive to the current passing through the current transformer 8, 9, may be substituted for the trip button 52, or employed additionally therewith.

The manual closing of the trip button 52 will bridge the contacts 53 and complete a circuit 54 to energize the electromagnetically-actuated blast-valve mechanism 14. The energization of the coil 55 will move the arma-

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ture 56, and hence the plunger 57 downwardly, as viewed in FIG. 5. The plunger 57 will contact the button 58 (FIG. 5) associated with the pilot valve 59, forcing the latter downwardly in opposition to the pressure exerted by a compression spring 60 and a slightly unbalanced gas pressure. The opening of the pilot valve 59 will dump the pressure from the region 61 behind the main blast valve 62 to the region 40, which is at relatively low pressure.

The dumping, or exhausting of the region 61 to low pressure will permit the high pressure within the region 64 (FIG. 5) to act downwardly on the main blast valve 62, forcing the latter downwardly against the opposition afforded by a second compression spring 65. The opening of the main blast valve 62 will permit high-pressure gas passing upwardly through the blast tube 13 to flow into the manifold structure 41 and to the several blast tubes 38 associated with the several pole-units A, B and C.

With further reference to FIG. 6, it will be noted that not only does the manual closing of the trip button 52 energize the circuit 54 leading to the blast-valve mechanism 14, but also the closing of the trip button 52 will energize a circuit 66, which will energize the coil 67 of a delayed-acting relay 68. Following a suitable time delay, the bridging contact 69 will close the contacts 70 of delay-action relay 68, and thereby energize the circuit 71 energizing an electromagnetically-actuated latching device 72. The energization of the coil 73 of the latching device 72 will release the latch 74 from a catch 75 provided along the side of a piston rod 76. This will permit a compression spring 77 to move a piston 78, and hence the piston rod 76 in a rightward direction, as viewed in FIG. 6. The piston rod 76 is pivotally connected, as at 79, to an externally disposed crank-arm 80, the lower end of which is keyed to the rotatable operating shaft 6.

The rotation of the operating shaft 6 effects opening of the several movable contacts 26, in the manner pointed out above, and the passing of the high-pressure gas through the several blast tubes 38 and into the interrupting units 3, and out through the tubular contacts 26 will effect rapid extinction of the arcs 36 in a manner more fully brought out in the aforesaid Colclaser and Yeckley patent application. More specifically, the right-hand terminal of the arc 36 is transferred from the conducting orifice opening 42 to the arc horn 32, as shown in FIG. 3. The left-hand end of the arc 36 is blown along the inside surface of the tubular movable contact 26.

The rightward opening movement of the piston rod 76 will be open up an interlock switch 81 (FIG. 6), and will thereby deenergize the coil 55 of the blast-valve mechanism 14. Referring to FIG. 5, this will permit high-pressure gas within the region 64 to pass through side openings 82 in the blast valve 62 and into the region 61. This fact, coupled with the spring action exerted by the compression spring 60, will effect reclosure of the pilot valve 59 and consequent reclosure of the main blast valve 62. The closing of the main blast valve 62 will halt the passage of high-pressure gas out of the interior 40 of the manifold 41 and through the blast tube 38. The pressure will then drop in the region 40 to the same pressure as that present in the region 83 interiorly of the main exhaust tank structure 2.

It will be obvious that following a plurality of opening operations, the pressure within the region 83 within the tank structure 2 will be raised, and, consequently, the pressure within the storage tank 12 will be correspondingly lowered. A pressure switch 84 will reflect this state of affairs, and will start up a compressor unit 85. The compressor unit 85 will extract gas from the exhaust tube 86 and force the recompressed gas through the inlet 87 back into the high-pressure reservoir tank 12. When the pressures within the high-pressure tank 12 and the exhaust tank 2 have attained their desired values, suitable means, well known to those skilled in the art, will be effective to deenergize the compressor unit 85.

To effect closing of the circuit interrupter 1, a closing button 88 may be pressed. This will bridge the contacts 89 and will energize a circuit 90, which will energize an electromagnetically-actuated valve 91. The opening of the valve 91 will permit high-pressure gas to pass from a conduit 92 into one end 93 of an operating cylinder 94 to act upon the piston 78 and force the same leftwardly toward the left-hand end of the operating cylinder 94. When the catch 75, carried by the piston rod 76, reaches the position illustrated in FIG. 6, the latching device 72 will be effective to hold the piston rod 76 in this closed-circuit position.

It will be noted that the region 95, to the left of the piston 78, communicates through a low-pressure connecting tube 96 with the exhaust tank 2, which is, of course, at low pressure.

While the valve 91 is open, the high-pressure gas will pass through the pipe 97 and effect closing of a valve 98 over an opening 99. This will prevent substantial bleeding of high-pressure gas through bypass conduit 102. When the valve 91 is deenergized, by release of the closing button 88, the presence of the relatively small bypassing conduit 100 will permit pressure within the region 93 to be rapidly lowered. This will enable the compression spring 10 to effect reopening of the dump valve 98 and permit a rapid dumping, or exhausting action to take place through the opening 99 and relatively large exhaust pipe 102.

From the foregoing description, it will be apparent that there is illustrated and described an improved compressed-gas type of circuit interrupter particularly adapted for relatively low voltages, where a single interrupting unit 3 may be adequate. The interrupting unit 3 employs high-pressure sulfur hexafluoride (SF_6) gas at, say a pressure of 200 p.s.i.g. to extinguish the arcs 36. This interrupter 3 is particularly efficient at low currents of any nature and has proven interrupting ability. It has interrupted 44,000 amperes with no external demonstration.

By disposing the three pole-units A, B and C within a single exhaust tank structure 2, a relatively compact circuit-interrupting device 1 is obtained.

As was the case with United States patent application Serial No. 50,183, filed August 17, 1960, now abandoned, by Robert G. Colclaser, Jr., and Frank L. Reese, and assigned to the assignee of the instant application, the sulfur hexafluoride gas may not only be used to effect extinction of the established arcs, but also may be used to effect operation of the operating mechanism 103 set forth in FIG. 6 of the drawings.

The electromagnetically-actuated blast-valve device 14 is very rapidly opened by energization of the solenoid 55. This action is even faster and more effective than employing a pneumatically-actuated pilot-valve in connection with a blast-valve device.

It is to be noted that the end castings 21, 31, of the interrupting unit 3 are constructed to be identical before machining. Thus the interrupting unit 3 is made up of simple and common parts where possible for economy. Since the high-pressure reservoir tank 12 is at ground potential and located, preferably, below the interrupting tank 2, no problem is encountered in supplying heat to the tank 12 to prevent the gas from liquefying in cold weather.

From the foregoing, it will be apparent that there is disclosed a single-tank, dual-pressure, gas-filled, low-voltage line of circuit breakers, which incorporate a proven interrupter unit 3. The interrupter units 3 are constructed economically, using common components where possible. High-pressure gas is supplied by a quick-acting, electrically-operated blast valve. The breaker mountings 10 on the tank permit the incorporation of through-type bushing current transformers 8, 9, which are, as is well known, economical.

Certain features of the terminal-bushing mounting con-

struction are set forth and claimed in United States patent application filed February 15, 1961, Serial No. 89,496, by Russell E. Frink, and assigned to the assignee of the instant application.

From the foregoing description, it will be apparent that because of the provision of a blast of gas exerted over a time interval, all independent of the magnitude of the current being interrupted, there results a circuit interrupter of improved construction and adaptable for efficient operation over a wide current range, including relatively low currents, with which oil circuit interrupters have difficulty, as pointed out above.

Although there has been disclosed and described a specific interrupter structure, it is to be clearly understood that the same was merely for the purpose of illustration, and that changes and modifications may readily be made therein by those skilled in the art, without departing from the spirit and scope of the invention.

We claim as our invention:

1. A compressed-gas circuit interrupter including a grounded tank, a pair of terminal bushings extending into said tank and at least partially supporting an arc-extinguishing unit at their interior ends, a movable tubular contact cooperable with a relatively stationary contact to establish an arc and for receiving a blast therethrough, crank means associated with said movable tubular contact to effect the actuation of the same, and means including a stationary orifice plate disposed intermediate the ends of said unit for directing a blast of high-pressure gas through said movable tubular contact to effect extinction of the arc.

2. The combination in a dual-pressure compressed-gas circuit interrupter of a grounded exhaust tank, a pair of terminal bushings extending into said tank and at least partially supporting an arc-extinguishing unit at their interior ends, said unit having a stationary orifice plate intermediate the ends thereof, a movable tubular contact cooperable with a relatively stationary contact and movable through said orifice plate to establish an arc, crank means associated with said movable contact to effect the actuation of the same, a separate high-pressure reservoir tank, blast-valve means for releasing a blast of gas from the high-pressure tank into the arc-extinguishing unit to effect extinction of the established arc, and the exhausted blast of gas being collected within the outer exhaust tank.

3. A compressed-gas circuit interrupter including a grounded tank, a pair of terminal bushings extending into said tank and at least partially supporting an arc-extinguishing unit at their interior ends, a movable tubular contact cooperable with a relatively stationary contact to establish an arc and for receiving a blast of gas therethrough, crank means associated with said movable contact to effect the actuation of the same, a rotatable operating shaft extending along the wall of the tank, linkage means interconnecting the shaft and said crank means, and means including a stationary orifice plate disposed intermediate the ends of said unit for directing a blast of high-pressure gas through said movable tubular contact to effect extinction of the arc.

4. The combination in a dual-pressure compressed-gas circuit interrupter of a grounded exhaust tank, a pair of terminal bushings extending into said tank and at least partially supporting an arc extinguishing unit at their interior ends, said unit having a stationary orifice plate intermediate the ends thereof, a movable tubular contact cooperable with a relatively stationary contact and movable through said orifice plate to establish an arc, crank means associated with said movable contact to effect the actuation of the same, a separate high-pressure reservoir tank, blast-valve means for releasing a blast of gas from the high-pressure tank into the arc-extinguishing unit to effect extinction of the established arc, the exhausted blast of gas being collected within the outer exhaust tank, and a rotatable operating shaft extending along a wall of the exhaust tank to actuate the crank means.

5. A blast-valve mechanism including a main blast valve having an exhaust opening therethrough, a pilot valve disposed in said exhaust opening for dumping the pressure in back of the main blast valve, and a solenoid plunger for directly striking the pilot valve and effecting immediate opening of the same.

6. A blast valve mechanism including means defining a high pressure region, a main blast valve disposed in the high pressure region and controlling an outlet opening therefrom, said main blast valve having an exhaust opening therethrough, a pilot valve disposed in said exhaust opening for dumping high pressure gas from in back of the main blast valve through said exhaust opening, and an electromagnetically actuated solenoid plunger disposed down stream of the outlet opening for directly striking the pilot valve and thereby effecting immediate opening of the same.

7. A multi-pole compressed-gas circuit interrupter including a generally horizontally extending exhaust tank structure, a plurality of pole-units disposed within the exhaust tank structure, each pole-unit including a pair of terminal bushings and an arc-extinguishing unit supported thereby, an elongated manifold extending lengthwise along one wall of the exhaust tank structure, an insulating blast tube extending from said elongated manifold to each arc-extinguishing unit, a high pressure reservoir tank, and blast-valve means interconnecting the manifold and the high-pressure reservoir tank.

8. A multi-pole compressed-gas circuit interrupter including a generally horizontally extending exhaust tank structure, a plurality of pole-units disposed within the exhaust tank structure, each pole-unit including a pair of terminal bushings and an arc-extinguishing unit supported thereby, an elongated manifold extending lengthwise along one wall of the exhaust tank structure, an insulating blast tube extending from said manifold to each arc-extinguishing unit, a high pressure reservoir tank, blast-valve means interconnecting the manifold and the high-pressure reservoir tank, a movable contact associated with each unit, crank means for actuating the movable contact to the open and closed circuit positions, and a rotatable operating shaft extending generally parallel to said elongated manifold for operating the several crank means of the pole-units.

9. A multi-pole compressed-gas circuit interrupter including a generally horizontally extending exhaust tank structure, a plurality of pole-units disposed within the exhaust tank structure, each pole-unit including a pair of terminal bushings and an arc-extinguishing unit supported thereby, an elongated manifold extending lengthwise along one wall of the exhaust tank structure, an insulating blast tube extending from said manifold to each arc-extinguishing unit, a high pressure reservoir tank, blast-valve means interconnecting the elongated manifold and the high-pressure reservoir tank, a movable contact associated with each unit, crank means for actuating the movable contact to the open and closed circuit positions, and a rotatable operating shaft extending generally parallel to said elongated manifold extending lengthwise along one wall of the horizontally extending tank structure.

10. A compressed gas circuit interrupter including a grounded tank, a pair of terminal bushings extending into said grounded tank, a pole unit comprising a gas blast arc extinguishing unit supported by the interior ends of the terminal bushings and including a spaced pair of metallic end members and interposed insulating tubular interrupter casing, one end metallic member having a journal portion and guide means associated therewith and directly supported by the interior end of one terminal bushing, the other metallic end member being directly supported by the interior end of the other terminal bushing and having a relatively stationary contact support associated therewith, relatively stationary contact means supported by said contact support, an apertured guide partition plate

disposed intermediate the ends of said insulating tubular interrupter casing, a movable tubular contact at least partially guided by said guide means and having one end thereof separable from said relatively stationary contact means to establish an arc, said movable tubular contact being guided through the aperture of the guide partition plate with a relatively close fit and guided thereby, crank means including a rotatable crank journaled by said journal portion and mechanically connected adjacent the other end of said movable tubular contact for causing the actuation thereof, said partition plate and the portion of the tubular insulating interrupter casing between said partition plate and said other end metallic member comprising an interrupter chamber, said movable tubular contact being the sole venting means for said interrupter chamber to the region within the tank externally of the arc extinguishing unit, operating means extending between said crank means and the tank wall including an insulating operating rod to positively effect actuation of said crank means to effect opening and closing movement of the movable tubular contact, means forcing a blast of arc extinguishing gas into said interrupter chamber during the opening operation to sweep through the interior of said movable tubular contact, whereby the end of the arc will be influenced to move axially along the interior of the movable tubular contact for fast interrupting action.

11. The combination of claim 10, wherein three pole-units are disposed within a single grounded tank, a blast manifold extends longitudinally of the tank, said blast means comprising separate blast tubes extending between the manifold and the three interrupting chambers, and said operating means including a rotatable operating shaft extending generally parallel to said blast manifold interiorly of the tank wall.

12. A compressed-gas arc-extinguishing unit including means defining an arcing chamber, relatively stationary contact means disposed adjacent one end of said arcing chamber and including a first orifice opening (42), a stationary orifice plate (34) closing the other end of the arcing chamber and providing a second orifice opening (35) therethrough, said arcing chamber being defined by the region intermediate said two orifice openings, said relatively stationary contact means being disposed on the other side of the first orifice opening from the location of said arcing chamber, a movable tubular venting contact movable with slight clearance through the second orifice opening and through the first orifice opening into contacting engagement with the relatively stationary contact means, means for providing a blast of arc-extinguishing gas through the first orifice opening and into the arcing chamber to exhaust out of the movable tubular venting contact, whereby an arc terminal may be carried by the blast of gas into and along the interior surface of the movable tubular venting contact.

13. The combination according to claim 12, wherein the first orifice opening (42) is formed by a contact housing (31) for the relatively stationary contact means.

14. A compressed gas arc-extinguishing unit including an insulating casing and a spaced pair of metallic end members, one end member having guide means associated therewith, the other metallic end member having a relatively stationary contact support associated therewith and conducting means providing a first orifice opening, an apertured guide partition plate disposed intermediate the ends of the insulating casing, a movable tubular contact at least partially guided by said guide means and having one end thereof separable from said relatively stationary contact means to establish an arc, said movable tubular contact being guided through the second aperture of the guide partition plate with a relatively close fit and guided thereby, means providing an arc extinguishing blast of gas through said first orifice opening, said movable tubular contact being the sole venting means for the interrupting chamber to the region exteriorly of the arc ex-

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tinguishing unit, whereby one terminal end of the arc may be swept into the interior of the movable tubular contact for fast interrupting action.

15. The combination according to claim 14, wherein a plurality of circumferentially disposed relatively stationary contact fingers are situated immediately behind the first orifice opening.

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KATHLEEN H. CLAFFY, *Primary Examiner.*

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

R. S. MACON, *Assistant Examiner.*