Jan. 5, 1965 R. N. YECKLEY ETAL 3,164,704

BLAST-VALVE MECHANISM FOR COMPRESSED-GAS CIRCUIT INTERRUPTER

Filed Oct. 17, 1960 5 Sheets-Sheet 1

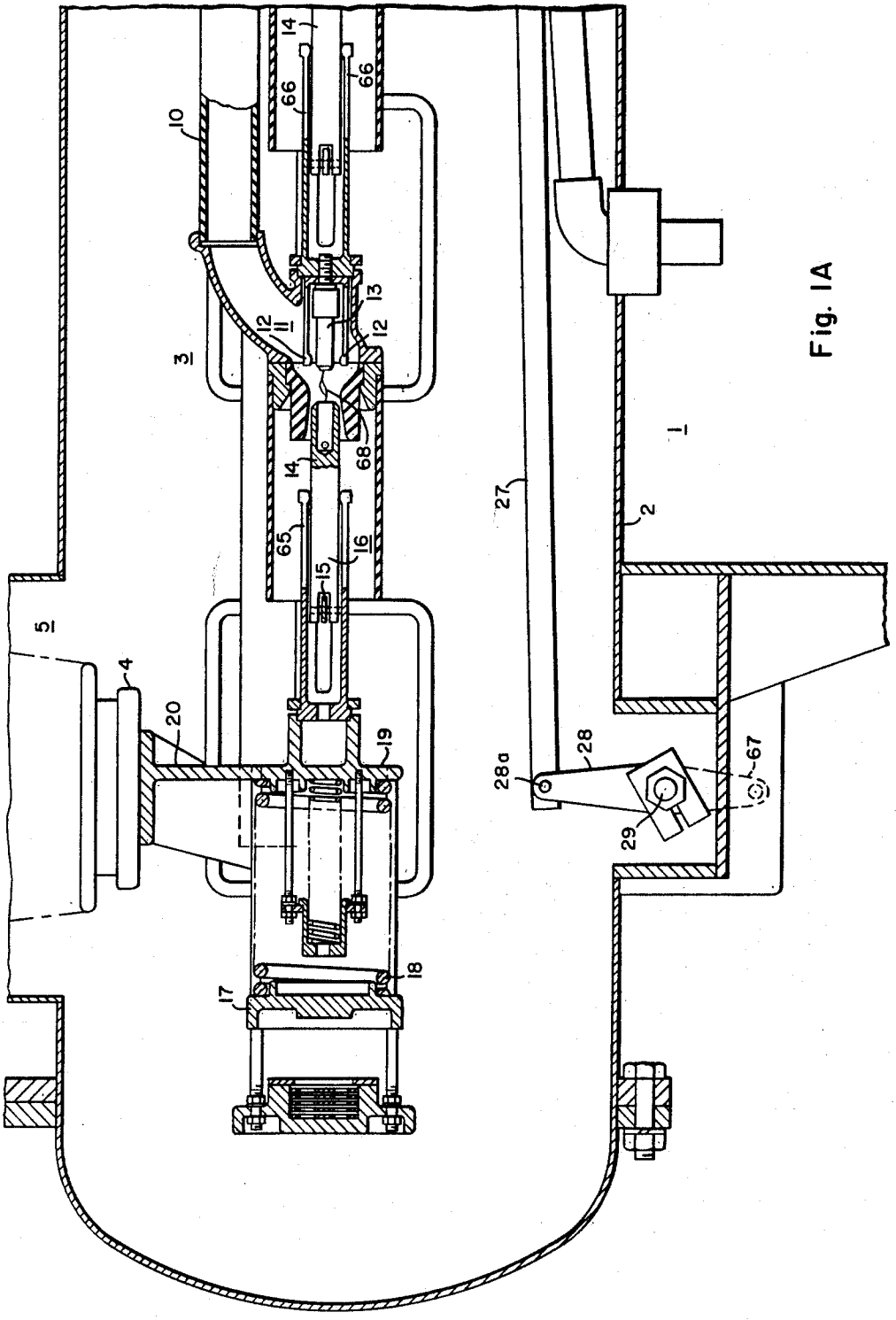


Fig. IA

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BLAST-VALVE MECHANISM FOR COMPRESSED-GAS CIRCUIT INTERRUPTER

Filed Oct. 17, 1960

5 Sheets-Sheet 2

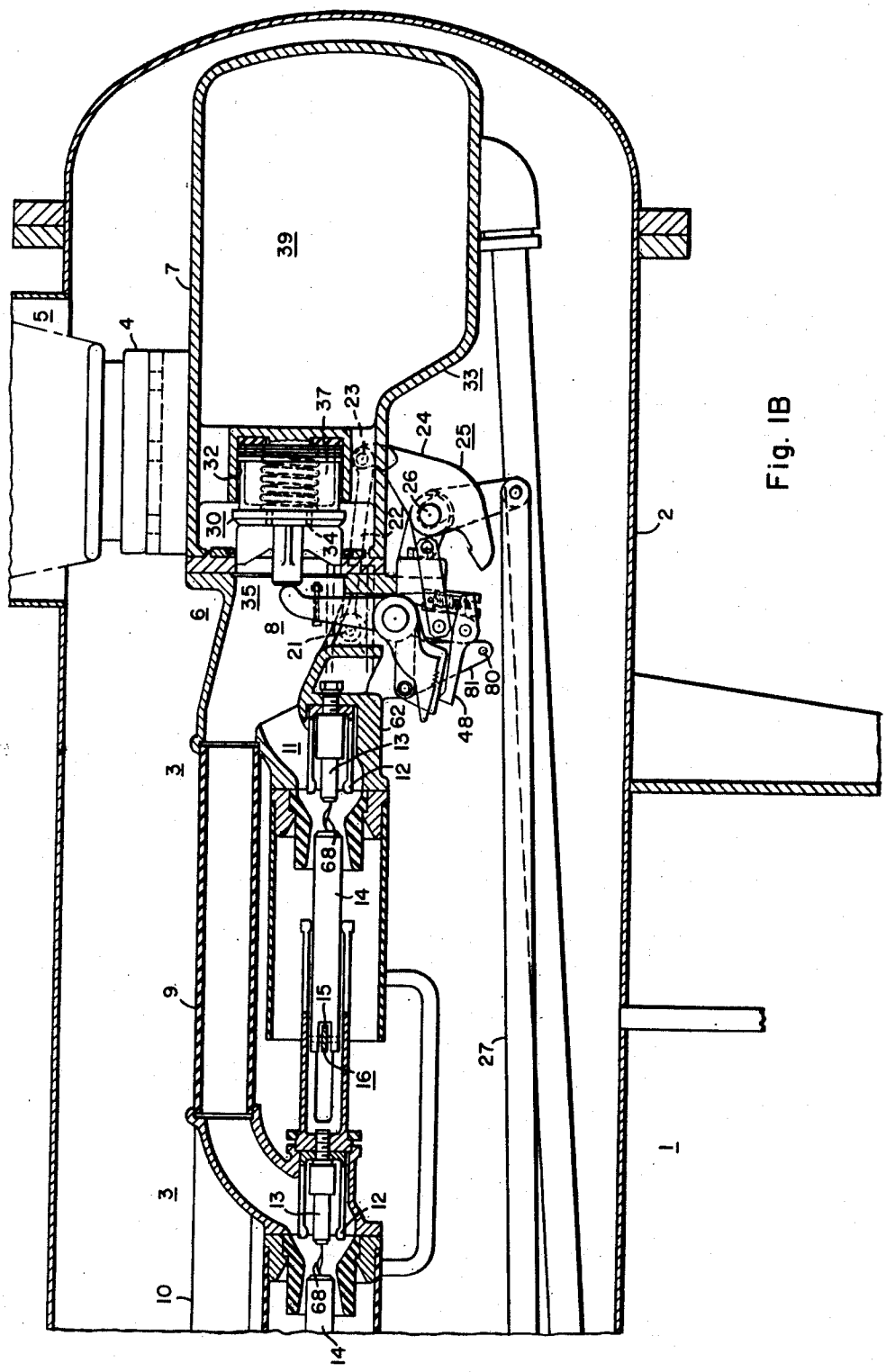


Fig. 1B

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BLAST-VALVE MECHANISM FOR COMPRESSED-GAS CIRCUIT INTERRUPTER

Filed Oct. 17, 1960 5 Sheets-Sheet 3

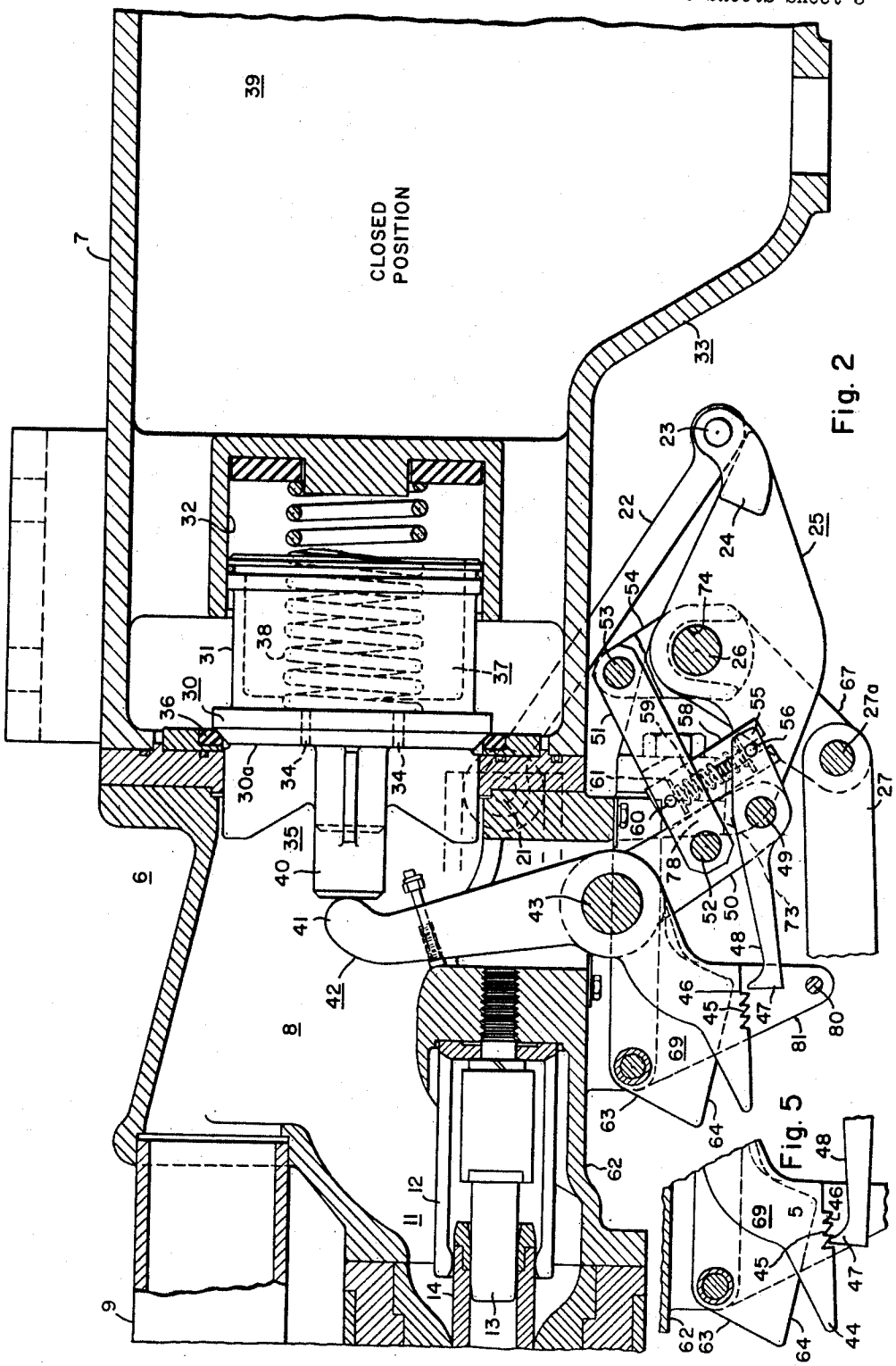


Fig. 2

Fig. 5

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BLAST-VALVE MECHANISM FOR COMPRESSED-GAS CIRCUIT INTERRUPTER

Filed Oct. 17, 1960

5 Sheets-Sheet 4

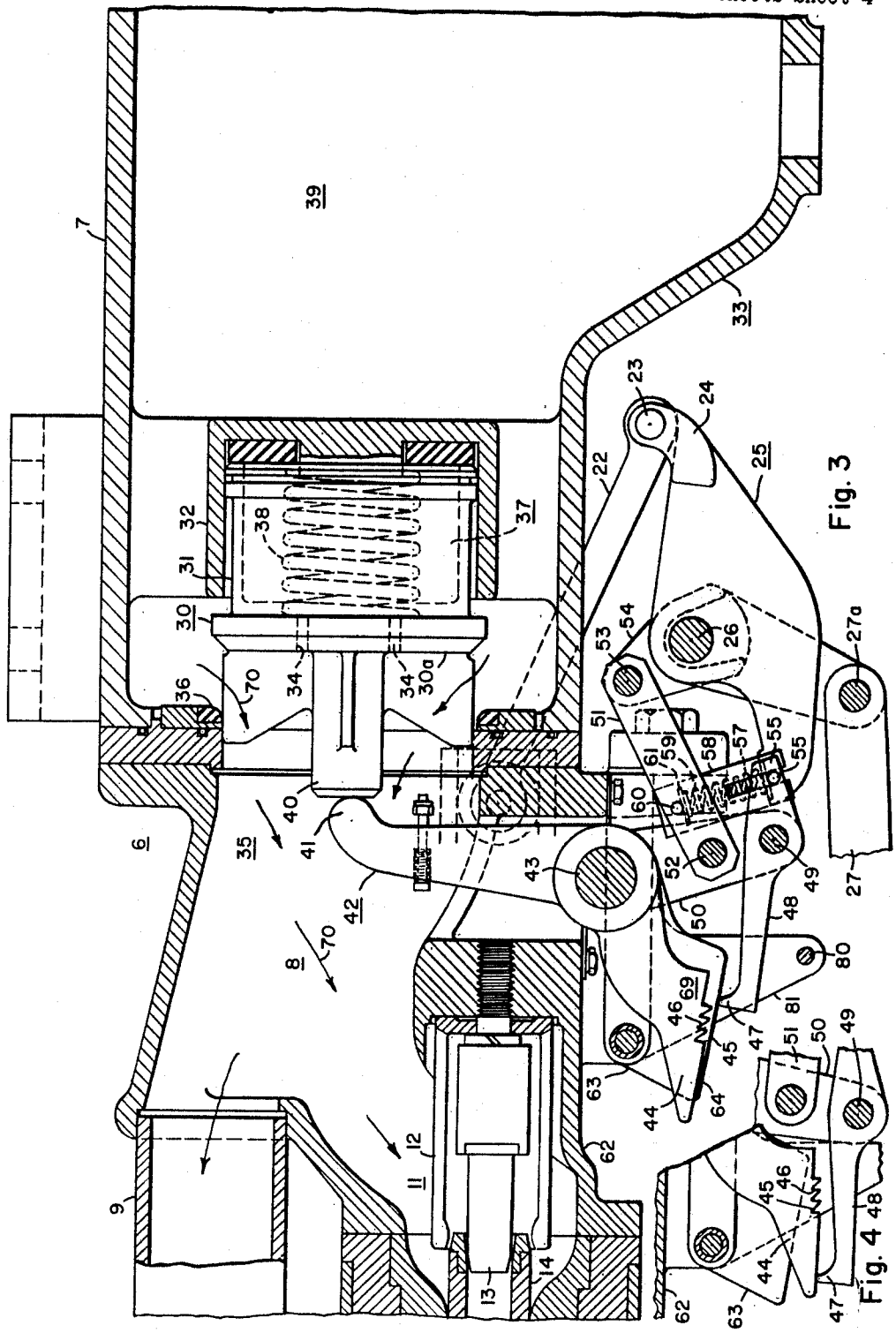


Fig. 3

Fig. 4

BLAST-VALVE MECHANISM FOR COMPRESSED-GAS CIRCUIT INTERRUPTER

Filed Oct. 17, 1960 5 Sheets-Sheet 5

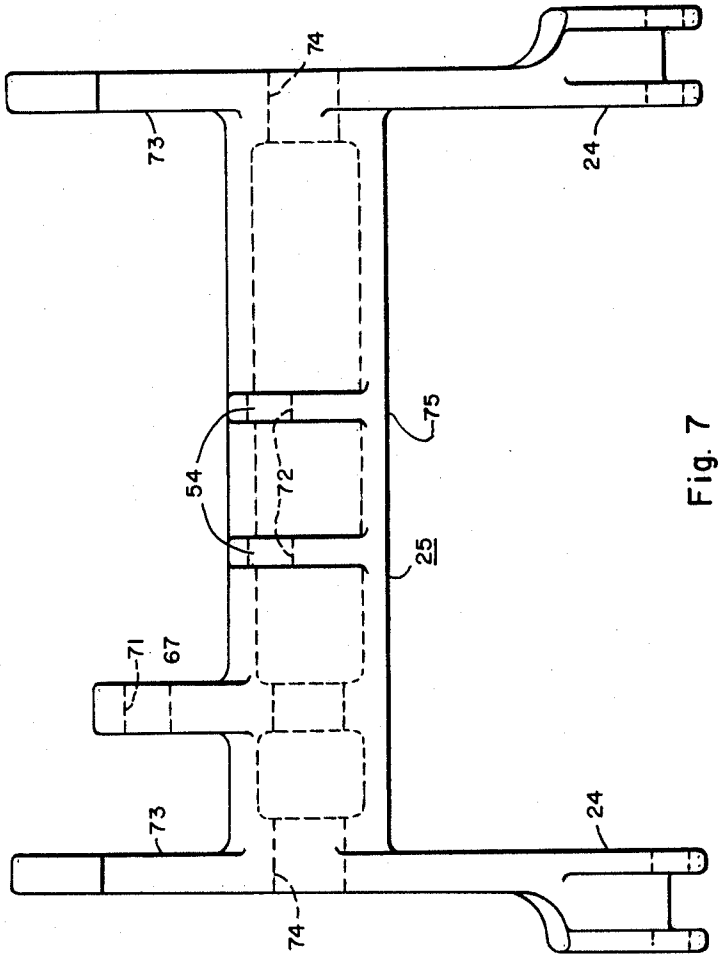


Fig. 7

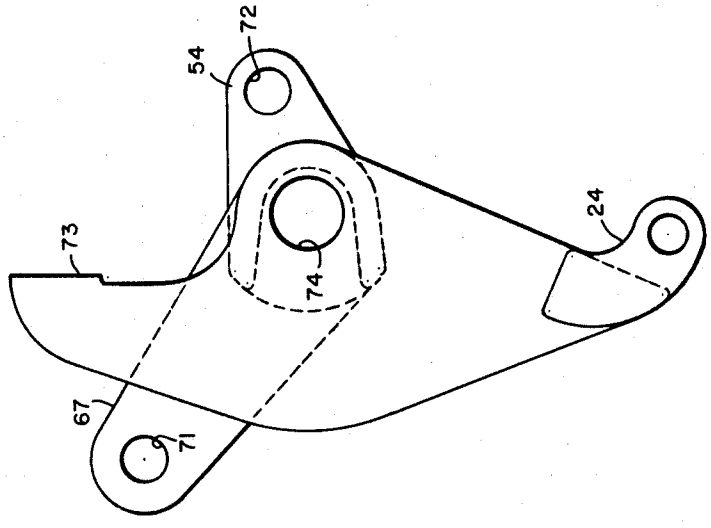


Fig. 6

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3,164,704

BLAST-VALVE MECHANISM FOR COMPRESSED-GAS CIRCUIT INTERRUPTER

Russell N. Yeckley, Monroeville, Joseph Sucha, Port Vue, and Roswell C. Van Sickle, Wilkinsburg, Pa., assignors to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

Filed Oct. 17, 1960, Ser. No. 63,201
9 Claims. (Cl. 200—148)

This invention relates to compressed-gas circuit interrupters in general, and, more particularly to blast-valve operating mechanisms therefor.

In United States patent application filed January 23, 1959, Serial No. 788,668, now Pat. No. 3,057,983, by Russell N. Yeckley, Joseph Sucha and Benjamin P. Baker, and assigned to the assignee of the instant application, there is disclosed a compressed-gas circuit interrupter involving a high-pressure reservoir chamber and a blast-valve operating mechanism, operable to control a blast of gas from the high-pressure reservoir chamber toward the plurality of arcs, which are established during the opening operation. In the aforesaid blast-valve operating mechanism there is utilized a pilot valve, which is first operated to dump compressed gas in back of a blast-valve operating piston. As a result of the initial opening movement of the pilot-valve assembly, and a subsequent opening operation of the blast valve, considerable time elapses prior to the actual blast of gas from the high-pressure tank toward the arcs.

It is a general object of the present invention to improve upon the blast-valve mechanism of the aforesaid patent application, rendering the same high speed in operation, and highly effective to quickly direct a blast of compressed gas toward one or more arcs drawn during a circuit-interrupter opening operation.

Another object of the present invention is to provide an improved blast-valve operating mechanism having few parts, and of strong and rugged construction.

Still a further object of the present invention is to provide an improved blast-valve operating mechanism, in which the blast valve is positively operated mechanically during the opening operation.

A further object of the present invention is to provide an improved compressed-gas blast-valve operating mechanism in which a balanced-pressure blast-valve is utilized, operating in conjunction with a pivotally-mounted blast-valve operating lever having ratchet means connected to the contact operating mechanism.

Another object of the invention is to provide an improved blast-valve operating mechanism which will be operable during a close-open operation of the interrupter, when the breaker may not get completely closed, to open the blast-valve at any one of a plurality of different intermediate positions. Thus, during a closing operation of the breaker, fault conditions may exist on the line. Such a faul condition may be detected by relays to effect a consequent reversal of the circuit-breaker operating mechanism even before the breaker reaches the fully closed position. It is, therefore, desirable to provide a blast-valve operating mechanism effective during such a close-open operation to pick up and open the blast-valve even though the breaker parts have not been fully closed.

Still a further object of the present invention is to provide an improved blast-valve operating mechanism, in which the blast valve will be opened the same distance regardless of the particular position at which the blast-valve mechanism is operated during the close-open stroke.

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

FIGURES 1A and 1B collectively illustrate a vertical

cross-sectional view taken through a circuit interrupter embodying the principles of the present invention, the contact structure being illustrated in the partly open-circuit position during the arc-drawing process;

FIG. 2 is an enlarged, vertical sectional view taken through the blast-valve operating mechanism only, and showing the position of the several parts of the mechanism in the blast-valve closed position, the contact structure likewise being closed;

FIG. 3 is a vertical sectional view taken through the improved blast-valve operating mechanism of the present invention, similar to the view shown in FIG. 2, but illustrating the position of the several parts of the mechanism at an intermediate time during the opening operation;

FIG. 4 is a fragmentary view showing the disposition of a few operating parts at the extreme end of the opening operation, when the blast valve has closed, and the contact structure is fully open;

FIG. 5 illustrates, fragmentarily, how the pawl can pick up the blast-valve operating lever at any one of a plurality of different positions during a close-open operation of the interrupter; and,

FIGS. 6 and 7 illustrate end and front elevational views of the main contact operating-lever casting employed in the improved blast-valve operating mechanism of the present invention.

Referring to the drawings, and more particularly to FIGS. 1A and 1B thereof, the reference numeral **1** generally designates a circuit-interrupting assemblage, including a grounded metallic tank **2** enclosing a plurality of serially related arc-extinguishing units **3** suspended from the lower interior ends **4** of a pair of terminal bushings **5**, which extend downwardly within the tank structure **2**.

Reference may be had to the aforesaid patent application for a detailed illustration, and description of the operation of the entire circuit-interrupting assemblage **1**. For the purpose of the present invention, however, it is only necessary to know that a blast-valve operating mechanism **6** is employed to control a blast of gas from a high-pressure reservoir tank **7** through an outlet passage **8**, and through a plurality of insulating blast tubes **9**, **10** to the separable contact structures **11**.

Generally, the separable contact structures **11** include relatively stationary finger contacts **12**, relatively stationary arcing electrodes **13**, which cooperate with movable contacts **14**, the latter being secured to cross-bars **15**, which in turn, form a part of a generally ladder-like movable contact assemblage, designated by the reference numeral **16**. At the left-hand end of the movable contact assemblage **16**, as shown more clearly in FIG. 1A of the drawings, it will be noted that an end cross-bar **17**, interconnecting the left-hand ends of two longitudinally extending operating rods, is biased in a leftward opening direction by a powerful accelerating compression spring **18**, the right-hand end of which seats against a stationary bracket **19** forming a part of a supporting structure **20**.

The right-hand ends of the two longitudinally extending movable operating rods, constituting a part of a movable contact assemblage **16**, are pivotally connected, as at **21**, to links **22**. The links **22** have their right-hand ends pivotally connected, by pivot pins **23**, to spaced bifurcated arms **24** (FIG. 7) of a main contact operating-lever casting **25**, pivotally mounted on a stationary shaft **26**.

An operating pull rod **27**, operated by a crank-arm **28** (FIG. 1A) keyed to an operating drive shaft **29**, is employed to effect clockwise closing rotative motion of the contact-lever casting **25** and consequent charging of the opening accelerating spring **18**.

The circuit-breaker operating mechanism, not shown, which drives the external operating crank **67** in a counterclockwise direction during the closing operation of the

breaker is latched by suitable means in the closed position of the interrupter 1.

During the opening operation of the interrupter, such latching means, associated with the breaker operating mechanism, is unlatched, and the powerful opening accelerating spring 18 expands to drive the movable contact assemblage 16 in a leftward opening direction, as viewed in FIGS. 1A and 1B. The arcs 68, drawn during such an opening operation, must be speedily interrupted; and to this end a blast of gas from the high-pressure reservoir 7 is released by opening of the blast valve 30 controlled by the valve mechanism 6, hereinafter described.

With reference to FIGS. 2 and 3 of the drawings, it will be observed that there is provided a balanced-pressure, blast-valve, generally designated by the reference numeral 30, including a cylindrical guide portion 31. The cylindrical guide portion 31 of the blast-valve 30 is guided within a substantially-enclosed, guiding, cylindrical portion 32, constituting a portion of a casting 33, which forms the high-pressure reservoir tank 7.

Apertures 34 are provided through the blast-valce 30, and permit communication between the region 35, on the down-stream side of the blast-valve seat 36, and the region 37 within the enclosed space in back of the blast valve 30.

A compression spring 38 is provided, disposed within the recess 37, to effect closing of the blast valve 30 upon its seat 36. Normally, high-pressure gas, say for example at 200 pounds per square inch, is disposed within the region 39 interiorly of the tank 7. On the other hand, relatively low-pressure gas, say at 40 pounds per square inch is present within the region 35 down stream of the blast valve 30 and within the general interior of the tank 2.

As illustrated in FIGS. 2 and 3, the blast valve 30 has a stem-like actuating portion 40 which is engaged by the tip end 41 of pivotally-mounted blast-valve operating lever, generally designated by the reference numeral 42. The blast-valve operating lever 42 is pivotally mounted about a stationary shaft 43. Integrally formed with the blast-valve operating lever casting 42 is a laterally extending portion 44, having a ratchet surface 45. The ratchet surface 45 includes a plurality of ratchet teeth 46, which are engaged by the nose 47 of a pivotally-mounted actuating pawl 48 whenever the contacts are closed sufficiently to establish the main circuit. The pawl 48 is pivotally mounted, as at 49, to a rotatable arm 50, which pivots around the shaft 43 independently of operating lever 42.

A connecting link 51 is pivotally connected to the rotatable arm 50 at the pivot pin 52. The other end of connecting link 51 is pivotally connected to a pivot pin 53, which extends transversely between two arm portions 54 (FIG. 7) of the main contact lever casting 25.

The right-hand end of the actuating pawl 48, as viewed in FIG. 2, has a tail extension 55, which is bifurcated, and supports a pin 56. The pin 56 is positioned within a pair of diametrically opposite slots 57 provided in a cylindrical spring support 58, housing a biasing spring 59. A second transversely extending pin 60 extends between the two connecting links 51, and, in conjunction with a spring seat 61, limits the expansion of the compression spring 59. Thus the compression spring 59 effects a clockwise biasing action of the pawl 48 about its pivotal center 49.

Stationarily mounted to a casting 62, forming a part of the right-hand relatively stationary contact structure 11, is a cam plate 63, having a cam surface 64. As mentioned, the cam plate 63 and the cam surface 64 are stationary, and engage and release the tip 47 of the pawl 48 from the notch 46 at exactly the same blast-valve opening. This takes place regardless of which particular notch 46 is engaged.

FIGS. 6 and 7 show more clearly the configuration of the contact lever casting 25. It will be noted that at the ends of the casting 25 are the bifurcated arms 24, which pivotally connect by pins 23 to the contact-operating links 22. In addition, the casting 25 has a driving arm 67 having an aperture 71. The pivot pin 27*a* extends

through the aperture 71 of driving arm 67 and pivotally connects the insulating operating rod 27 therewith.

The additional arms 54 are integrally formed with the casting 25 and have openings 72, through which pivot pin 53 extends to actuate the connecting links 51.

To limit the closing operation of the interrupter 1, stop or limiting arms 73 are provided at the ends of casting 25 (FIG. 7). As shown in FIG. 2, at the end of the closing stroke of the interrupter 1 the limit arms 73 strike a portion 78 of the frame 62 to halt the closing operation. A bore 74 is provided through the shaft portion 75 of the casting 25 to receive the pivot shaft 26.

In the closed-circuit position of the circuit interrupter 1, the electrical circuit therethrough includes the left-hand terminal bushing 5, bracket support 20, fingers 65, left-hand movable contact rod 14, fingers 12 of the left-hand interrupting unit 3, through the fingers 66 (FIG. 1A), to the second movable contact rod 14, and, in a similar manner, to the conducting casting 62. The circuit then extends through the casting 33 to the terminal stud extending through the right-hand terminal bushing 5 (FIG. 1B).

To effect the opening operation of the circuit interrupting assemblage 1, the external operating mechanism, not shown, is unlatched. This permits the opening accelerating spring 18 to drive the movable contact assemblage 16 to the left, as viewed in FIGS. 1A and 1B. The links 22, being pivotally connected to the movable contact assemblage 16 at the pivot pins 21, drive, in turn, the main operating casting 25 in a counter-clockwise direction.

During the leftward movement of the movable contact assemblage 16 the several movable contacts 14 are correspondingly moved toward the left, as viewed in FIG. 1A and FIG. 1B, separating from the stationary finger contacts 12 and drawing arcs 68, as shown in FIGS. 1A and 1B.

It is desired to effect the rapid extinction of the several arcs 68 by a blast of gas issuing from the high-pressure reservoir tank 7. Simultaneous operation of the blast-valve mechanism 6 is, therefore, desirable. According to the present invention, this simultaneous movement is achieved by the two connecting links 51 driven by arms 54 of casting 25. Thus, the connecting links 51 effect clockwise rotation of the independently movable actuating arm 50 about the shaft 43. The clockwise rotation of the actuating lever 50 effects consequent leftward movement of the pawl 48, as viewed in FIG. 2, the nose 47 of which is engaged with one of the teeth 46 of the ratchet surface 45. The ratchet means, generally designated by the reference numeral 69, is hence effective to effect clockwise rotation of the blast-valve lever 42, effecting, through the thrusting engagement at 41, opening movement of the blast valve 30.

With reference to FIG. 3, which shows the blast-valve 30 in its open position, it will be noted that a blast of high-pressure gas takes place from the region 39, on the upstream side of the blast-valve seat 36, in the direction of the arrows 70, to the downstream region 35. Since at this time, the region 37, within the recess 32, is at a lower pressure, as caused by the apertures 34, the full pressure of the high-pressure gas within the region 35 will now act over the entire exposed face 30*a* of the blast-valve 30, forcing it rapidly to its open position, as shown in FIG. 3, and thus causing compression of the biasing spring 38.

Since the blast pressure assists in the opening movement of the blast-valve 30 after the blast-valve 30 is partially open, the load imposed upon the blast-valve lever 42 at point 41 is very light after the valve is open. As a result, when the nose 47 of the pawl 48 engages the stationary cam surface 64, the pawl 48 will freely disengage from the ratchet surface 45, and the several parts will then assume the position shown in FIG. 3 of the drawings.

It may be desirable to point out that the nose 47 of the pawl 48 engages the cam surface 64 always with the same amount of blast-valve opening, and disengagement can oc-

cur only after the blast-valve 30 is almost fully open. The pressure conditions in the regions 35, 37 may be such that the stem 40 of blast-valve 30 may not be in contact with nose 41 of valve lever 42 at the time of release by cam surface 64. At most, only a slight force at the valve stem 40 will be needed due to the fact that blast-valve 30 is a differential-type blast-valve.

The passage of compressed gas out of the reservoir tank 7, and through the region 35, downstream of the blast-valve seat 36, through the outlet 8 and the blast tubes 9, 10, adjacent the separated contact structures 11, will quickly effect extinction of the several series arcs 68. It is then desirable to effect rapid closing of the blast-valve 30 to conserve the supply of high-pressure gas. During the opening of the blast-valve 30, the high-pressure gas, which is now present within the region 35, passes through the apertures 34, provided in the blast-valve face 30*a*, and raises the pressure within the region 37 on the rear side of the blast-valve 30. This raising of the pressure within the region 37, in conjunction with the biasing action exerted by the compression spring 38, tends to effect reclosing of the blast valve 30 at the proper time. When the pressure within the region 37 has risen sufficiently, the biasing spring 38 will quickly effect reclosing of the blast-valve 30, cutting off thereby the blast of gas from the tank 7 to the several contact structures 11.

The continued driven counter-clockwise rotative movement of the main contact lever casting 25 will force the actuating arm 50 in a continued clockwise direction, so that the pawl 48 will assume the position illustrated in FIG. 4 of the drawings. With reference to FIG. 4, it will be noted that not only is the pawl 48 shown in its fully open-circuit position, but also the reclosure of the blast-valve 30 has effected downward movement of the ratchet surface 45 to the position indicated in FIG. 4. The circuit-interrupter assemblage 1 is now in the fully open-circuit position, with the contact structures 11 separated, and the blast-valve 30 closed against its seat 36.

During the closing operation of the interrupter 1, the main operating shaft 29 (FIG. 1A) is rotated in a counter-clockwise direction by the external breaker mechanism, not shown. This effects, through the crankarm 23 and insulating operating rod 27, clockwise rotation of the main contact lever casting 25. Through the bifurcated arms 24, and linkage 22, the movable contact assemblage 16 is moved toward the right, as viewed in FIGS. 1A and 1B, to effect closure of the contact structure and charging of accelerating spring 18. During this clockwise rotative movement of the contact lever casting 25, through the linkage 51, the actuating lever 50 is rotated in a counter-clockwise direction, ratcheting the nose 47 of the pawl 48 over the several ratchet teeth 46. This closing movement of the pawl 48 obviously has no effect whatsoever upon the blast-valve lever 42 which remains stationary. During such a closing operation, should there exist fault conditions on the line, suitable relays will detect such a fault condition and will initiate an immediate reopening of the contact structure, even before such a closing operation is completed. In other words, the breaker mechanism will be released to permit the accelerating spring 18 to effect an immediate opening operation starting even before the breaker is fully closed.

By the provision of a plurality of successive ratchet teeth 46, the engagement of the nose 47 of the pawl 48 with any one of these teeth 46, as indicated in FIG. 5, will, upon reversal of the contact-mechanism travel, result in an immediate reopening of the blast-valve 30, as described hereinbefore.

To restrict the movement of the pawl 48 so that it cannot bounce away from the ratchet surface 45 during the closing stroke of the breaker 1, an anti-bounce or an overtravel stop pin 80 is provided, being fixedly secured to the casting 62 by a bracket 81. This insures quick and positive engagement of the pawl 48 with the teeth 46 of the ratchet surface 45 at whatever time the breaker may start to open.

Thus, the ratchet means 69 is effective to pick up the blast-valve lever 42 and effect opening motion of the blast-valve 30 at any one of a plurality of intermediate positions at which it may reverse its motion during a close-open operation.

Since the opening of the balanced-pressure blast-valve 30 is effected largely by the high-pressure acting upon its face 30*a*, the blast-valve 30 will reopen completely regardless of which ratchet tooth 46 is picked up by the pawl 48. This action is assured mechanically by the particular configuration of the cam surface 64, which is so designed that the pawl 48 will open the blast-valve 30 mechanically the same distance regardless of which tooth 46 is engaged. Thus, consistent opening operations are assured regardless of the particular pick-up position during a close-opening operation.

From the foregoing description it will be apparent that there is provided an improved blast-valve operating mechanism 6, which results in positive mechanical actuation of the blast-valve 30. Because of the provision of the balanced pressure blast-valve 30, the actuation of which is largely taken over by pressure conditions following initial mechanical opening of the blast-valve 30, the structure results in little energy being imposed upon the blast-valve lever 42 and facilitated disengagement of the ratchet means 69. Also the use of a balanced-pressure blast-valve 30 reduces the initial load or force required.

During the closing operation, the ratchet means 69 is ineffective to pick up the blast valve 30 unless the operating mechanism reverses its motion due to a fault on the line as detected by relay operation. If this happens, the ratchet means 69 is operative to effect opening of the blast-valve 30, during such a close-open operation, at any one of a plurality of different intermediate spaced positions as provided by the several ratchet teeth 46.

It will be noted that the number of parts involved in the improved valve construction is few, and that the several parts involved are of rugged and sturdy construction. Also, it will be observed that a pilot-valve mechanism, such as was utilized in the aforesaid patent application, has been eliminated with the improved blast-valve operating construction 6 of the present invention.

It will be apparent to those skilled in the art that for certain applications, a balanced-pressure blast-valve 30 may not be required, and instead a conventional blast-valve may be used, which is solely mechanically operated by the blast-valve lever 42. For high-pressure conditions, however, the balanced-pressure type is preferred to relieve the energy required of the blast-valve operating lever 42.

Although there has been illustrated and described a specific blast-valve operating mechanism of the balanced-pressure type, it will be observed 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 contact means separable to establish an arc, a compressed-gas reservoir chamber, blast-valve means for controlling a flow of compressed gas from said compressed-gas reservoir chamber to effect extinction of said arc, said blast-valve means including a blast valve (a pivotally mounted blast-valve operating lever having a ratchet portion, a pawl for engaging said ratchet portion, and means responsive to opening motion of said contact means for effecting thru said pawl the opening movement of the blast-valve.

2. A compressed-gas circuit interrupter including contact means separable to establish an arc, a compressed-gas reservoir chamber, blast-valve means for controlling a flow of compressed gas from said compressed-gas reservoir chamber to effect extinction of said arc, said blast-valve means including a balanced-pressure blast valve, a pivotally mounted blast-valve operating lever having a ratchet portion, a pawl for engaging said ratchet portion, a contact

operating lever, means pivotally mounting said contact operating lever, a linkage interconnecting said contact operating lever with said pawl, and rotative movement of said contact operating lever during the opening operation effecting thrusting engagement of said pawl against the ratchet portion to effect thereby opening motion of the blast valve.

3. A blast-valve mechanism for a compressed-gas circuit interrupter including a balanced-pressure blast valve having a valve stem, a pivotally mounted blast-valve lever for forcing in separable abutting relation the valve stem and hence the balanced-pressure blast valve to the open position, the blast-valve lever having a ratchet surface, and a pawl for rotating said blast-valve lever during opening and becoming ineffective during closing.

4. A compressed-gas circuit interrupter including contact means separable to establish an arc, a compressed-gas reservoir chamber, blast-valve means for controlling a flow of compressed gas from said compressed-gas reservoir chamber to effect extinction of said arc, said blast-valve means including a blast valve having a cylindrical portion, an enclosed guiding cylindrical portion within which said blast valve cylindrical portion moves, a closing spring in said enclosed guiding cylindrical portion for biasing the blast valve closed, at least one aperture through the blast valve communicating the down-stream portion with said enclosed guiding cylindrical portion, a pivotally mounted blast-valve operating lever having a ratchet portion, a pawl for engaging said ratchet portion, and means responsive to opening motion of said contact means for effecting engagement of said pawl against said ratchet portion to effect opening movement of the blast valve.

5. A compressed-gas circuit interrupter including contact means separable to establish an arc, a compressed-gas reservoir chamber, blast-valve means for controlling a flow of compressed gas from said compressed-gas reservoir chamber to effect extinction of said arc, said blast-valve means including a balanced-pressure blast-valve, a pivotally mounted blast-valve operating lever, and ratchet means responsive to opening of the contact means to effect opening movement of the blast-valve operating lever.

6. A compressed-gas circuit interrupter including contact means separable to establish an arc, a compressed-gas reservoir chamber, blast-valve means for controlling a flow of compressed gas from said compressed-gas reservoir chamber to effect extinction of said arc, said blast-valve means including a balanced-pressure blast valve, a pivotally-mounted blast-valve operating lever having a ratchet portion, a pawl for engaging said ratchet portion, a relatively stationary cam surface for effecting disengagement of said pawl from said ratchet portion at a predetermined time in the opening operation, and means responsive to opening motion of said contact means for effecting engagement of said pawl against said ratchet portion to effect opening movement of the blast valve.

7. A compressed-gas circuit interrupter including contact means separable to establish an arc, a compressed-gas reservoir chamber, blast-valve means for controlling a flow of compressed gas from said compressed-gas reservoir chamber to effect extinction of said arc, said blast-valve means including a balanced-pressure blast valve, a pivotally mounted blast-valve operating lever having a ratchet portion, a pawl for engaging said ratchet portion, a contact operating lever, means pivotally mounting said contact operating lever, a relatively stationary cam surface for effecting disengagement of said pawl from said ratchet portion at a predetermined time in the opening operation, a linkage interconnecting said contact operating lever with said pawl, and rotative movement of said contact operating lever during the opening operation effecting thrusting engagement of said pawl against the ratchet portion to effect thereby opening motion of the blast valve.

8. A blast-valve mechanism for a compressed-gas circuit interrupter including a balanced-pressure blast valve, a pivotally mounted blast-valve lever for forcing the balanced-pressure blast valve to the open position, the blast-valve lever having a ratchet surface, a pawl for rotating said blast-valve lever during opening and becoming ineffective during closing, and the relatively stationary cam surface for effecting disengagement of said pawl from said ratchet portion at a predetermined time in the opening operation.

9. A blast-valve machanism for a compressed-gas circuit interrupter including a balance-pressure blast valve, a pivotally mounted blast-valve lever for forcing the balanced-pressure blast valve to the open position, the blast-valve lever having a ratchet surface, a pawl for rotating said blast-valve lever during opening and becoming ineffective during closing, and a relatively stationary cam surface for effecting disengagement of said pawl from said ratchet portion at a predetermined time in the opening operation, and said cam surface being tapered to permit said pawl to open the blast valve the same amount regardless of which tooth of the ratchet surface is engaged.

References Cited in the file of this patent

UNITED STATES PATENTS

1,000,012	Jolma	Aug. 8, 1911
1,547,528	Sears	July 28, 1925
1,710,289	Bresler	Apr. 23, 1929
2,238,317	Gensburg	Apr. 15, 1941
2,294,821	Baker et al.	Sept. 1, 1942
2,414,522	Hall	Jan. 21, 1947
2,419,447	Gayer et al.	Apr. 22, 1947
3,057,983	Yeckley et al.	Oct. 9, 1962