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ELECTRICAL SWITCH HAVING ROTARY MOVABLE CONTACT WITH VANE PISTON CONTACT ACTUATING MEANS

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Fig. 1.

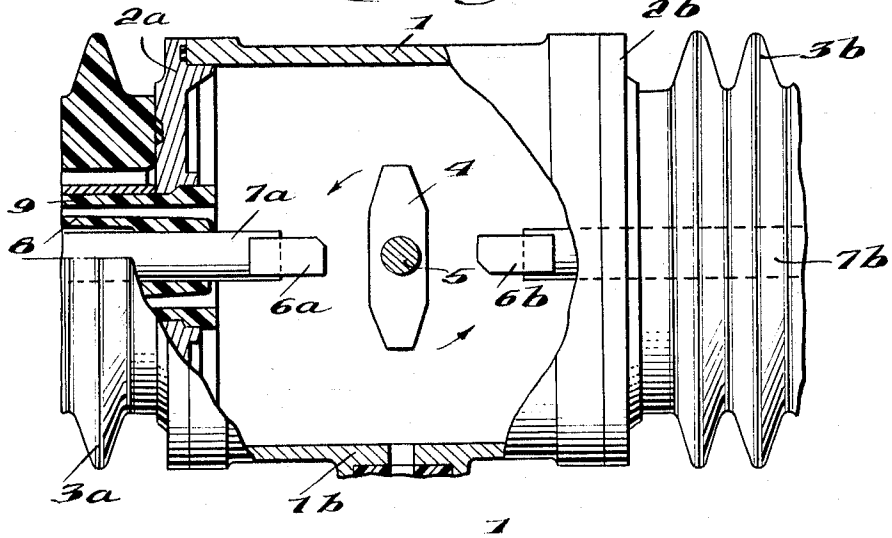

Fig. 2.

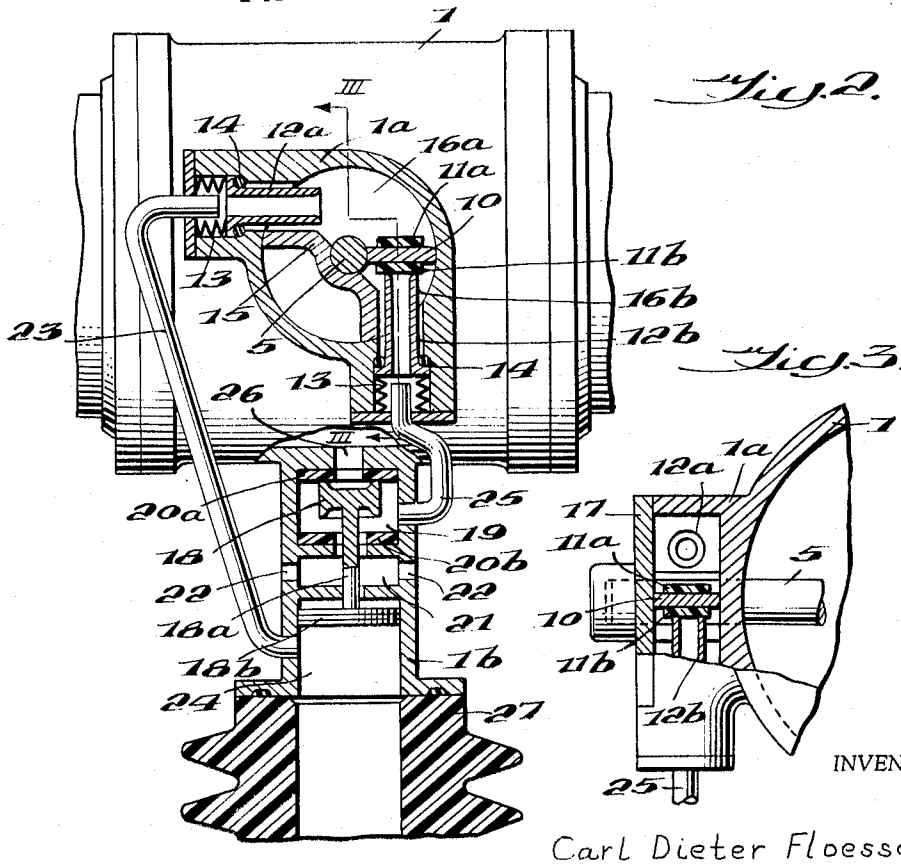

Fig. 3.

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ELECTRICAL SWITCH HAVING ROTARY MOVABLE CONTACT WITH VANE PISTON CONTACT ACTUATING MEANS

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2 Claims. (Cl. 200—148)

The present invention relates to an improved construction for gas blast breakers with multiple interruption, where at least one voltage isolating switching point is connected electrically in series with impulse-power switching points to insure in the disconnected position of the switch the insulation over the open switching gap, the voltage switching point being arranged in a switch chamber that is continually subjected to a pressurized gas.

It is known to design gas blast breakers so that several impulse-power switching points are connected in series, and that one or more voltage isolating switching points are connected likewise in series with the latter. The voltage isolating switching point, usually referred to as a disconnecting switch, can be designed either as a so-series disconnector with interruption in air, or as an interruption point which is arranged in a switch chamber filled with a pressurized gas. In the latter case, the movable contact piece is pin- or tulip-shaped and performs a thrust movement in the switch to which end it is in driving connection with a pressure gas actuated piston. The actuation of the movable contact piece in the known series disconnectors, where the contact piece in the form of a blade shaped element turns about an axis of rotation, as well as in the known thrust blade switch, requires relatively large driving and damping mechanisms respectively in the case of switches with higher rated voltages and higher rated currents, since large masses must be put in motion and braked respectively in order to meet the requirements of modern switches regarding short switching periods, particularly when the switch is to be used for short interruptions.

The problem underlying the invention is to provide a simple and inexpensive solution of a voltage switching point for high-speed gas blast breakers, where the above mentioned disadvantages of the known embodiments are avoided. According to the invention it is therefore suggested that the movable blade-shaped contact pieces of the voltage switching point be secured on a shaft supported in the switch chamber housing, and that the shaft be connected for rotation with a rotary piston drive whose vane piston movable in a cylinder can be admitted alternately with a pressurized gas from one and the other side in such a way that pressurized gas from a storage vessel is used for disconnection and pressurized gas from the switch chamber for connection, the chamber which happens to be on the non-admitted side of the vane piston being in communication with the outside air.

This has the advantageus result that the driving gas is brought during connection along the shortest path to the rotary piston drive. Besides, the new arrangement requires no mechanical intermediate members, since the vane piston is secured on the same shaft that also carries the movable contact piece. This arrangement also has the advantage that the limiting positions of the movable contact piece are clearly fixed so that it cannot perform any unauthorized, automatic movement if the pressure should drop in the switch chamber or in the feed pipes to the rotary piston drive. The invention will be more fully described on the basis of a preferred embodiment and the attached drawings: In these:

FIG. 1 shows an embodiment according to the invention where the switch chamber is partly represented in a section;

FIG. 2 shows a longitudinal section through the rotary piston drive attached laterally on the switch chamber according to FIG. 1; and

FIG. 3 shows a cross section through the rotary piston drive according to FIG. 2 along the line III—III.

With reference now to FIG. 1 the switch chamber housing **1** is terminated at both sides by the flange parts **2***a*, **2***b*, which are joined by the insulators **3***a*, **3***b*. **4** designates the blade-shaped contact piece of the voltage isolating switch which is connected rigidly with the drive shaft **5** and which is arranged symmetrically with the latter. The drive shaft **5** is rotatably mounted at its ends in known manner in the switch chamber housing **1**. The two spaced fixed contact pieces **6***a*, **6***b*, which are preferably designed in known manner as contact brushes, and which are engaged respectively opposite ends of the switch knife **4** when the drive shaft **5** turns through 90° in the direction indicated by the arrow, are rigidly connected with the conductors **7***a*, **7***b*, the latter being held by means of the insulating parts **8** and **9** and introduced insulated into the switch chamber housing **1**. FIG. 2 shows a longitudinal section and FIG. 3 a cross section along the line III—III of FIG. 2 of the rotary piston drive actuating the drive shaft **5**. In the cylinder housing **1***a*, cast on the housing **1**, for example, is guided the vane piston **10** rigidly connected with the drive shaft **5**. This piston has at both sides disk-shaped valve elements **11***a*, **11***b*, which are rigidly connected with the vane piston in known manner, for example, by vulcanization. Into the cylinder housing **1***a* project, staggered by 90°, the tubular nipples **12***a*, **12***b* which are designed as valve seats at their ends facing the valve discs **11***a*, **11***b* on vane piston **10**. The nipples **12***a*, **12***b* have at their outer end a collar and are pressed by means of the cup spring **13** against the sealing rings **14**. The partition **15** serves to subdivide and reduce the size of the effective chambers **16***a*, **16***b* in the cylinder housing **1***a*. **17** is a cover (FIG. 3) which terminates the cylinder housing **1***a* laterally. FIG. 2 shows furthermore in a section the cylindrical extension **1***b* which extends downward under switch-chamber housing **1**. The extension **1***b* contains a reversing valve **18** which is conected over the valve rod **18***a* with the drive piston **18***b*. In the valve chamber **19** are arranged the sealing disks **20***a* and **20***b*, while the chamber **21** is connected with the open air through the apertures **22**. The pressurized gas line **23** connects the chamber **24** under the drive piston **18***b* with that part of the cylinder housing **1***a* which houses the nipple **12***a*, while the pressurized gas line **25** leads from the chamber **19** containing the reversing valve to the nipple **12***b*. The interior of the switch chamber housing **1** is connected with the chamber **19** through the aperture **26** that can be closed by the reversing valve **18**. Finally **27** designates a hollow supporting insulator which is rigidly connected with the extension **1***b* and which serves as a support for the entire switch chamber.

The method of operation of the above described arrangement is as follows: In the represented position (FIG. 1), the voltage switching point **4** is in the disconnected state. The interior of the switch chamber housing **1** is connected by way of a non-illustrated compressed gas line with a storage vessel, likewise not represented, of the gas blast breaker and is constantly under gas pressure. The interior of the supporting insulator **27** is connected through a switch valve of known design, not represented, on the lower part of the switch with the storage vessel of the latter and is thus likewise under pressure. The chamber **16***a* in the cylinder housing **1***a* is filled with pressurized gas through the line **23** and the nipple

12*a*, which presses the vane piston 10 via its disk-shaped valve element 11*b*, which is designed preferably as an elastic sealing disk, firmly against the end of nipple 12*b*. The latter is connected through the line 25, the chambers 19 and 21, which communicate through the wide bore for the piston rod 18*a*, and the apertures 22 with the open air and is thus pressure-free. The aperture 26 between the switch chamber housing 1 and the chamber 19 is closed by the reversing valve 18, since the pressure in the chamber 24 retains the piston 18*b* and thus the reversing valve 18 in its upper limiting position. Since the nipple 12*b* in the cylinder housing 1*a* is yeldingly mounted by means of the sealing ring 14, inaaccuracies in the manufacture regarding a non-planar fit of the sealing disk 11*b* on the valve seat at the inner end of the nipple 12*b* are automatically compensated. For connection, to close the disconnect switch contacts 4, 6*a*–6*b*, the interior of the supporting insulator 27 is ventilated by means of the above mentioned switch valve, not represented. In this way, on the one hand, chamber 24 under the drive piston 18*b* of the reversing valve 19 is ventilated, and on the other hand the chamber 16*a* is ventilated through the interior of the nipple 12*a* and the line 23. Under the action of the gas pressure in the switch chamber housing 1, which presses through the aperture 26 on the upper side of the reversing valve 18, the latter is brought into its bottom limiting position, so that the chamber 19 is closed from the open air. The movement of the reversing valve 18 can be enhanced, if necessary, by a return spring, not represented. As soon as the reversing valve 18 releases the aperture 26, pressure gas flows from the switch-chamber housing 1 through this aperture 26 into the chamber 19 and thence through the line 25 into the nipple 12*b* so that vane piston 10 is now turned counterclockwise through 90° and chamber 16*b* is filled with pressure gas. Chamber 16*a* is ventilated, as already mentioned and reduced in size during the rotation of the vane piston 10 until the latter strikes with its sealing disk 11*a* against the nipple 12*a*. The connecting position of the voltage switching point 4, 6*a*–6*b* has thus been reached, since the drive shaft 5 connected with the vane piston 10 has brought the movable contact piece 4 (FIG. 1) into the horizontal position, in which the contact piece 4 engages at both ends the fixed contact pieces 6*a*, 6*b*. Subsequent disconnection is effected again by introducing pressurized gas into the interior of the supporting insulator 27, filling the chamber 24, the line 23 and the chamber 16*a*, and causing the reversing valve 18 to move into its upper limiting position. The chamber 19, and thus the line 25, as well as the chamber 16*b* are connected again with the open air so that the vane piston 10 performs a clockwise rotation through 90° which brings it finally into the represented limiting position. To this position corresponds again the disconnection of the voltage switching point, represented in FIG. 1.

I claim:

1. In a gas blast circuit breaker comprising at least one set of power interrupting contacts of the impulse type connected in series with the separable contact members of a voltage isolating switch to insure an adequate voltage isolation in the switched-out position of the circuit breaker, the improvement wherein said voltage isolating switch is comprised of at least one stationary contact member located in a switch chamber filled with a pressurized gas and a movable blade shaped contact member mounted on a rotatable shaft to engage and be disengaged from said stationary contact member, a rotary piston type drive for said shaft including a vane piston secured to said shaft and mounting for rotation in a cylinder between two limiting positions corresponding respectively to the engaged and disengaged positions of the contact members of said voltage isolating switch, said vane piston including a disc-shaped valve plate at each side thereof, a pair of nipples extending into said cylinder at opposite sides of said vane piston, the mouths of said nipples being cooperative respectively with said valve plates in alternation such that the mouth of one nipple is closed by the associated valve plate when pressurized gas is admitted through the other nipple, and control valve means for selectively admitting pressurized gas into said cylinder through one of said nipples at one side or the other of said vane piston and simultaneously venting to atmosphere through the other of said nipples the interior of said cylinder at the non-admitted side of said vane piston, the pressurized gas from said switch chamber being admitted into said cylinder at one side of said vane piston for rotating said vane piston and movable blade shaped contact member in such direction as to engage said stationary contact member, and pressurized gas from a storage vessel being admitted into said cylinder at the opposite side of said vane piston for rotating said piston and said movable blade shaped contact member in such direction as to disengage itself from said stationary contact member.

2. A gas blast circuit breaker as defined in claim 1 wherein said nipples are mounted in a yielding manner to compensate for any misalignment of the corresponding valve plate.

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