

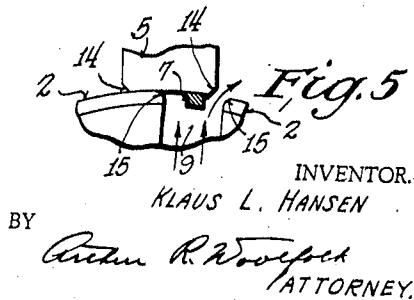
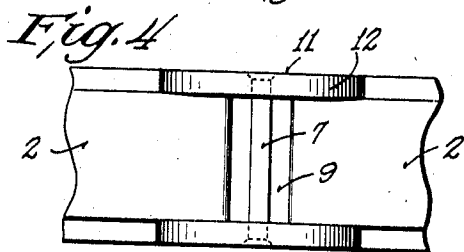
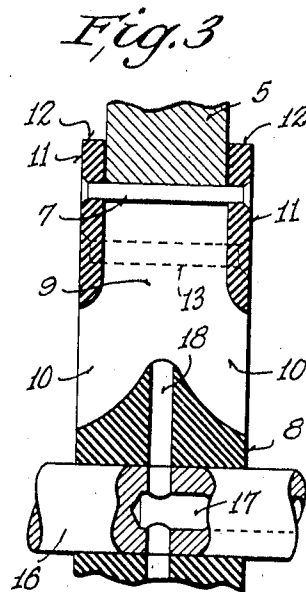
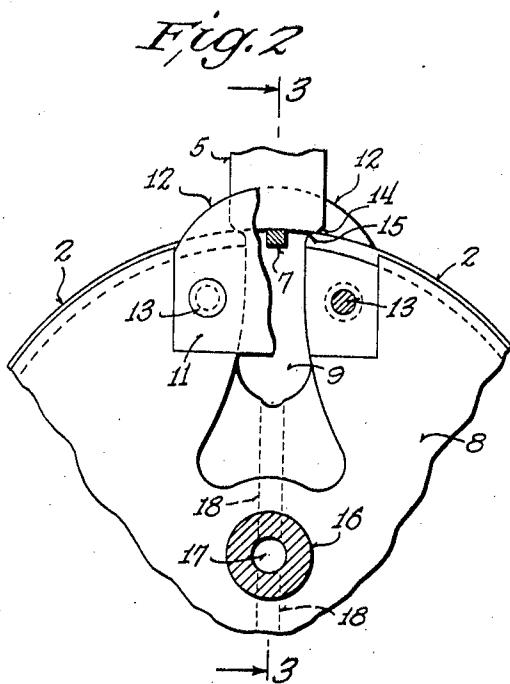
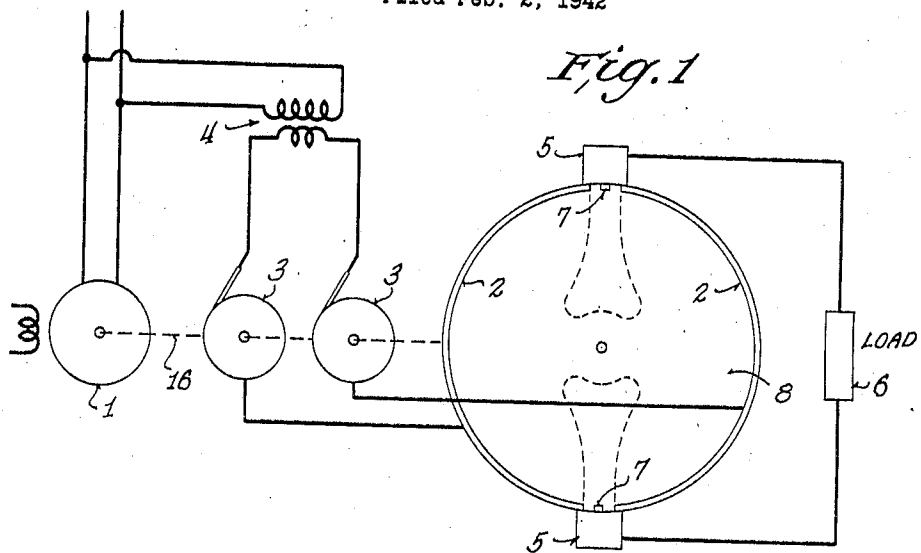
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COMMUTATING MEANS

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COMMUTATING MEANS

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3 Claims. (Cl. 175—364)

This invention relates to a novel commutating means which though it has many applications is particularly applicable to rotary mechanical rectifiers.

Objects of this invention are to provide a novel commutating means which is so constructed that an arc extinguishing action or suppression is produced by a very simple blow-out arrangement in which a stream of gas is projected between the brush and the commutator segment at the instant the arc tends to form so as to provide a blowout arrangement for suppressing or extinguishing the arc whose effect starts instantly at the time the arc is initiated and which also has the further function of cooling the commutator and the brushes.

In greater detail objects of this invention are to provide a rotary commutator construction which is so made that a blast of air or other gas is projected outwardly between the brush and the commutator to produce an active blast to blow away any ionized gases that may be formed between the brush and the commutator segment, such action coming into play at the instant the arc starts to thereby prevent growth of the arc and which acts to instantly replace the ionized gases with deionized gases.

The use of rotary rectifiers as heretofore constructed has been somewhat limited due to the fact that a destructive arc is frequently formed under certain load conditions, particularly when an inductive load exists, and that the arc is frequently of such a violent nature that rapid deterioration both of the commutator segments and of the brushes occurs.

This invention, though having other applications, is particularly designed to provide a very simple arrangement for forcibly blowing out the arc, such action coming into play, as stated hereinabove, upon the initiation of the arc to thereby either suppress the formation of the arc or to quickly extinguish and limit the arc to a non-destructive value, the construction being such that a simple centrifugal blower action is produced in the rotary commutator itself and the device being so designed that the blast of air or other gas is applied at the point where it is most effective.

Further objects are to provide a novel commutator construction which although it has the above features, is extremely simple in its construction, which is cheap to produce, which requires no auxiliary equipment, and which is formed as a unitary construction.

An embodiment of the invention is shown in the accompanying drawing, in which:

Figure 1 is a diagrammatic view of a two-segment rotary rectifier.

Figure 2 is an enlarged fragmentary detail, partly broken away and partly in section.

Figure 3 is a sectional view on the line 3—3 of Figure 2.

Figure 4 is a view looking directly downwardly on the commutator adjacent one of the slotted portions.

Figure 5 is a detail showing the direction of the air or gas blast in one position of the rotary commutator.

Referring to the drawing, it will be seen that the device chosen for illustrating the invention is a simple form of rotary rectifier. In Figure 1 a synchronous motor 1 drives the commutator which is provided with a pair of main segments 2 connected to slip rings 3. Brushes bear on the slip rings and are connected to opposite sides of the secondary of a transformer indicated generally at 4. A pair of main brushes 5 bear on the commutator and are connected to the load 6.

It is to be noted that the main segments 2 of the commutator are spaced apart and this spacing may be of any desired extent, depending upon the particular requirements. The spacing has been shown relatively wide in the drawing and means are provided for preventing tilting of the main brushes 5 when the gaps between the main segments pass beneath the brushes. This means may consist of auxiliary commutator segments 7 located between the main commutator segments 2. The auxiliary commutator segments are independent of the main commutator segments and serve to support the brushes as the gaps between the main segments pass beneath the brushes.

The main body of the commutator assembly consists of any suitable insulation. Preferably a molded insulating body portion 8 is provided to which the main and auxiliary segments 2 and 7 of the main commutator are secured in any suitable manner.

The body portion 8 of the commutator is provided with air passages indicated generally at 9. These air passages preferably have side openings 10 on each side of the body of the commutator. A convenient way of forming these openings is to provide openings of approximately the shape indicated in Figures 2 and 3, which openings extend from one side to the other of the main body 8 of the commutator. They are partially closed on opposite sides by means of the insulat-

ing plates 11 and thus form air channels which open directly outwardly through the gaps between the main commutator segments 2. The plates 11 are preferably provided with rounded outer portions 12 which project outwardly beyond the outline of the commutator and serve as guiding means for the brushes 5 in addition to the auxiliary segments 7. The plates 11 may be secured in any suitable manner, as by means of the rivets 13, and the auxiliary segments 7 may be carried by the plates, as shown most clearly in Figure 3.

It is preferable to slightly bevel opposite faces of the brushes 5 as indicated at 14 in Figures 2 and 5 and to slightly round or bevel the edges of the main segments 2, as indicated at 15. This is most clearly shown in Figures 2 and 5.

It is to be noted that the passageways 9 are radially arranged in the commutator assembly and that the lower portions of these passageways have sweeping curve like shapes to lead the air into the passageways 9 with the minimum shock to the air stream when the commutator is revolving rapidly in its normal manner. The construction, therefore, provides an air blast which projects a stream of air outwardly through the passageways 9 and through the gaps between the main segments 2, the auxiliary segments 7 being made as small as desired to provide relatively small restriction of the air stream. The purpose of this construction is to provide an air blast which blows out or suppresses any arc that tends to form between the edge of the brush and the receding or approaching main segment of the commutator.

From an examination of Figure 5 it will be seen that the beveling of the brushes as indicated at 14 and the rounding of the main segments as indicated at 15 directs the air outwardly at an angle to the brushes and causes the air to somewhat sweep over the adjacent surface of the commutator segments. This air blast not only blows out the arc, but also tends to cool the brushes and the commutator segments.

Consider the operation of the apparatus when an arc is being initiated between the brush and a main segment of the commutator, for example a receding segment. At the instant the arc starts, the air blast immediately starts as the commutator segment has moved away from the brush a slight distance and the entire air passageway is opened to the outer peripheral side of the commutator assembly through this small slot like opening. The air blast is started at exactly the same instant the arc tends to form and before the arc can grow to any material value, it is blown out by the air stream. In addition to this, any ionized gases that may be formed at this point are blown away and are replaced by de-ionized gases and consequently the tendency of the arc to persist during even this very brief interval is materially reduced.

The air stream is relatively violent as the rectifier assembly rotates at a high rate of speed. For example, if a two-pole motor is employed and two main segments as shown in Figure 1, the speed of rotation will be 3600 R. P. M. for 60 cycles. Consequently there is a pronounced centrifugal action which causes a relatively violent air blast.

It is to be noted that this apparatus does not require any auxiliary equipment for furnishing the air blast but instead the air blast is produced in the commutator body itself due to the rotation of the commutator.

Gases other than air may be employed and may be mixed with the air if desired. For example it is to be noted that the shaft 16 which carries the commutator may be provided with a passageway 17 which opens into jet like passageways 18 formed in the commutator body 8, through which passageways the additional gas may be projected, preferably under pressure from any suitable source not shown. As shown in Figure 3 these passageways may open at the outwardly projecting portion of the lowermost surface of the main passageways through the commutator and thus act more or less as injectors to augment and increase the velocity of the stream of mixed gases passing radially outwardly through the passageways 9. This additional gas or these additional gases may be inert gases or may be gases which are difficult to ionize and which assist in preventing oxidation.

It is thus seen that the atmosphere in which commutation takes place may be controlled. Ordinarily the stream of air would be sufficient and the passageways 17 and 18 could be wholly omitted.

By having the plates 11 project upwardly as indicated at 12 on opposite sides of the commutator, it will be seen that they form, together with the brushes 5, channel like constructions which tend to confine the arc within such channels and also serve to prevent lateral spreading of the air stream and thus assist in blowing out the arc. The plates 7 and the body 8 of the commutator may be made of any suitable insulating material.

It will be seen that an effective means has been provided for suppressing or blowing out the arc without requiring the use of any auxiliary equipment. It will be seen further that heating of the commutator segments and brushes is materially reduced. It will also be seen that due to the fact that the arc is substantially instantly extinguished that the life of the device is materially increased.

Although this invention has been described in considerable detail, it is to be understood that such description is intended as illustrative rather than limiting, as the invention may be variously embodied and is to be interpreted as claimed.

I claim:

1. A commutator construction comprising a body portion, a plurality of commutator segments carried by said body portion and being relatively widely spaced apart, said body portion having passageways formed therein opening outwardly through the spaces between said segments for centrifugally producing a blast of air upon rotation of said commutator outwardly between said segments, brushes bearing on said segments, and means carried by said body portion for preventing tilting of said brushes when the spaces between said segments are passing said brushes.

2. A rotary commutator construction comprising a body portion, relatively large and widely spaced main segments carried by said body portion, relatively small auxiliary segments located in the space between successive main segments, brushes bearing on said segments, said body portion having open spaces between said main segments, and said auxiliary segments preventing tilting of said brushes, said body portion having passageways opening outwardly between said main segments for centrifugally producing a blast of gas upon rotation of said commutator outwardly between said main segments for sup-

pressing arcing between said brushes and said main segments.

3. A rotary commutator construction comprising a body portion, relatively large and widely spaced main segments carried by said body portion, relatively small auxiliary segments located in the space between successive main segments, brushes bearing on said segments, said body portion having open spaces between said main segments, and said auxiliary segments preventing tilting of said brushes, said body portion

5 having insulating plate like members projecting outwardly on opposite sides of said main and auxiliary segments adjacent the spaces between successive main segments, said body portion having passageways opening outwardly between said main segments for centrifugally producing a blast of gas upon rotation of said commutator outwardly between said main segments for suppressing arcing between said brushes and said main segments.

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