

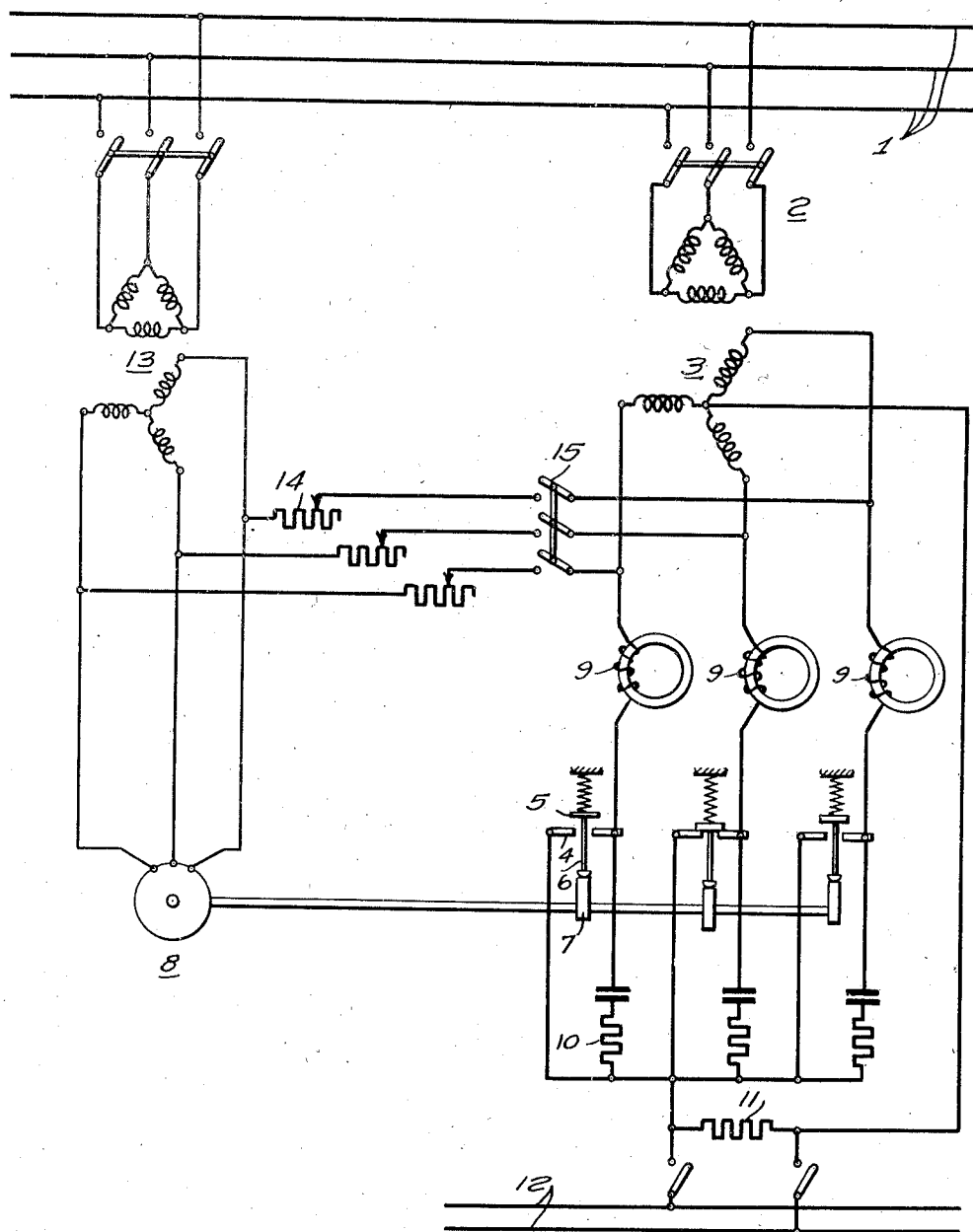
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CONVERSION SYSTEM

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WITNESSES:

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CONVERSION SYSTEM

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The invention relates to a conversion system and particularly to converters which operate with mechanically actuated switching contacts, and in which the switching contacts are connected in series with switching chokes, i. e., choke coils which become saturated for a very small current compared to the normal current for the purpose of avoiding contact arcing. Under certain circumstances, shunt paths to the contacts are provided in such contact converters; these comprise condensers and resistances and have the effect of maintaining the potential across the switching chokes immediately before the contacts come into engagement and immediately after the contact separation for a predetermined time interval so that the separation path of the contacts do not have the potential impressed across them.

In normal operation, currents, potentials and magnetic fluxes in the switching chokes and the shunt paths pass through periodically recurring operating cycles. This stationary condition is a requirement for a faultless, i. e., arc-free, commutation of the switching contacts.

In setting the converters into operation, this stationary condition is not immediately attained and the switching chokes and the shunt paths must have an opportunity to swing into this condition. The starting of the contact converter must, therefore, take place with gradually increasing potential until the normal value is reached, the contact converter being preferably subjected only to the so-called base load during the starting time; the base must be maintained at all times for the purpose of attaining a continuously faultless commutation. For the purpose of starting, a starting resistance is accordingly connected in the polyphase conductors of the contact converter. The latter need only be dimensioned to carry small power since it is connected in only for a short time, and since, in addition, the starting takes place only with the base load.

After the starting, the starter must, however, be short-circuited, and for this purpose a bridging switch designed for the full power is necessary. Such a bridging switch, however, increases the cost of the equipment, particularly for large powers.

It is, accordingly, an object of the present invention to eliminate this bridging switch for the full power.

The object is achieved in accordance with the invention by supplying the gradually increasing starting potential, while the contact converter is permanently connected with the main trans-

former from a second auxiliary transformer designed for small power. The power circuit breaker on the network side of the main transformer must obviously remain open during the starting. The main transformer is magnetized on its secondary side during the starting through the auxiliary transformer. The power which the auxiliary transformer need supply during the starting is the magnetization power of the main transformer and the power absorbed by the base loading. In addition to the fact that this power is in itself small, there is the fact that the starting requires only a few seconds so that the auxiliary transformer may be overloaded to a substantial extent. The same holds for the means for regulating upward the potential supplied by the auxiliary transformer, as well as for the disconnecting switch which disconnects the auxiliary transformer from the main circuit at the end of the starting process. In general, the addition of a separate auxiliary transformer is not necessary, since at any rate a separate transformer is provided for the supply of the driving motor for the switching contacts. Accordingly, this transformer may be used under certain circumstances with an adapting transformer interposed to supply the starting potential.

Other objects and advantages of my invention will be apparent from the following detailed description taken in conjunction with the accompanying drawing, in which the figure is a schematic illustration of a converter system according to my invention.

In the embodiment of the invention according to the illustration, the power to be converted is derived from the polyphase network 1 through the contact converter over the power circuit breaker 2. 3 is the main transformer of the contact rectifier which, in the present case, is illustrated in three-phase neutral point connection for the sake of simplicity, although, in general, Graetz connections are used.

The switching contacts of the contact converter consist of the fixed contact elements 4 insulated from each other and the movable contact bridges 5. The latter may be lifted against the potential of a spring by means of thrust bars 6 and cam disks 7. The cam disks are disposed on a common shaft rotated by a synchronous motor 8. The left fixed contact elements 4 are each connected through a switching choke 9 to the terminals of the secondary phase windings of the main transformer 3. The right contact elements 4, on the other hand, are connected together and with one pole of the direct-current

network 12. The other pole of the direct-current network 12 is the neutral point of the main transformer winding as is customary. 10 are the shunt paths to the contacts which permit the flow of current through the switching chokes, even if the contact connection has not as yet been made by the bridge 5, or is no longer made. In parallel with the direct-current network 12 is connected the loading resistor 11 which constitutes the base load.

The transformer 13 serves as auxiliary transformer for the starting in the present embodiment; at the same time, it also serves for the feeding of the synchronous motor 8 for driving the switching contacts. For simplicity of illustration, it may be assumed that the secondary potential of the transformer 13 is equal to the secondary potential of the main transformer 3.

During starting, the power circuit breaker 2 remains open and thus the main transformer 3 is disconnected from the network. On the other hand, the connecting switch 15 is closed, and after the connecting in of the transformer 13, the resistor 14 is gradually disconnected so that finally the full polyphase potential is impressed on the contact converter. Since the main transformer 3 is now magnetized on the secondary side, the circuit breaker 2 may be closed without any substantial current impulse, and thereafter the switch 15 may be opened. The contact converter is now in the normal operating condition and may be further loaded by connecting in the ordinary load circuit 12.

While for purposes of illustration I have shown and described a specific embodiment of my invention, it will be apparent to those skilled in the art that changes and modifications can be made therein without departing from the true spirit of my invention or the scope of the appended claims.

I claim as my invention:

1. An electric current conversion system comprising a polyphase circuit, a direct-current circuit,

a plurality of contactors for periodically establishing conduction between said circuits, a commutation system for each of said contactors including a saturable choke in series therewith, and a capacitive shunt across the contactor, a main transformer connected to said contactors, switching means for connecting said main transformer to said polyphase circuit, a source of auxiliary power, means for connecting said source to said contactors, a base load connected to said contactors and means for gradually applying power from said source to said load through said contactors.

2. An electric current converting system comprising a polyphase circuit, a direct-current circuit, a plurality of contactors for periodically establishing a conduction circuit between said polyphase circuit and said direct-current circuit, a main power transformer, switching means for connecting said main transformer between said polyphase circuit and said contactors, periodic commutating circuits associated with said contactors, means for initiating operation of said commutating circuits comprising a source of auxiliary power, a base load device and means for supplying current through said contactors to said base load device at controlled potential.

3. An electric current conversion system for transferring current between a polyphase circuit and a direct-current circuit comprising a plurality of contactors for periodically establishing conduction between successive phases of the polyphase circuit and the direct-current circuit, saturating reactors in series with each of said contactors, an impedance in shunt with each of the contactors, a main power transformer, switching means for connecting said main transformer to said polyphase circuit, an auxiliary transformer, circuit means for connecting said auxiliary transformer to said contactors and said main transformer and voltage controlling means included in said circuit means.

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