No. 792,091. PATENTED JUNE 13, 1905.

M. O. TROY.

CONSTANT CURRENT SYSTEM.

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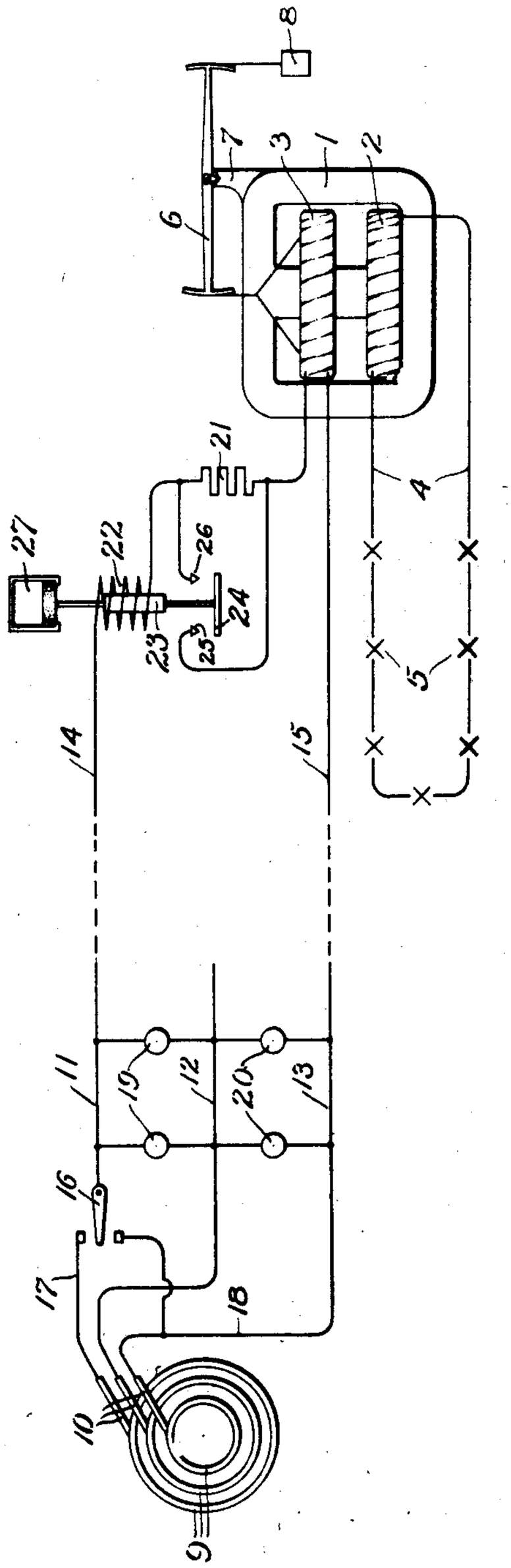

Witnesses:
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No. 792,091. Patented June 13, 1905.

UNITED STATES PATENT OFFICE.

MATTHEW O. TROY, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

CONSTANT-CURRENT SYSTEM.

SPECIFICATION forming part of Letters Patent No. 792,091, dated June 13, 1905.

Application filed December 12, 1903. Serial No. 184,893.

To all whom it may concern:

Be it known that I, MATTHEW O. TROY, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Constant-Current Systems, of which the following is a specification.

Constant-current transformers or reactive coils as usually constructed are provided with relatively movable coils which perform their regulating functions by automatically adjusting their relative distances apart. When out of circuit, the coils of these devices lie close together, but when in normal operation they are separated from each other by distances varying inversely with the amount of load. In starting up apparatus of this type the coils being at that time close together possess comparatively low reactance, and therefore draw from the mains or supply-circuit a heavy starting-current. The rush of current which takes place causes a more or less violent separation of the coils, and a consequent strain upon the apparatus and possible injury thereto.

My invention provides means whereby apparatus of the type mentioned may be started smoothly and without drawing from the mains an excessive starting-current. The apparatus which I employ is, moreover, especially arranged, so that the transformer or other device may be started from any point either near to or distant from the transformer and is of such character as not to require the presence of an attendant to supervise the action of the transformer.

My invention, therefore, is particularly suitable for controlling transformers or similar devices located at a substation or other point distant from the central station. An arrangement for thus controlling a transformer located at a substation by means operated at the generating-station is represented, mainly in diagram, in the drawing. The features of novelty possessed by such an arrangement will be pointed out with particularity in the appended claims.

In the drawing, the device to be controlled is represented by way of illustration as a constant-current transformer, having a core 1 of the usual form provided with relatively movable coils 2 and 3. The coil 2, which in this case is a secondary, is fixed in position and is connected to a series consumption-circuit 4, supplying lights or other translating devices, such as 5. The coöperating primary coil 3 is mounted so as to be movable relatively to the secondary 2 and to this end is carried by one end of a lever 6, pivoted upon some suitable support, as 7. The opposite end of the lever has a counterweight 8, which balances part but not all of the weight of the movable coil 3. It therefore follows that when no current is flowing in the apparatus the movable coil rests upon the fixed coil.

For supplying current to the transformer any suitable constant potential source of alternating current may be employed. In the arrangement illustrated in the drawing I have represented for this purpose a source of three-phase alternating current indicated conventionally by three collector-rings 9, having corresponding brushes 10 bearing thereon. From these brushes extend leads which connect with the three-phase mains 11, 12, and 13. The constant-current transformer is fed from one of the three phases of this supply system and for this purpose is shown as having its primary 3 connected through leads 14 and 15, of indefinite length, to the two mains 11 and 13 of the three-phase system.

The main 11 is arranged so that it may be connected by a switch 16 with one or the other of the two three-phase leads 17 and 18. When shifted from lead 17 to the lead 18, the main 11 is, in effect, folded over onto the main 13, and the primary 3 is therefore short-circuited upon itself and put out of circuit. Under these conditions all the translating devices are fed from one and the same phase of the system. This condition of affairs may exist, for example, in the day-time when the constant-current transformer is not required for use and when the demand for incandescent lights is small. When night-time comes, the switch 16 may be thrown, so as to connect the main 11 with the lead 17. This throws the primary

of the transformer across one phase of the source of current-supply and distributes the incandescent lamp or other load 19 and 20 across the other two phases. Current then flows through the primary of the transformer and the coils under the influence of the repulsive action of the currents therein commence to separate. The relative movement of the coils is, however, rendered gradual and easy by means of a resistance or other current-limiting device 21, placed in series with the primary 3. This resistance limits the flow of current to such an extent as to prevent too abrupt movement of the primary 3. As soon, however, as current commences to flow in the primary a solenoid 22 in series with the primary is energized. This solenoid is provided with a core 23, carrying a short-circuiting device 24, which by engaging two fixed contacts 25 and 26 closes a short circuit around the resistance 21, and thus cuts the same out of circuit. The core 23, which operates this short-circuiting device, is rendered slow in action by means of a dash-pot 27.

When the constant-current transformer is first connected in circuit, the resistance 21 interferes with the free passage of current to the transformer long enough to allow the coils of the transformers to assume their working position, after which the resistance is cut out by the short-circuiting device and the transformer operates as usual.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of a constant-current device having relatively movable coils, a resistance in series with one of said coils, and a slow-acting short-circuiting device for the resistance controlled by current flowing to said constant-current device.

2. The combination of a constant-current device having relatively movable coils, means external to the device for limiting the flowing of current thereto when the device is first put in circuit, and automatically-operated means for eliminating the effect of the current-limiting means.

3. In a device for the remote control of constant-current transformers or the like, the combination of resistance in series with the primary of the transformer, short-circuiting contacts for the resistance, a solenoid in series with said resistance, a core controlled by the solenoid for operating said short-circuiting contacts, and means for causing a yielding resistance to movement of said core.

4. The combination of constant-current apparatus having relatively movable parts, a supply-circuit therefor, a resistance or similar device for limiting the initial flow of current to said apparatus when first connected into circuit, and means controlled by said current for cutting the current-limiting means out of circuit.

5. The combination of a multiphase-supply system, means for disconnecting one main of the system and connecting it to another main, and constant-current apparatus connected between said mains.

In witness whereof I have hereunto set my hand this 10th day of December, 1903.

MATTHEW O. TROY.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.