(No Model.) 2 Sheets—Sheet 1.

C. J. STURGEON.

ELECTRIC ELEVATOR.

No. 470,158. Patented Mar. 1, 1892.

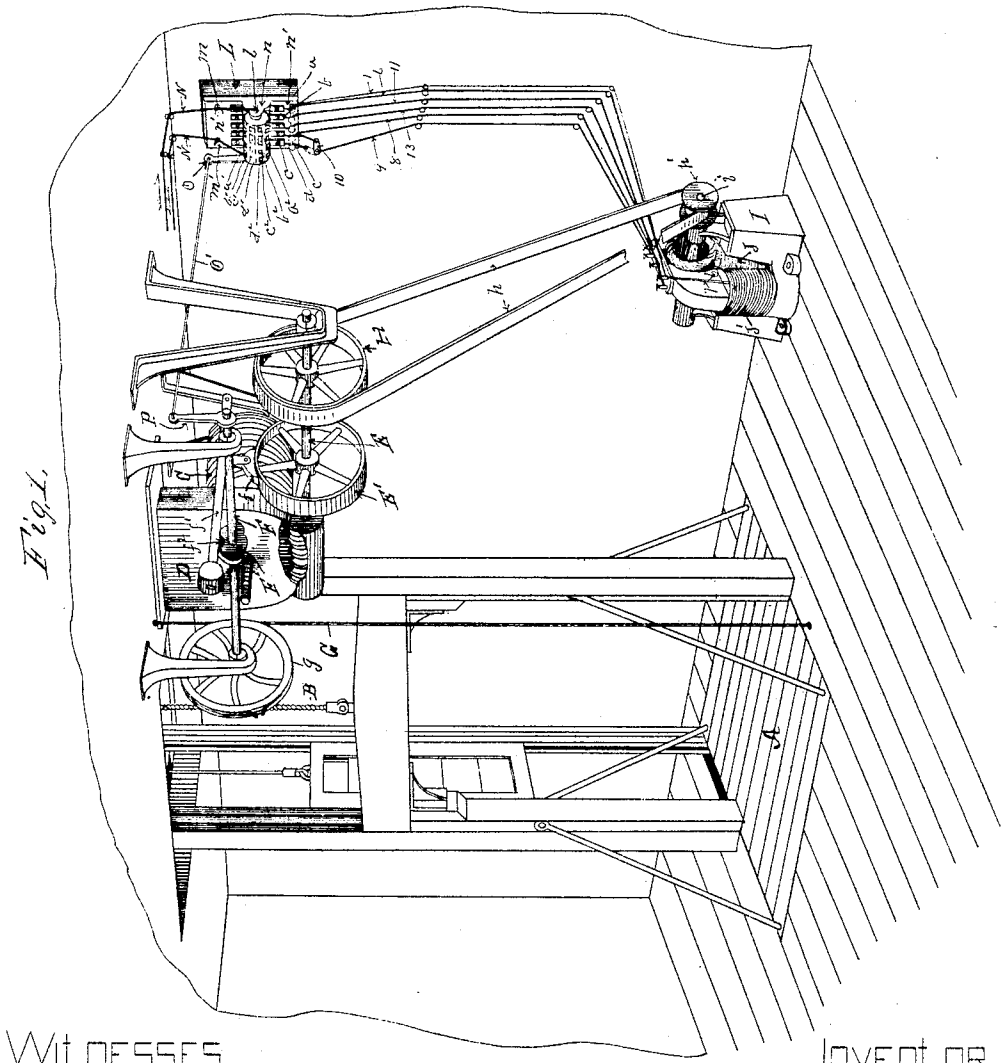

Fig. 1.

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(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

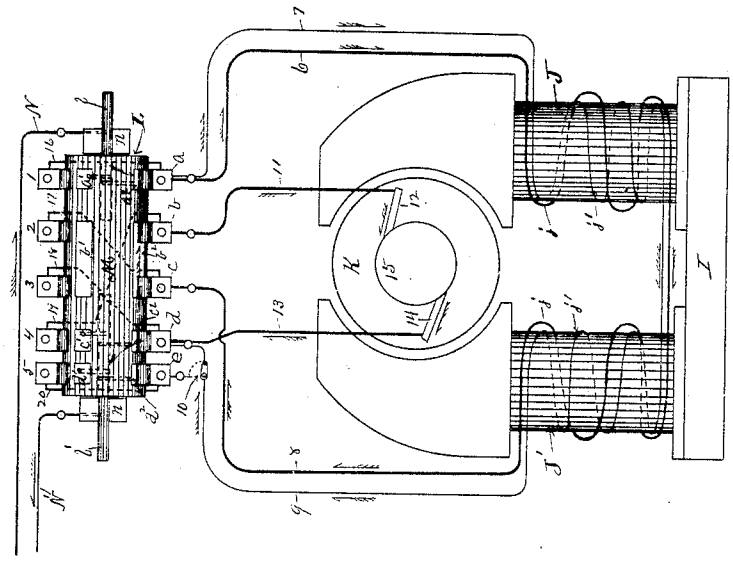
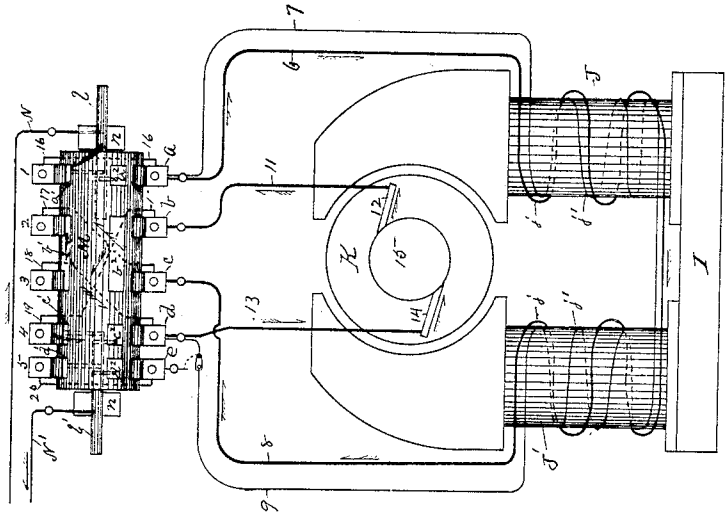


Fig. 3.



WITNESSES.
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UNITED STATES PATENT OFFICE.

CARSON J. STURGEON, OF ERIE, PENNSYLVANIA, ASSIGNOR TO THE KEYSTONE ELECTRIC COMPANY, OF SAME PLACE.

ELECTRIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 470,158, dated March 1, 1892.

Application filed January 27, 1891. Serial No. 379,303. (No model.)

To all whom it may concern:

Be it known that I, CARSON J. STURGEON, a citizen of the United States, residing at the city of Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Electric-Elevator Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, forming part of this specification.

My invention consists in the improvements in electric-elevator mechanism hereinafter set forth and described, and illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of an electric elevator embodying my improvements. Figs. 2 and 3 are diagram figures illustrative of the switch and motor mechanism and of the wire connections to the same.

Like letters and figures refer to like parts in all of the figures.

The elevator illustrated in the drawings as embodying my invention is of the type known as a "drum-elevator, in which the elevator car or platform is raised by winding a hoisting-cable attached thereto upon a drum actuated by an electric motor run in one direction and lowered by reversing the electric motor and rotating the drum in the opposite direction, so as to unwind the hoisting-cable therefrom.

The principal objects of my invention are, first, to operatively combine with an elevator an electric motor for actuating it, having the field-magnets thereof wound with both series and shunt coils, and current controlling and reversing mechanism connected therewith, whereby said motor can be operated in series alone when the elevator-platform is being raised and in compound when the motor is reversed and the elevator-platform is being lowered, or in compound both ways, as may be desired, without the intervention of rheostats or resistance-coils; second, to construct and combine a compound-wound motor and the current-controlling mechanism thereof so that the full power of the current may be turned directly into the motor when starting it without the intervention of a rheostat or of resistance-coils; third, to construct and operatively combine with an elevator and an electric motor for actuating the same current controlling and reversing mechanism operatively connected with the elevator break mechanism and adapted to be operated from the elevator-platform to start, stop, and reverse the motor, as desired, without the intervention of a rheostat or of resistance-coils; fourth, to construct and operatively combine with a compound-wound electric motor current controlling and reversing mechanism adapted to simultaneously turn on the current and cut the shunt field-magnet coils out of circuit for running the motor in one direction and to likewise simultaneously turn the current through both the shunt and series field-coils and reverse the direction of the current through the armature for running the motor in the opposite direction.

The other features of my invention are set forth hereinafter in the specification and claims.

In the construction of my invention illustrated in the drawings, A is the elevator-platform; B, the hoisting cable; C, the drum; D, the worm-wheel case; E, the worm-wheel shaft; E′, the break-wheel; F, the cam-shaft operating the break *f* and actuated by the hand-rope G, passing around and secured to the wheel *g* thereon, all of which parts are of a type in common use in drum-elevators, and I do not claim the same as my invention, as my invention is equally adapted to any type of drum-elevator.

In the construction shown in Fig. 1 I secure a band-wheel H to the worm-wheel shaft E, from which a belt *h* runs to and around the pulley *h′* on the armature-shaft *i* of the electric motor I, whereby power is communicated from the motor I to the worm-wheel shaft E. The armature K of the motor I is made either of the Gramme or Siemens type. The field-magnets J and J′ of the electric motor I are wound with both series coils *j* and shunt-coils *j′*, the relative proportions of these coils to each other being preferably as to the series coils *j* less and as to the shunt-coils *j′* greater than is usual in compound-wound

machines. These field-coils *j* and *j'* I wind in the same direction in parallel. The armature K is so connected up in series with the series field-magnet coils *j* (the shunt field-coils *j'* being shunted around the armature) that the current from the incoming line N when turned into the motor first traverses the series coils *j* and the shunt-coils *j'* in parallel in the same direction before the current passing through the series coils *j* reaches the ingoing armature-brush, and after passing through the armature K it passes from the outgoing armature-brush thereof directly to the outgoing line N', the current from the shunt-coils passing directly to the outgoing line N' without passing through the armature. The result of this construction is that the series and shunt field-coils *j* and *j'* first receive the current from the incoming line N, through which coils it travels in the same direction in parallel, the armature K receiving its supply of current from the outgoing end of the series coils *j'*, and the maximum force and volume of current used to operate the machine may therefore be instantly turned into the motor to start it under load without the intervention of a rheostat or of other artificial resistance, as the current in passing through the field-magnet coils is for a brief time so greatly retarded or absorbed in the magnetization of the field-magnets that at first it reaches the armature under such comparatively low tension that the armature will safely carry it until it starts, the tension and volume of the current speedily thereafter rising to the maximum. This construction also operates to very speedily magnetize the field-magnets to such a degree of saturation that they instantly exert their maximum power upon the armature to start it.

The current controlling, switching, and reversing mechanism of my device consists, preferably, of the cylinder M, of non-conducting material, mounted on journals *l l'*, which operate in bearings *n*, secured to a base *n'*. On one of the journals *l'* of the cylinder M, I secure a short lever O, to which is pivoted the end of a push-bar O', the opposite end of which is pivoted to a like lever P, secured to the cam-shaft F of the elevator, so that the rotation of the cam-shaft F operates through the push-bar O' to rotate the cylinder M, as and for the purpose hereinafter set forth.

Upon the base *n'* I secure two binding-posts *m* and *m'*, to which are secured the incoming conducting-wire N and the outgoing conducting-wire N'. The bearings *l* and *l'* extend into the ends of the cylinder M a short distance, but are insulated from each other, (see dotted lines in Figs. 2 and 3,) and the incoming and outgoing conductors N and N' are electrically connected therewith.

On the surface of the cylinder M, I secure contact-plates *a'*, *b'*, *c'*, and *d'* (see Figs. 1 and 2) and a^2, b^2, c^2, and d^2. (See Figs. 1 and 2.) The plates *a'* and a^2 I connect electrically with the journal *l* and the plates *c'* and *d'* and c^2 and d^2 with the shaft *l'*, so that the incoming conductor N is at all times electrically connected with the contact-plates *a'* a^2 and the outgoing conductor N' with the contact-plates *c'* c^2 and *d'* d^2, the plates *b'* and b^2 operating as a bridge, as hereinafter set forth.

On the base *n'* at the side of the cylinder M next to the incoming and outgoing conductor binding-posts *m* and *m'* I secure contact-plates 1, 2, 3, 4, and 5, adapted to make electrical contact with the plates *a'*, *b'*, *c'*, and *d'* when the cylinder M is rotated in that direction far enough to bring them together, and on the opposite side of the cylinder M, I secure to the base *n'* another set of contact-plates *a*, *b*, *c*, *d*, and *e*, adapted to make electrical contact with the plates a^2, b^2, c^2, and d^2 when the cylinder M is rotated in that direction far enough to bring them together, so that each set of contact-plates on the cylinder M may be brought into electrical contact with its own set of contact-plates secured to the base *n'* by rotating the cylinder M in the proper direction, or both sets of the plates on the cylinder M can be entirely removed out of electrical connection with the plates *a b*, &c., and 1 2, &c., according to the direction or distance the cylinder M is rotated by the operation of the cam-shaft F. I also connect electrically the plates *a* and 1, the contact-plates *b* and 4, the contact-plates *c* and 2, the contact-plates *d* and 3, and the contact-plates *e* and 5. (See dotted lines in Figs. 2 and 3.) To the contact-plate *a* the ingoing connecting-wires 6 and 7 of the series winding *j* and the shunt winding *j'* of the field-magnets J' J are secured, and from the series coil *j* of the field-magnet J' an outgoing connecting-wire 8 extends to the contact-plate *c*, and from the shunt-coil *j'* of the field-magnet J' an outgoing connecting-wire 9 extends to the contact-plate *d*, this wire 9 being however provided with an ordinary lever-switch 10, pivoted at one end to a suitable support and electrically connected with the wire 9, so that the free end of the lever may be moved around into contact with the end of a wire connected with the plate *d*, as illustrated in Figs. 1, 2, and 3, and thereby conveying the current from the wire 9 to the plate *d* or swung around out of contact with the wire leading to the plate *d* and into contact with the wire leading to the plate *e*, as illustrated by dotted lines in said Figs. 1, 2, and 3, so as to divert the current of the shunt field-coils from the plate *d* and convey it to the plate *e* when it is desired to run the motor in compound both ways, and from the contact-plate *b* a wire 11 connects with the commutator-brush 12, and from the contact-plate *d* a wire 13 connects with the commutator-brush 14.

Now when the cylinder M is rotated so as to bring the contact-plates a^2, b^2, c^2, and d^2 thereon into electrical contact with the contact-plates *a*, *b*, *c*, *d*, and *e*, as illustrated in Fig. 2, the motor operates in compound as the incoming current from the wire N passes through

the shaft l and its connection to the contact-plate a, whence it passes over the ingoing wires 6 and 7 and through the series coils j and the shunt-coils j', the current from the shunt-coil j' passing out on the wire 9, contact-plate d, and contact-plate c^2 and its connection with the shaft l', while the current from the series coil passes over the outgoing wire 8 to contact-plate c and over the bridge-plate b^2 on the cylinder M to the contact-plate b, thence down wire 11 to commutator-brush 12, whence the current passes through the armature K and commutator 15 to commutator-brush 14, and out on wire 13 to contact-plate d, and out through plate c^2 and its connection with shaft l' to the outgoing wire N', the difference of potential between the contact-plates a and d in this case being the full potential of current under which the motor operates. When, however, the cylinder M is rotated in the reverse direction, so as to bring the plates a', b, c', and d' thereon into electrical contact with the plates 1, 2, 3, 4, and 5, the motor operates in series, as the switch 10 being turned so as to connect the outgoing shunt-conductor 9 with the contact-plate d, as illustrated in Fig. 5, the incoming current from the wire N passes through the shaft l and its connections to the plate 1, from whence it passes on connection 16 to contact-plate a, and thence over ingoing wires 6 to and through series coils j and over outgoing wire 8 to contact-plate c, whence it passes over connection 17 to contact-plate 2 and over bridge-plate b' to contact-plate 3, and thence through connection 18 to contact plate d and down in the reverse direction through wire 13 to commutator-brush 14, and thence through the armature K and commutator-brush 12 and by wire 11 to contact-plate b, and by connection 19 to contact-plate 4 and plate c' and connections to shaft l' to outgoing wire N'. In this case no perceptible current passes over the ingoing wire 7 and through shunt-coils j', the difference of potential between the contact-plates a and b in this case being the full potential of current under which the motor operates. If, however, it is desired to run both ways in compound, then by turning the switch 10 so as to connect the outgoing wire 9 with the contact-plate e, as hereinbefore described, then the current passes from the contact-plate a on the ingoing wire 7 and through the shunt-coils j' and over the outgoing wire 9 to the contact-plate e and contact-plate d^2 on the cylinder M and over its connections to the outgoing line N', and when the motor is reversed and run in the opposite direction, as above described, then the current passes from the contact-plate e over the wire 20 to contact-plate 5 and contact-plate d' on the cylinder M and over its connections to the outgoing line N'. Thus when the motor is run in compound both ways the difference of potential of the shunt-coils is at all times between the contact-plates a and e and of the series coils between the contact-plates a and d when the motor runs in one direction and between the plates a and b when the motor is run in the other direction.

In operation when the break-lever f rests in the notch f^2 of the cam F' on the cam-shaft F the break f is in contact with the break-wheel E' and the switching-cylinder M stands at such point that neither set of plates thereon is in contact with the contact-plates on the base n' and the current is entirely cut off the motor I. When the operator, standing on the elevator-platform, wishes to raise it, he pulls the hand-rope G, which rotates the cam-shaft F, lifting the break f from the break-wheel g, and simultaneously therewith rotates the switch-cylinder M, so as to bring the plates a', b', c', and d' thereon into contact with the contact-plates 1, 2, 3, 4, and 5, starting the motor and running it in series to raise the platform, and when he desires to stop he lifts up on the hand-rope G until the break-lever f falls into place in the notch f^2 in the cam F, which operation simultaneously rotates the cylinder M and moves the plates a', b', c', and d' out of contact with the contact-plates 1, 2, 3, 4, and 5, cutting off the current from the motor. When, however, the operator, standing on the platform, desires to lower it, he lifts up the hand-rope G, which rotates the cam-shaft F in the opposite direction, lifting the break f off of the break-wheel E' and simultaneously therewith rotates the switch-cylinder M in the reverse direction, so as to bring the plates a^2, b^2, c^2, and d^2 thereon into contact with the contact-plates a, b, c, d, and e, starting the motor and running it in compound to lower the platform, and when he desires to stop he pulls down on the hand-rope G until the break-lever f' falls into the notch f^2 in the cam F', which simultaneously rotates the cylinder M back until the current is turned off the motor, the same as hereinbefore described. It will be observed that by means of this construction I am enabled to run the motor in compound both ways or in series in one direction and in compound in the other direction. For example, when raising the elevator with a load I can run the elevator in series or in compound, as desired, and when lowering the elevator-platform with a load I can run the motor in compound, and thereby maintain an exceedingly-high degree of magnetism in the field-magnets, so as to develop a strong counter electro-motive force from any material increase of speed of the rotation of the motor-armature, which, operating as a break upon the motor, enables it to lower the loaded elevator at substantially the same speed as it raises it.

I have herein shown and described a convenient form of mechanism for utilizing my invention; but I do not limit myself to the exact construction and arrangement of parts shown and described, as

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

1. The combination, in an electric elevator, of elevator mechanism and an electric motor having its field-magnet cores wound with coils connected in series with the motor-armature and also wound in the same direction with coils shunted around the armature, said coils being both connected with the incoming conductor in a manner whereby the current passes from the outgoing end of the series coils to the armature, operatively geared to and actuating said elevator mechanism, with a current controlling and reversing mechanism adapted to turn the current on and off the motor and reverse its direction through the armature, and non-rheostatted conductors between said current controlling and reversing mechanism and the motor, whereby the full force of the current is turned directly into the motor to start it, substantially as and for the purpose set forth.

2. The combination of an electric motor having an armature, field-magnet cores, a wire coil wound on each of said magnet-cores and connected in series with the armature, a second wire coil wound on each of said magnet-cores in the same direction as the first-named coils and shunted around the armature, said coils being connected up with the incoming and outgoing lines in a manner whereby the current will traverse said coils in the same direction in parallel with a current-controlling mechanism, and a non-rheostatted conductor between said current-controlling mechanism and said motor, substantially as and for the purpose set forth.

3. The combination, in an electric elevator, of elevator mechanism with a compound-wound electric motor operatively geared to and actuating said elevator, and current switching and reversing mechanism adapted to switch the current into the motor so as to run it in series in one direction and to so switch the current as to reverse it through the armature as to run it in compound in the opposite direction, substantially as and for the purpose set forth.

4. The combination, in an electric elevator, of elevator mechanism and a compound-wound electric motor operatively geared to and actuating said elevator, with current switching and reversing mechanism adapted to cut out the shunt field-coils for running the motor in series in one direction and to reverse the direction of the current through the motor-armature and restore the shunt field-coils in circuit for running the motor in compound in the opposite direction, and break mechanism operatively connected to said switching and reversing mechanism, adapted to be operated from the elevator car or platform for starting, stopping, or reversing said motor, substantially as and for the purpose set forth.

5. The combination, in an electric elevator, of suitable elevator mechanism and a compound-wound electric motor operatively geared thereto for actuating said elevator, with current reversing and switching mechanism and elevator break mechanism operatively geared together and operating simultaneously to switch the current into the series field-coils alone and thence through the armature when the motor runs in one direction and to switch both series and shunt field-coils into circuit and reverse the direction of the current through the motor-armature when the motor runs in the reverse or opposite direction, substantially as and for the purpose set forth.

6. The combination, in an electric elevator, of elevator mechanism and break mechanism for stopping said elevator, adapted to be operated from the elevator car or platform, with a compound-wound electric motor operatively geared to and actuating said elevator mechanism, and switching and reversing mechanism geared to said elevator break mechanism for starting, stopping, and reversing the motor and operating simultaneously therewith, and non-rheostatted connections between said switching and reversing mechanism and said motor, substantially as and for the purpose set forth.

7. The combination of a compound-wound electric motor with a current switching and reversing mechanism adapted to switch the current through the series field-coils alone and into the motor-armature in one direction for running the motor in series in one direction and to switch both the series and shunt field-coils into circuit and reverse the direction of the current through the armature for running the motor in compound in the reverse or opposite direction, substantially as and for the purpose set forth.

8. The combination, in an electric-current switching and reversing mechanism, of a cylinder of insulating material, as M, mounted upon a shaft consisting of sections, as l and l', secured in said cylinder so as to be insulated electrically from each other, contact-plates a' b' c' and a^2, b^2, and c^2, secured to the surface of said cylinder M, so that the contact-plates a' and a^2 are each connected electrically with the shaft-section l, and the contact-plates d' and d^2 are also each connected electrically with the shaft-section l', with contact-plates a, b, c, and d secured to the base n' and adapted to contact with the plates a^2 b^2 c^2 on the cylinder M, contact-plates 1, 2, 3, and 4, secured to the base n' and adapted to contact with the plates a' b' c' on the cylinder M, an electrical conductor 16 between the contact-plates a and 1, an electrical connection, as 19, between the contact-plates b and 4, an electrical connection, as 17, between the contact-plates c and 2, and an electrical connection, as 18, between the contact-plates d and 3, substantially as and for the purpose set forth

9. The combination, in an electrical switching and reversing mechanism, of a cylinder of insulating material, as M, mounted upon a shaft consisting of sections, as l and l', secured in said cylinder, contact-plates a' b' c' d' and a^2 b^2 c^2 d^2, secured to the surface of

said cylinder M, so that the contact-plates *a* and 2 are each connected electrically with the shaft-section *l*, and the contact-plates *c'* and c^2 and *d'* and d^2 are each connected electrically with the shaft-section *l'*, with contact-plates *a*, *b*, *c*, *d*, and *e* secured to the base *n'* and adapted to contact with the plates a^2, b^2, c^2, and d^2 on the cylinder M, contact-plates 1, 2, 3, 4, and 5, secured to the base *n'* and adapted to contact with the plates *a' b' c' d'* on the cylinder M, an electrical connection, as 16, between the contact-plates *a* and 1, an electrical connection, as 19, between the contact-plates *b* and 4, an electrical connection, as 17, between the contact-plates *c* and 2, an electrical connection, as 18, between the contact-plates *d* and 3, an electrical connection, as 20, between the contact-plates *e* and 5, and a switch 10 for connecting the wire 9 from the shunt-coils *j'*, either with the contact-plate *e* or with the contact-plate *d*, as may be desired, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CARSON J. STURGEON.

Witnesses:
JOHN S. RILLING,
H. T. IAVEDI.