

No. 731,298.

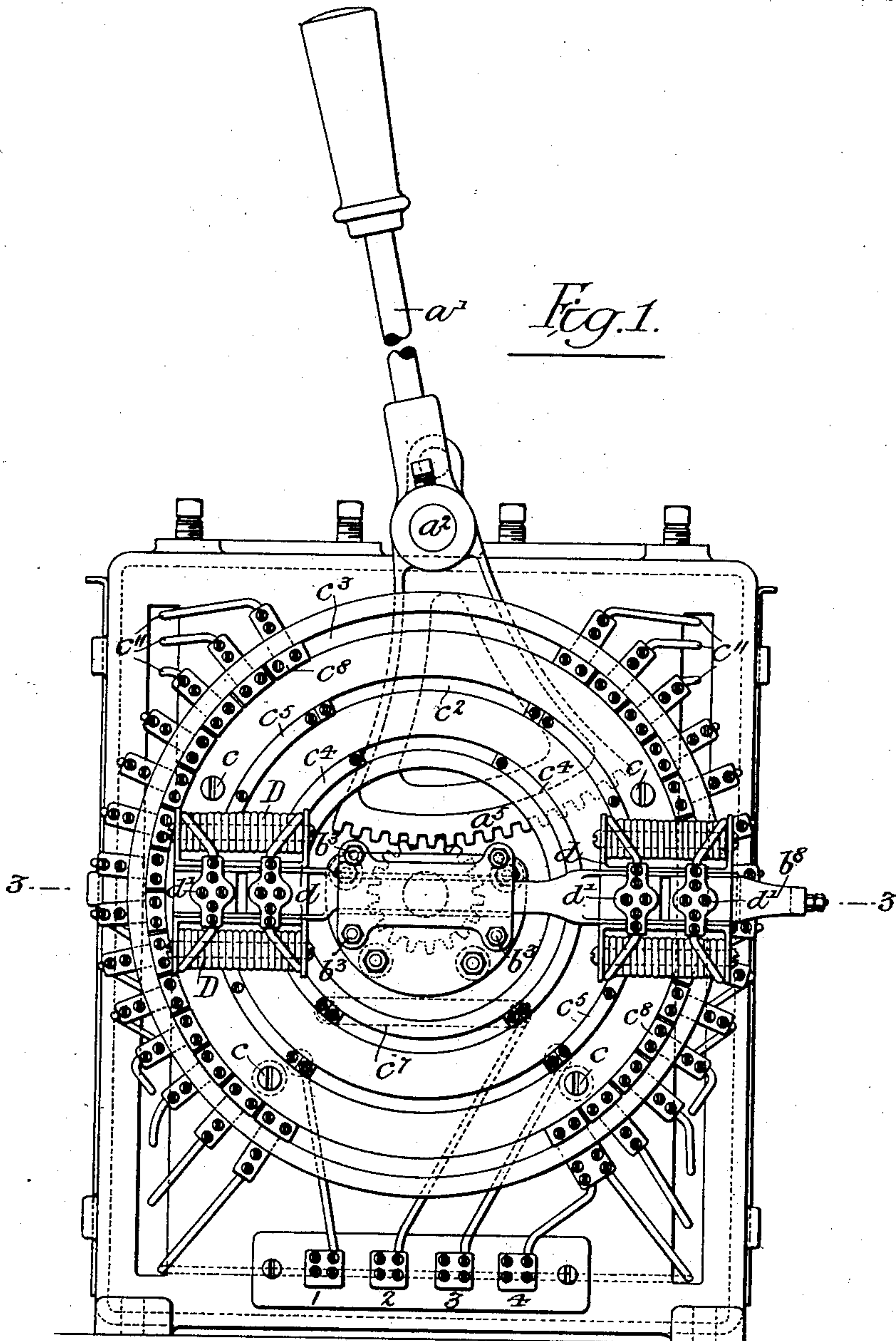
PATENTED JUNE 16, 1903.

G. W. GILMORE & D. KENDALL.
ELECTRIC CONTROLLER.

APPLICATION FILED MAR. 12, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses:-

Augustus B. Coppes
Frank L. A. Graham

Inventors:-
George W. Gilmore,
David Kendall,
by their Attorneys:

Howson & Howson

No. 731,298.

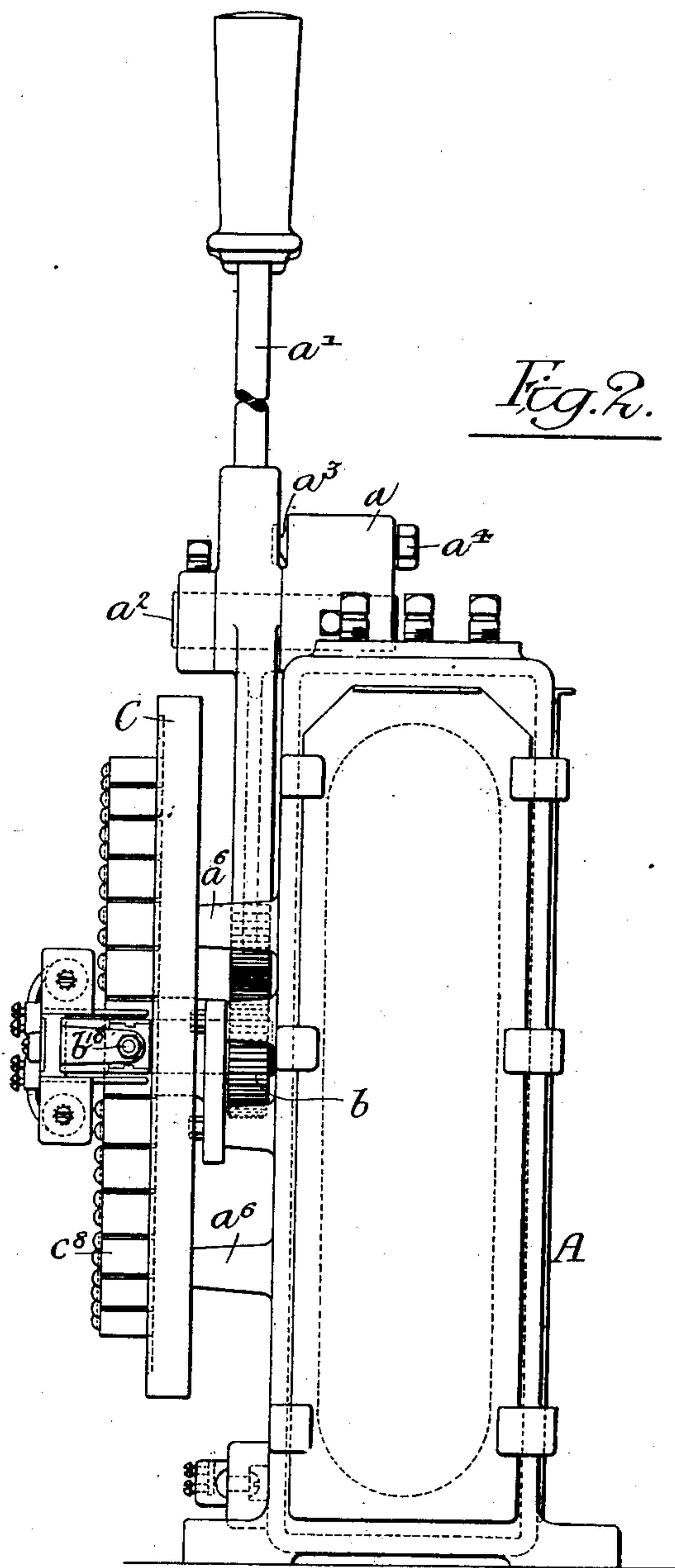
PATENTED JUNE 16, 1903.

G. W. GILMORE & D. KENDALL.
ELECTRIC CONTROLLER.

APPLICATION FILED MAR. 12, 1903.

NO MODEL.

3 SHEETS—SHEET 2.



Witnesses:

Augustus B. Cropper
Frank L. A. Graham

Inventors:
George W. Gilmore,
David Kendall,
by their Attorneys;

Howard Howard

No. 731,298.

PATENTED JUNE 16, 1903.

G. W. GILMORE & D. KENDALL.
ELECTRIC CONTROLLER.

APPLICATION FILED MAR. 12, 1903.

NO MODEL.

3 SHEETS—SHEET 3.

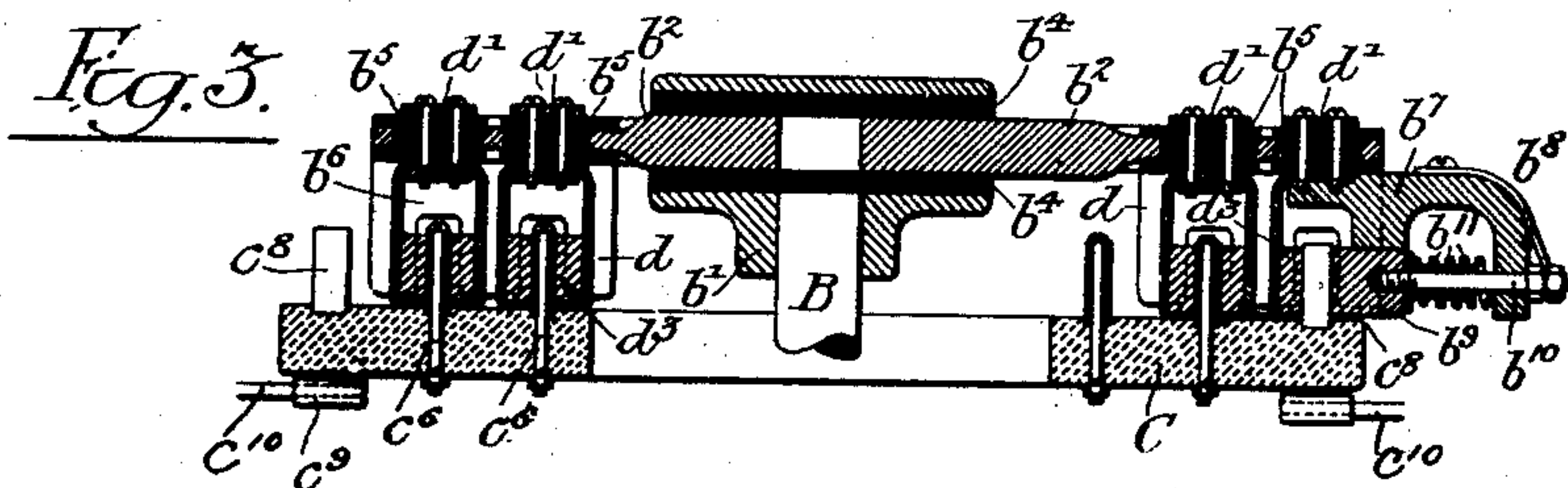


Fig. 4.

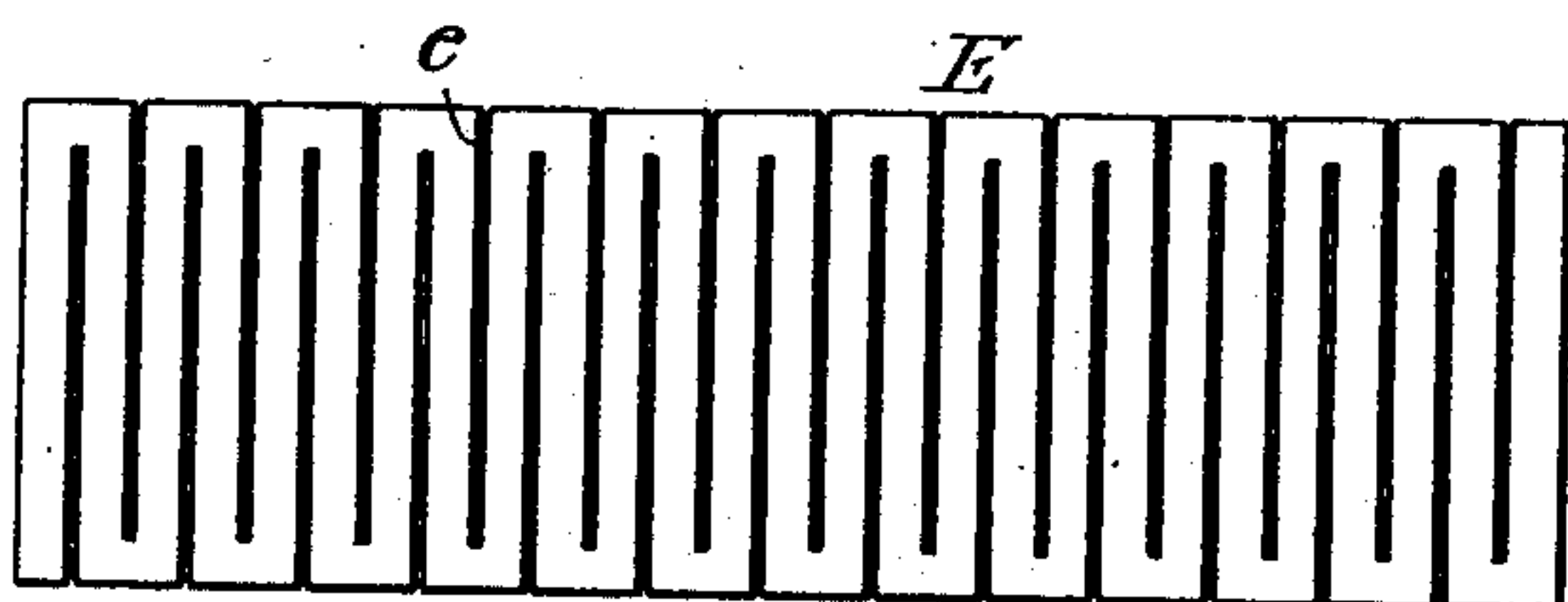
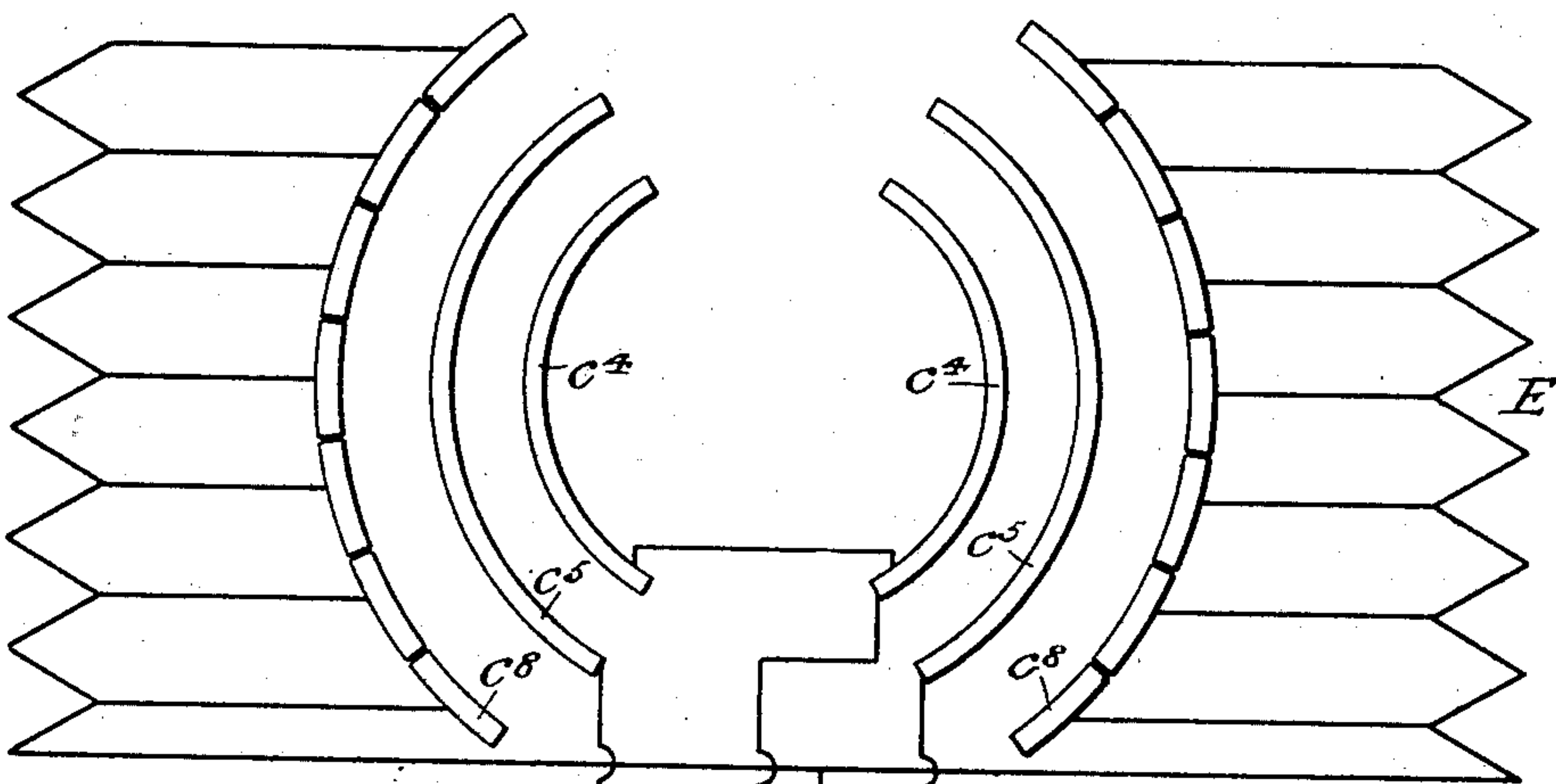
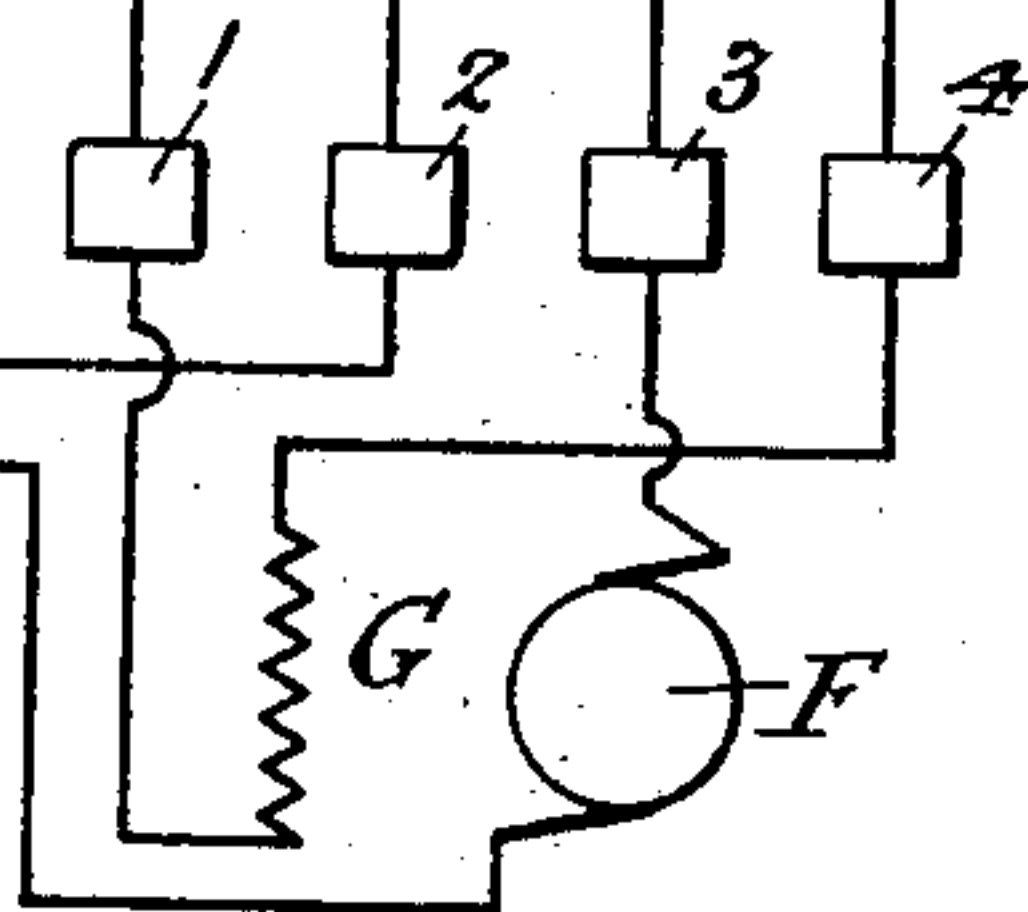


Fig. 5.



Witnesses:

Augustus B. Coppes
Frank L. A. Graham



Inventors:
George W. Gilmore,
David Kendall,
by their Attorneys:

Howson & Howson

UNITED STATES PATENT OFFICE.

GEORGE W. GILMORE AND DAVID KENDALL, OF ALLIANCE, OHIO, ASSIGNORS TO THE ALLIANCE MACHINE COMPANY, OF ALLIANCE, OHIO, A CORPORATION OF OHIO.

ELECTRIC CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 731,298, dated June 16, 1903.

Application filed March 12, 1903. Serial No. 143,446. (No model.)

To all whom it may concern:

Be it known that we, GEORGE W. GILMORE and DAVID KENDALL, citizens of the United States, and residents of Alliance, Ohio, have invented certain Improvements in Electric Controllers, of which the following is a specification.

Our invention consists in certain improvements in the detail construction of apparatus for controlling the starting and operation of electric motors, having for its object the provision of a novel combination of parts by which is provided a device reliable in action and efficient as well as durable in its operation, a further object being to so arrange the various contacts that these shall be readily accessible both for cleaning or inspection and removal, at the same time providing a construction of brush-holder which shall automatically act so as to insure good contact between the brushes and the pieces electrically engaged thereby. These objects we attain as hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of our improved controller. Fig. 2 is a side elevation of the same, certain of the electrical connections being omitted for the sake of clearness. Fig. 3 is a sectional elevation taken on the line 3-3, Fig. 1, and illustrating particularly the detail construction of the contact-arm and the parts carried thereby. Fig. 4 is one of the resistance units preferably used in our improved controller, and Fig. 5 is a diagrammatic view illustrating the internal connections of the various parts of our controller and showing the whole operatively connected to an electric motor.

In the above drawings, A represents the containing-casing or supporting structure of the controller, which is provided at its top with a projecting portion or lug a , pivotally carrying an operating handle or lever a' , by means of a suitable pin or bolt a^2 . There is a recess formed in the rear portion of this lever or handle, into which a pin a^3 extends when said lever is in its central or vertical position, this pin being pressed outwardly by a spring (not shown) with a force adjustable by means of a bolt a^4 .

The lever a' is extended downwardly from its pivotal support and has its lower end in the shape of a segmental gear a^5 , designed to mesh with a pinion b , operatively keyed or otherwise fixed to a shaft B, revolvably mounted in any desired manner in a bearing or bearings formed in the main casing A. Projecting from the front face of said casing are lugs a^6 , to which is secured a plate C of insulating material, such as slate or marble, said plate being held in position in the present instance by screws c . From Fig. 3 it will be noted that said plate is open or cut away at its middle to permit of the passage of the shaft B and has formed in its face three concentric grooves c^1 , c^2 , and c^3 , each of the two former of these having mounted in it two segmental strips c^4 and c^5 , preferably of bronze or copper and held in place by screws c^6 . It is to be noted that while the two segments c^4 are independent of each other there is a bar or other suitable metallic piece (shown in dotted lines at c^7 in Fig. 1) whereby they are electrically connected. The segments c^5 are not only independent of each other, but are connected to two different ones of the main terminals or binding-posts 1 and 4 for the attachment of connections from a motor and the supply-mains. In the outer groove c^3 are two series of contact-pieces c^8 of such superficial dimensions that they occupy portions of said grooves of lengths subtending the angle between the lines drawn from the center of the shaft B past the ends of the segments c^4 and c^5 . The screws extending through these segments c^8 enter and form electrical contact with terminal pieces c^9 on the rear face of the supporting slab or plate C, and to these terminal pieces are connected wires c^{10} , electrically connected with various points of resistance material, which in the controller illustrated is preferably of the form shown in Fig. 4. A unit element of this resistance consists of a plate of relatively thin metal E, having in it a series of slots e , extending alternately from one side of the plate transversely through the same to a point relatively near the opposite side thereof, thus forming a continuous electrical conductor having great durability and a relatively high resistance.

To the upwardly-projecting end of the spindle or shaft B is fixed a head-piece b' , and there are two pieces b^2 electrically insulated from one another, forming a single contact-arm, which is held to the piece b' by bolts b^3 . Suitably-placed pieces of fiber b^4 effectually serve to insulate the pieces b^2 of the contact-arm from the head-piece b' and from the shaft B.

Each piece b^2 of the contact-arm may be described as forked, or as having through it an opening or openings formed parallel to the shaft B, in which are movably mounted insulating-bushings b^5 , carrying brush-holders b^6 and b^7 , as hereinafter described, said bushings being of such form and dimensions that they are free to move to a limited extent toward or from the shaft. Blow-magnets D are supported or carried by U-shaped metallic pieces d , projecting from and fastened to the sides of the contact-arms, and one end of each magnet-winding is electrically connected to a metallic piece d' on top of each bushing b^5 , so that, as seen from Fig. 1, each pair of the pieces d' are connected to each other through two blow-magnets D, it being noted in Fig. 3 that a portion of the magnet-supporting pieces or frames d project downward toward the plate C, so as to form pole-pieces for the magnets.

U-shaped pieces b^6 , forming one series of the brush-holders, are each electrically connected to one of the metallic pieces d' by bolts or screws passing through the corresponding insulating-bushing b^5 , and it will be seen that the arm b^2 , as well as the bushings thereon, is so placed that while one brush-holder has contacts d^3 engaging only the segments c^4 the other two brush-holders of the same construction are arranged so that they both engage the segments c^5 . In other words, said two latter brush-holders are at a distance from the center of the shaft B equal to the radius of the circle in which the contact-segments c^5 are movable.

In order to insure perfect contact with the outermost circle of contact-pieces, we provide a special form of brush-holder therefor of the construction shown at b^7 , which, as in the case of the others, is carried by and is in electrical connection with a metallic piece d' , being provided with a single contact-piece d^3 , carried on a spring-arm, so that it bears against the inside surface of the line of contact-pieces c^8 . The main portion of said brush-holder b^7 , however, consists of a U-shaped casting b^8 , through the limbs of which are openings or recesses for a special brush b^9 , which has attached to it a spindle b^{10} and is movable toward and from the outside surface of the line of contacts c^8 . A spring b^{11} on said spindle acting between one of the arms of the piece b^8 and the brush b^9 presses said brush against the contacts c^8 with a relatively high pressure, such construction having been found advisable by reason of the fact that the frequent breaking of the current

between the brush-holder and the various individual contacts c^8 gave rise to irregularities of surface which ordinarily would prevent good electrical contact unless high pressure was used.

The connections of the various parts of our controller are shown diagrammatically in Fig. 5, there being four contact-pieces 1, 2, 3, and 4 provided on the main contact-supporting plate for the purpose of connecting said controller to supply-mains and to the motor to be operated, the armature and field of such motor being indicated at F and G, respectively. It is to be noted that the two segments of the innermost contact-ring c^4 are connected to each other and to the terminal 2, and the two segments c^5 are connected, respectively, to the terminals 1 and 4, while the terminal 3 is connected to the end contact-piece of each of the two sets of contacts c^8 and to the resistance E, as shown.

We claim as our invention—

1. In an electric controller, the combination of a series of contacts, a movable arm carrying brush-holders and brushes for engagement with said contacts, each of said brush-holders including means for causing the brushes to exert pressure against the contacts, one of said pressure-causing devices being of a different construction from the others so as to permit of its brush-holder being pressed against the contacts with a force different from that of the others, substantially as described.

2. The combination of a supporting structure, contact-pieces carried thereby on the arcs of substantially concentric circles, a rotatably-mounted arm provided with brush-holders each having a plurality of members constructed to bear upon opposite sides of the contacts, said brush-holders being free to move on said arm toward and from the center of rotation thereof, substantially as described.

3. The combination of a supporting structure, an arm rotatably carried thereby, a series of contact-pieces arranged concentrically with the axis of rotation of said arm and a series of independent brush-holders of U-shaped form and of relatively flexible material, each of the same having a plurality of brushes, said brushes bearing upon opposite faces of said contact-pieces, substantially as described.

4. The combination of a supporting structure having contacts, a movable arm having in it a slot, an insulating-bushing free to move in said slot and provided with flanges whereby it is retained therein, with a brush-holder carried by said bushing and provided with brushes engaging opposite sides of the contacts, substantially as described.

5. The combination of a supporting structure having a series of contacts, a movable arm carrying a plurality of brush-holders each having a brush or brushes in engagement with independent contacts and each insulated from

the other, blow-magnets carried by and disposed on opposite sides of said arm, each magnet having one end of its winding connected to one brush-holder and the other end thereof of connected to a second brush-holder, substantially as described.

6. An electric controller including a supporting structure, contacts thereon, a movable arm, brush-holders carried thereby, each having members engaging opposite faces of said contacts, a metallic frame carried by said arm and slotted for the accommodation of said contact-pieces, with a blow-magnet carried by said frame and having one end of its winding connected to one brush-holder and the other end of said winding connected to the second brush-holder, substantially as described.

7. An electric controller having a supporting structure and contact-pieces thereon, a movable arm having fixed to it a frame with a blow-magnet, a pair of independently-movable brush-holders, each having a plurality of brushes and carried by said frame, said brush-holders being connected respectively to the ends of the blow-magnet winding and placed so that the brushes engage the contacts on the fixed structure while being movable independently of the magnets, substantially as described.

8. The combination of a supporting structure having contact-pieces, a movable arm carrying a brush-holder provided with flexible members and brushes thereon for engaging certain of said contacts, a second brush-holder carried by said arm, the same having a supporting-framework and a contact-brush movable relatively thereto for engaging certain others of said contacts, substantially as described.

9. A movable arm for a controller, the same having a brush-holder including two members constructed to engage opposite sides of a contact-piece or series of pieces, one of said members having a main supporting structure, a brush guided thereon and a spring acting between said supporting-piece and the brush for pressing the latter against the contact piece or pieces, substantially as described.

10. A contact-arm for an electric controller, the same having a bushing carried so as to be free to move on said arm, a flexible piece at-

tached to said bushing having means for engaging one face of the contact-piece, a supporting structure also carried by the bushing having a relatively movable brush for engaging the opposite side of the contact piece or pieces and means for forcing said brush against the contact-pieces, substantially as described.

11. An electric controller including a casing having in it resistance-coils, a series of projections from said casing, and an insulating-plate carried thereby, a series of contacts projecting from said plate and arranged on the arcs of concentric circles, a contact-arm carried by the controller, with means for operating the same, and brush-holders on said contact-arm constructed to engage opposite faces of the said projections, substantially as described.

12. The combination of a controller having parallel series of contact-pieces, a movable arm having a brush-holder for each of said series, a brush or brushes carried by said brush-holders, the brush-holders including means for causing the brushes to forcibly press against their respective contacts, the brush-holder for the outer series of contacts having an extended portion and a spring confined between the same and its brush whereby it is possible to cause said brush to bear upon its contacts with a force different from that exerted upon the other contacts, substantially as described.

13. An electric controller including parallel series of contacts, a movable arm, brush-holders having flexible portions brushes carried by said flexible portions and placed to engage opposite sides of the contacts, the brush-holder for the outer set of contacts having a rigid piece for guiding its brush and having a spring acting between said brush and said piece, whereby force is exerted upon said brush to press it directly upon its contacts, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

GEORGE W. GILMORE.
DAVID KENDALL.

Witnesses:

W. H. PURCELL,
G. W. SHEM.