

No. 637,323.

Patented Nov. 21, 1899.

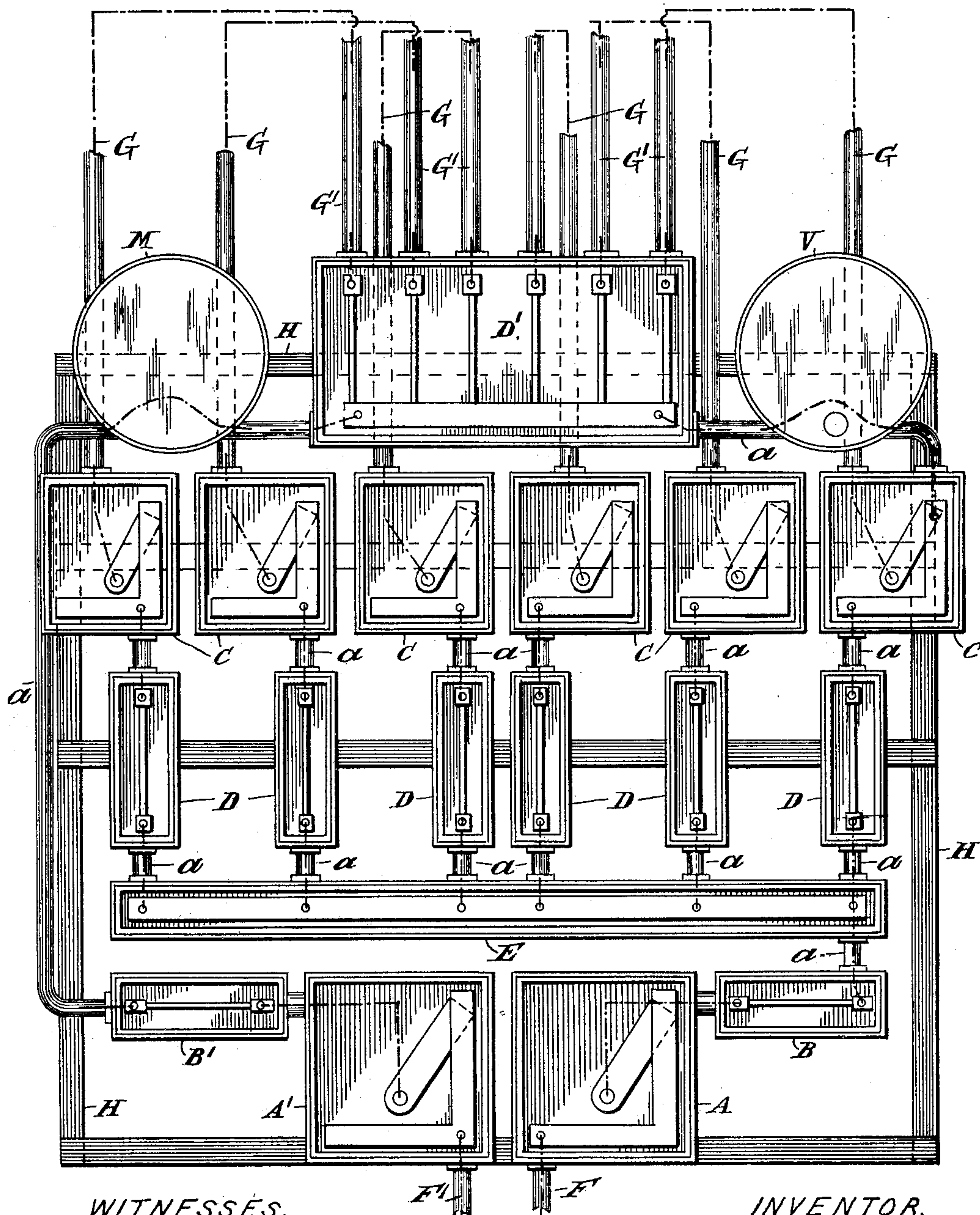
C. H. COX.
ELECTRICAL SWITCHBOARD.

(Application filed Apr. 29, 1899.)

(No Model.)

4 Sheets—Sheet 1.

FIG. 1.



WITNESSES.
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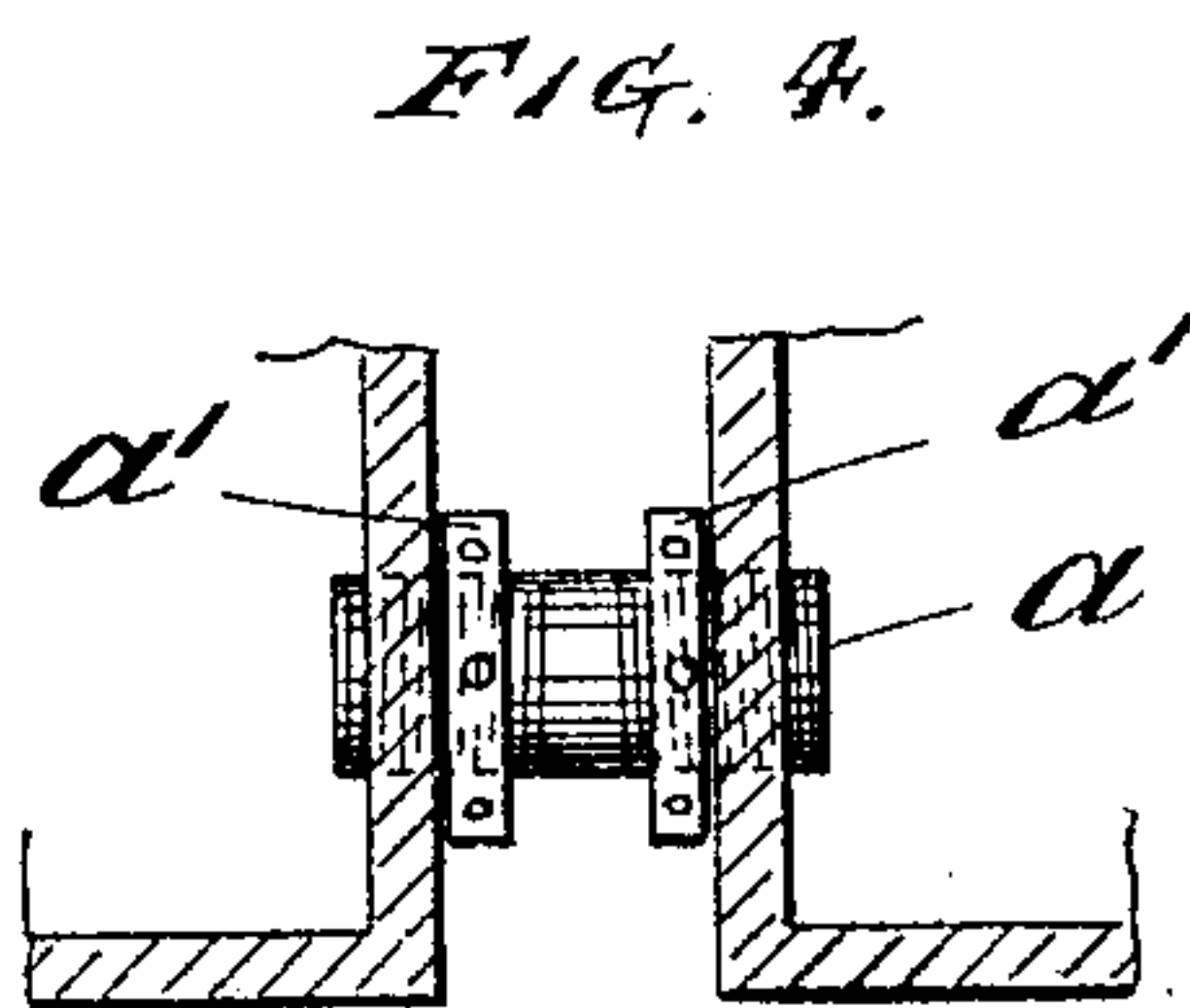
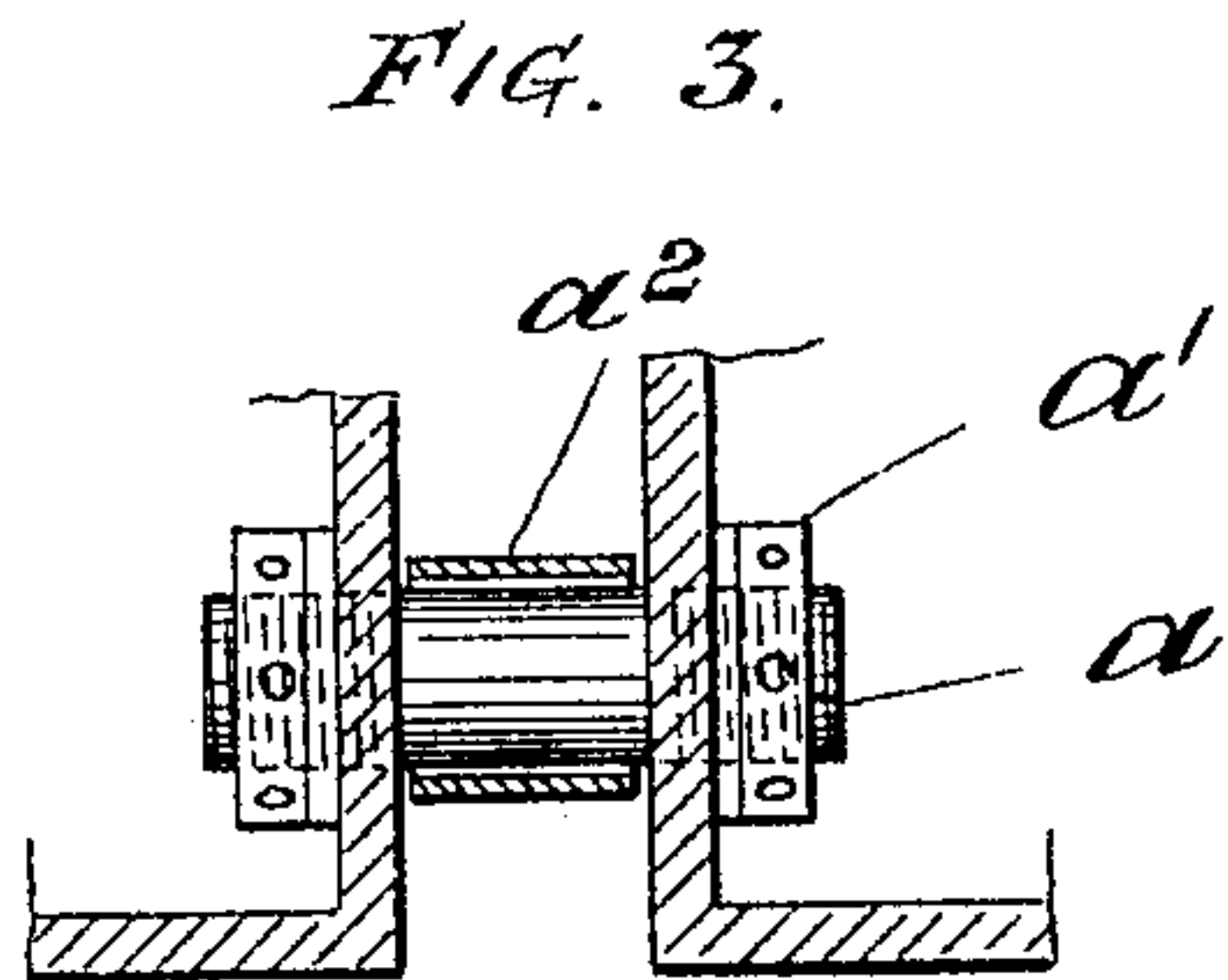
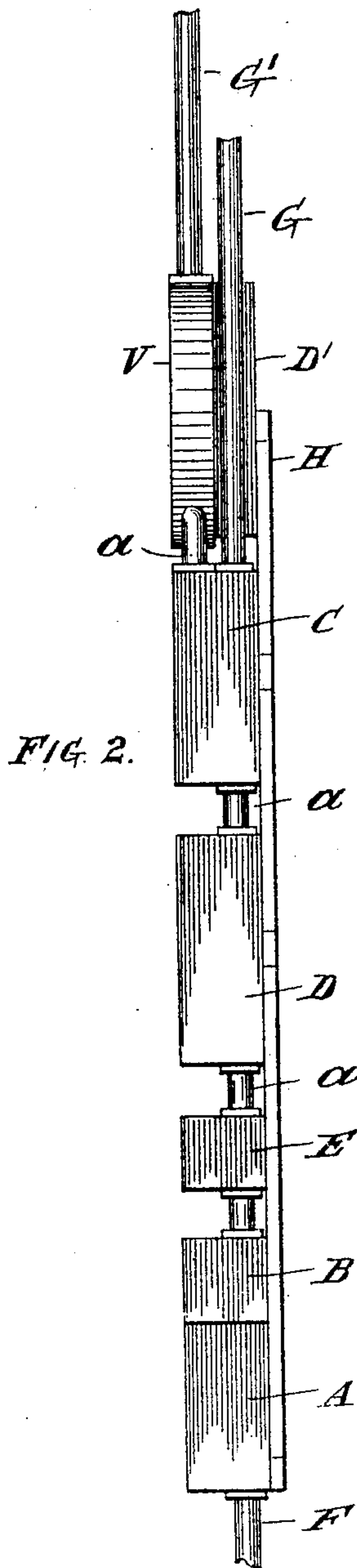
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FIG. 5.

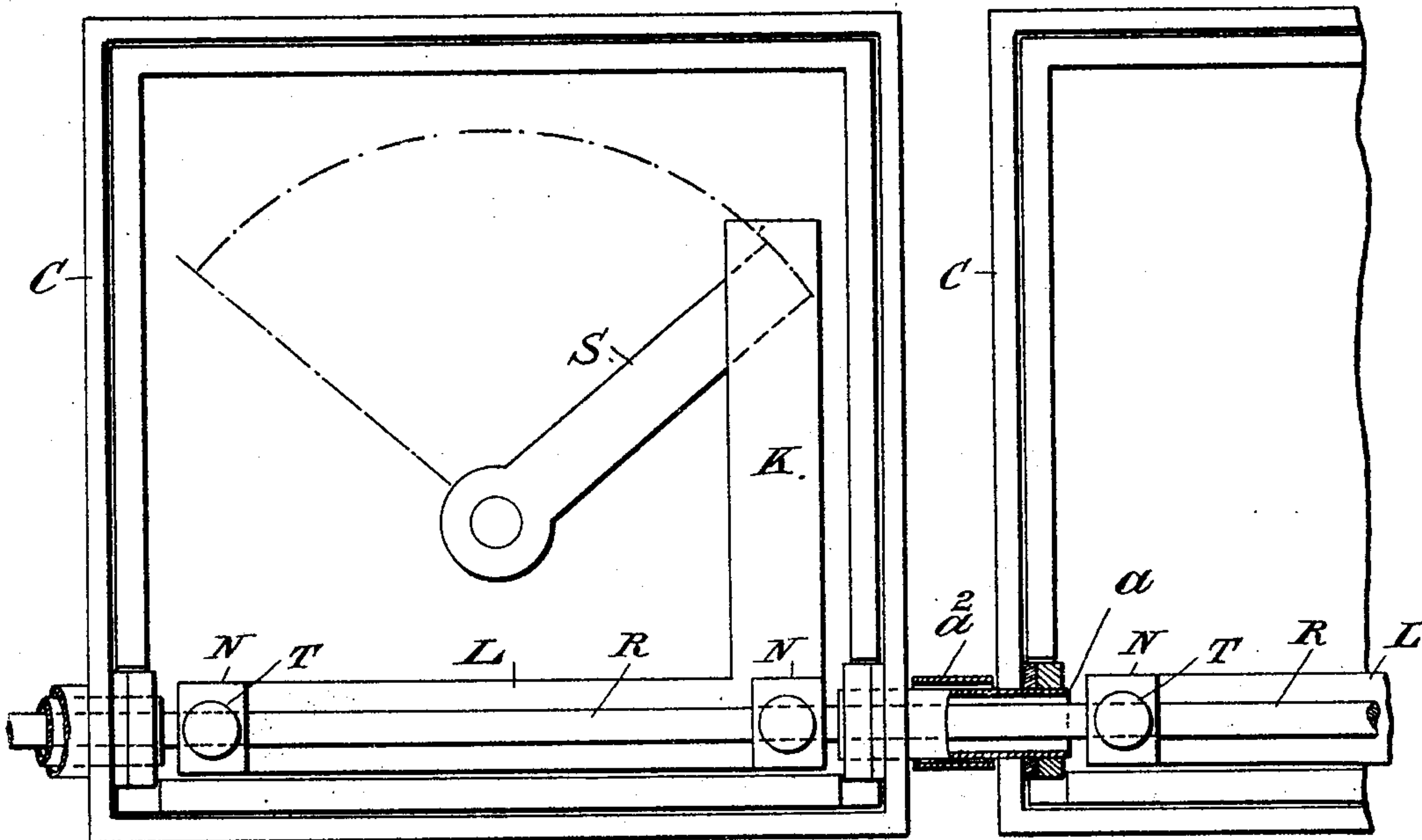
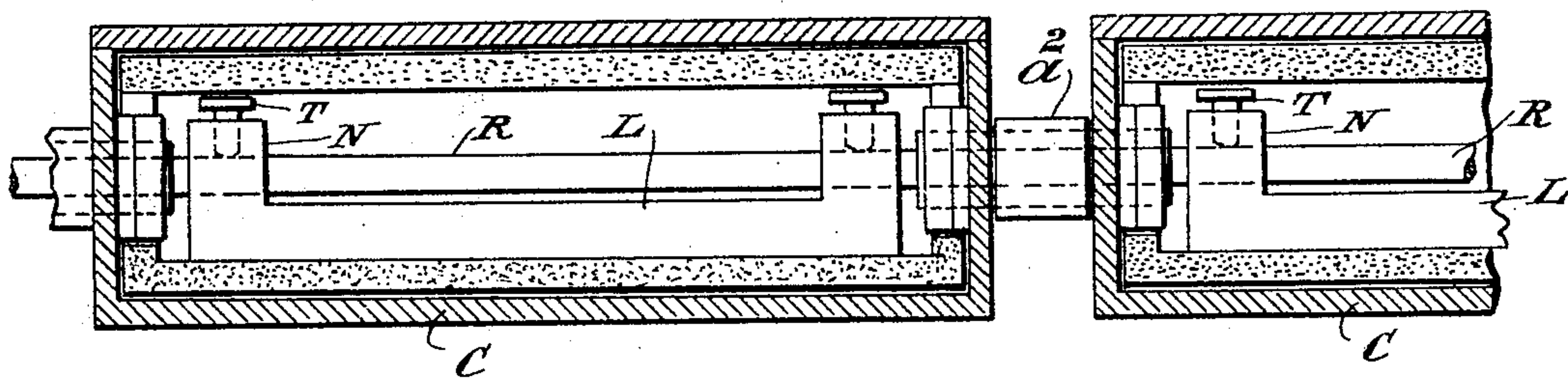


FIG. 6.



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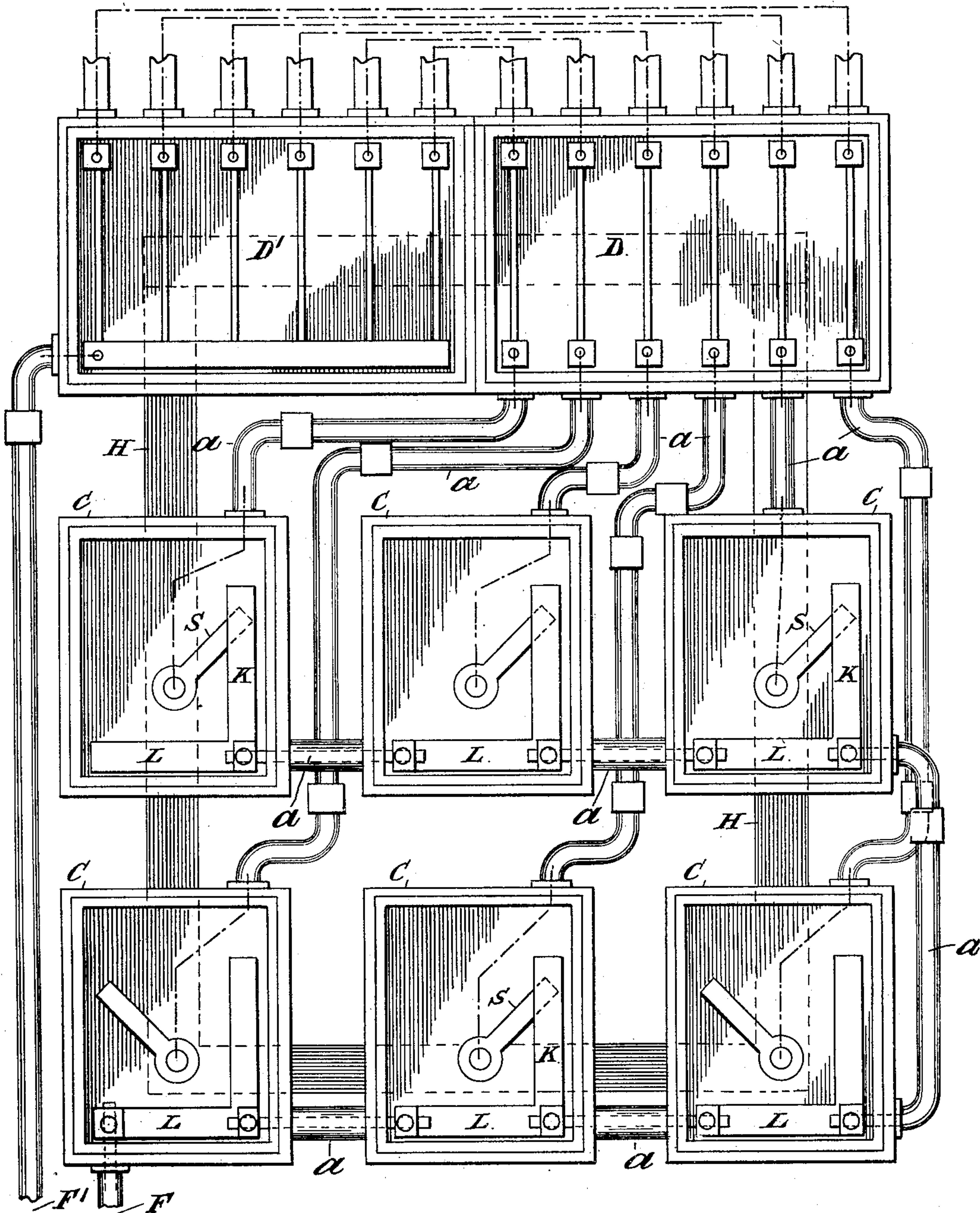
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FIG. 7.



WITNESSES

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UNITED STATES PATENT OFFICE.

CHARLES HORACE COX, OF LIVERPOOL, ENGLAND.

ELECTRICAL SWITCHBOARD.

SPECIFICATION forming part of Letters Patent No. 637,323, dated November 21, 1899.

Application filed April 29, 1899. Serial No. 715,013. (No model.)

To all whom it may concern:

Be it known that I, CHARLES HORACE COX, a subject of the Queen of Great Britain and Ireland, and a resident of 4 Hargreaves road, Sefton Park, Liverpool, England, have invented certain new and useful Improvements Relating to Electrical Switchboards, (for which I have applied for Letters Patent in Great Britain, No. 14,514, dated July 1, 1898, and No. 2,906, dated February 9, 1899,) of which the following is a specification.

This invention has for its object to so construct a switchboard that it will be practically incapable of causing fire to its surroundings, and the invention is especially applicable to switchboards employed in theatrical work and in places where very especial care must be taken for the prevention of fire.

In constructing a switchboard according to my invention I dispense with the usual slate base with its attendant rear connections and its uncovered switches.

My novel method of building a switchboard consists in forming it of a skeleton framework of metallic (and preferably iron) tubes and boxes, such tubes being attached to the boxes, so as to form a rigid structure. Within such boxes are placed the various appliances, such as main and branch circuit switches and fuses, which go to make up a switchboard, and within the tubes which connect and support these boxes are the cables, bars, or other electrical leads from one appliance to another.

Hitherto in the formation of a distributing-switchboard or association of a number of electrical circuit switches or fuses it has been the practice to supply current to such circuit switches or fuses by separate leads which branch off an "omnibus-bar"—namely, a copper bar of sufficient current capacity to supply all the switches of the series and which is fed by the main lead. Such an arrangement is open to objection, inasmuch that the bar occupies space and the connections of the switchboard are necessarily multiplied.

According to the present invention I dispense with the separate and distinct omnibus-bar above referred to, and I also so construct and connect the contact-pieces of a series of switches or fuses that such contact-pieces and their connections themselves form a substitute for or parts of or are equivalent

to an omnibus-bar—that is to say, an omnibus-bar is divided into sections and one section is placed in each switch or fuse box and is joined up with neighboring sections by suitable conductors.

In order that my invention may be clearly understood, attention is directed to the drawings hereto annexed.

Figure 1 is a front view of my improved metallic switchboard, and Fig. 2 is a side view thereof. Figs. 3 and 4 are details. Figs. 5 and 6 are a front view and cross-section showing my improved method of constituting a switch-contact, a part of my novel form of omnibus-bar. Fig. 7 is a front view of a six-way switchboard according to my invention, showing my novel method of arranging circuit-switches and their sectional omnibus-bar.

A A' are boxes which contain a double-pole main switch. B B' are boxes which contain double-pole main fuses. C are boxes which contain single-pole circuit-switches. D D' are boxes which contain double-pole circuit-fuses. Such boxes are preferably shallow rectangular metallic cases having removable lids or covers and a porcelain lining.

E is a tube, case, or box which contains an omnibus-bar which feeds the circuit-fuses.

F F' are the positive and negative main leads, respectively, and G G' are the positive and negative circuit-leads.

Connecting the various boxes A B C D and the tube E are short lengths of metal tubing a .

The course which the current takes through the switchboard in Fig. 1 is as follows: Entering at F, the current passes the main switch A and the fuse B and enters the bus-bar in E. From the bus-bar it passes to the circuit-fuses in D and from thence to the circuit-switches in C. From the circuit-switch arms in C the current passes out by the tubes G to the working circuit and returns by the tubes G' to the negative fuses in D', then to the fuse in B', the switch in A', to the tube F'.

The tubes a may be attached to the boxes in any suitable manner—as, for instance, by inserting the end of the tube a through drilled apertures in the side of the boxes and securing them by nuts a' , a rubber or other washer being placed between the nut and the box—and a ferrule a^2 acts as a distance-piece, as

shown in Fig. 3. It will, however, be apparent that different forms of tubes and different methods of fixing them may be used. Thus the ends of tubes *a* may bear right and left hand screw-threads and be screwed into tapped apertures in the boxes and be secured by nuts *a'*, as shown in Fig. 4, or any other suitable method of attaching a pipe to a box may be used. The tubes *a* perform two functions—namely, they form conduits for electrical leads between the various appliances of the board, and they also form an integral part of the switchboard—namely, by connecting and supporting the cases or boxes of the various appliances of the board they form part of the fabric of the board. The fabric of tubes and boxes thus formed may be attached to a metallic frame *H*, which latter is secured to a wall or other surface, or the fabric may be secured directly on such surface.

The switches, fuses, bus-bars, or other appliances of the switchboard may be according to any suitable pattern.

M is an ammeter, and *V* is a voltmeter.

The operating-spindle of each switch passes through an aperture in the cover of the switch-box, and such aperture is only large enough to admit the spindle. In some instances the spindle will pass through a stuffing-box or gland on the cover of the switch-box. In most instances the operating-spindle aperture will be the only one, apart from screw-holes, made in the lid of the switch-box. The conductors may be insulated from the tubes through which they pass by clothing the conductor or by coating the inner surface of the tube with any suitable material, or both these methods may be employed, or an air-space between the conductor and tube may perform the function.

The switch indicated in Figs. 1, 5, 6, and 7 may be of ordinary type and does not require description, it being understood that the switch-tongue *S* makes contact when in the "on" position with the contact *K*. This contact *K*, it will be seen, forms a part of what I may term a "contact-bar" *L*. The bar *L* is disposed across the lower end of the switch-box, and each of its ends is provided with a terminal or provision for the reception of a cable, rod, or other conductor, by which the bar is placed in electrical communication with similar contact-bars in adjacent switch-boxes. Thus the contact-bar *L* in each one of a group of switch-boxes is in series with the contact-bars of the entire group. Consequently when a connection is made between each series of bars and a main conductor the bars *L* and their connecting cables or rods become equivalent to an omnibus-bar. The current capacity of each of the bars *L* and their connections must be equal to or exceed the requirements of all the switches in the group.

The lugs *N* on the bar *L* form sockets for the conductor, which couples the bar to adjacent bars. Such conductor may be a con-

tinuous rod *R*, common to all the bars, as shown in Figs. 5 and 6, or the rod *R* may be divided into pieces just long enough to join two adjacent bars *L*. The conductors are secured to the bars *L* by the terminal screws *T*.

Fig. 7 illustrates a distributing-switchboard containing a group of six circuit-switches, which are contained in boxes *C* and arranged in two rows, one above the other. The main conductor *F* is led to one end box on the lower row and is there joined up to the contact-bar *L* of said box. Tubes *a*, which connect and support the boxes *C*, form conduits for cables, bars, or other conductors, which join up in series the bars *L* of all the switch-boxes *C*. Tubes *a* convey the conductors from the switch-boxes *C* to the positive fuses contained in a metallic case *D*, from whence lead the various circuits. The negative fuses are contained in the case *D'*. The positive and negative fuses may be of any suitable pattern. *F'* is the negative main lead.

The course which the current takes through the switchboard (shown in Fig. 7) is as follows: Entering at *F*, it passes to the bars *L* in the boxes *C*. From the contacts *K* it passes to the switches *S*, and from thence to the fuses in *D*, returning from the working circuit to the fuses in *D'*, and thence to the tube *F'*.

It will thus be seen that the main object of the present invention—namely, the safeguarding of a switchboard and its surrounding from fire caused by sparking, arcing, short-circuiting, the blowing of a fuse, or other circumstance—is accomplished by isolating and incasing the various appliances of the board and their connecting-leads within metallic cases or tubes. The switchboard is also rendered dust-proof and damp-proof and is practically indestructible.

I am aware that iron pipes have heretofore been used as conduits for conveying electrical leads to and from switchboards; but so far as I am aware it has never been proposed to construct switchboards wholly of metal pipes and boxes or switchboards of which metal pipes form an integral part of the fabric. Nor has it heretofore been proposed to feed the contact-pieces of a series of switches or fuses of a switchboard from a main lead in series instead of in parallel.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A fabric comprising a series of metallic cases united by a series of metallic tubes the whole lying in one plane and forming an electrical switchboard, said cases containing the appliances of the board, and said tubes containing the electrical conductors by which such appliances are electrically connected, the whole being mounted on a metallic framework and adapted to lie close against a flat surface, substantially as described.

2. The combination in a switchboard, of a

series of metallic cases which contain the appliances of the board, a bus-bar divided into sections each disposed within the case of the appliance which it feeds and having formed
5 upon it a contact-piece for said appliance, such sections being electrically connected, and tubes which contain the electrical conductors by which such appliances and sectional bus-bar are electrically connected and

which unite said cases one with the other; 10 substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

CHARLES HORACE COX.

Witnesses:

JAMES A. COUBROUGH,
JAMES W. MEIKLE.