

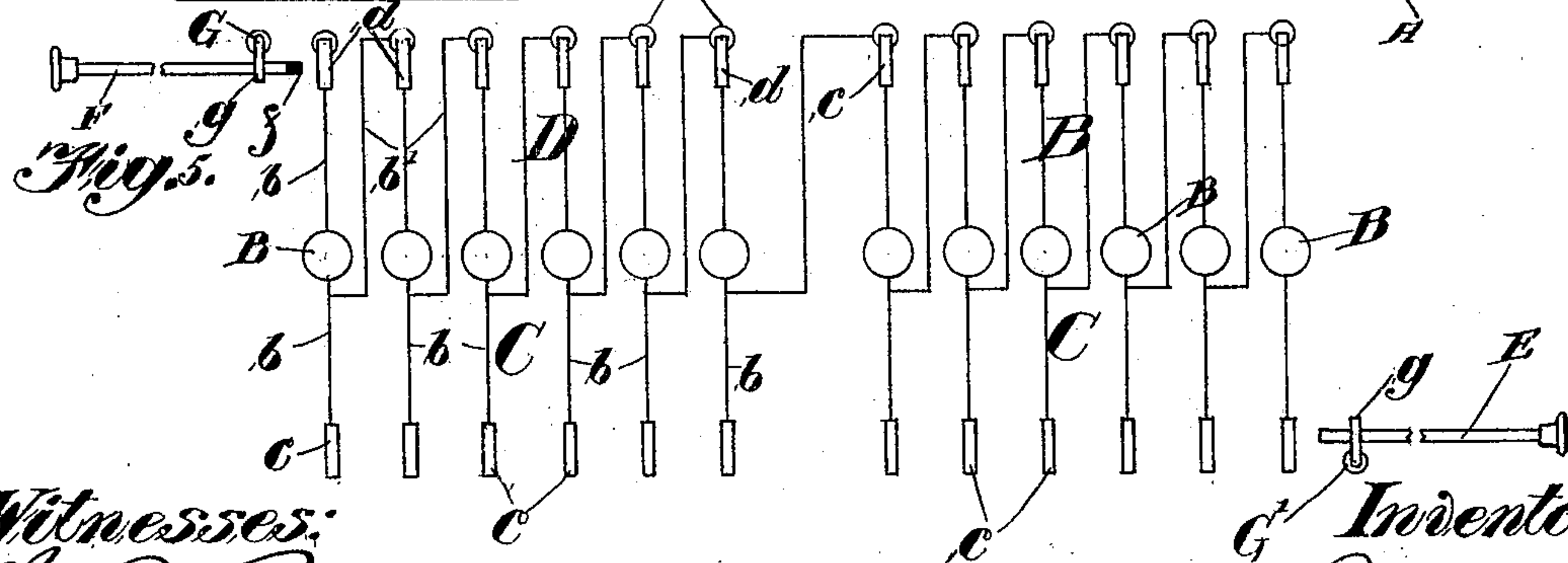
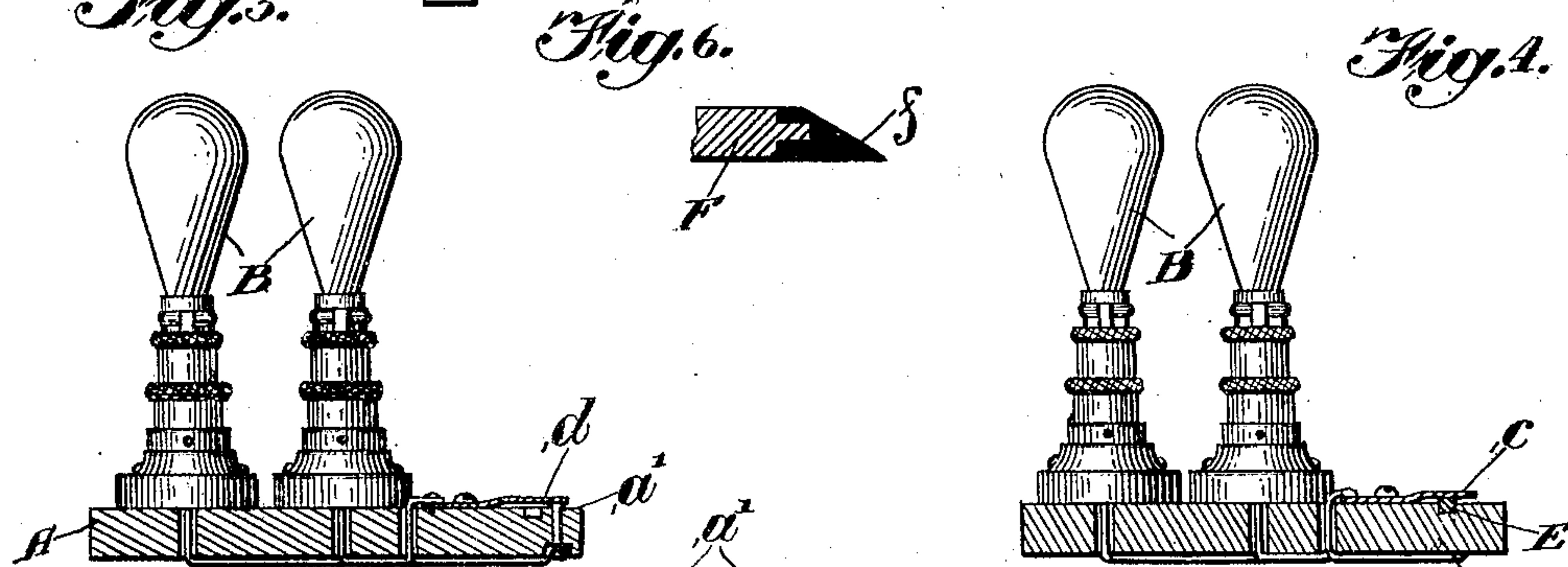
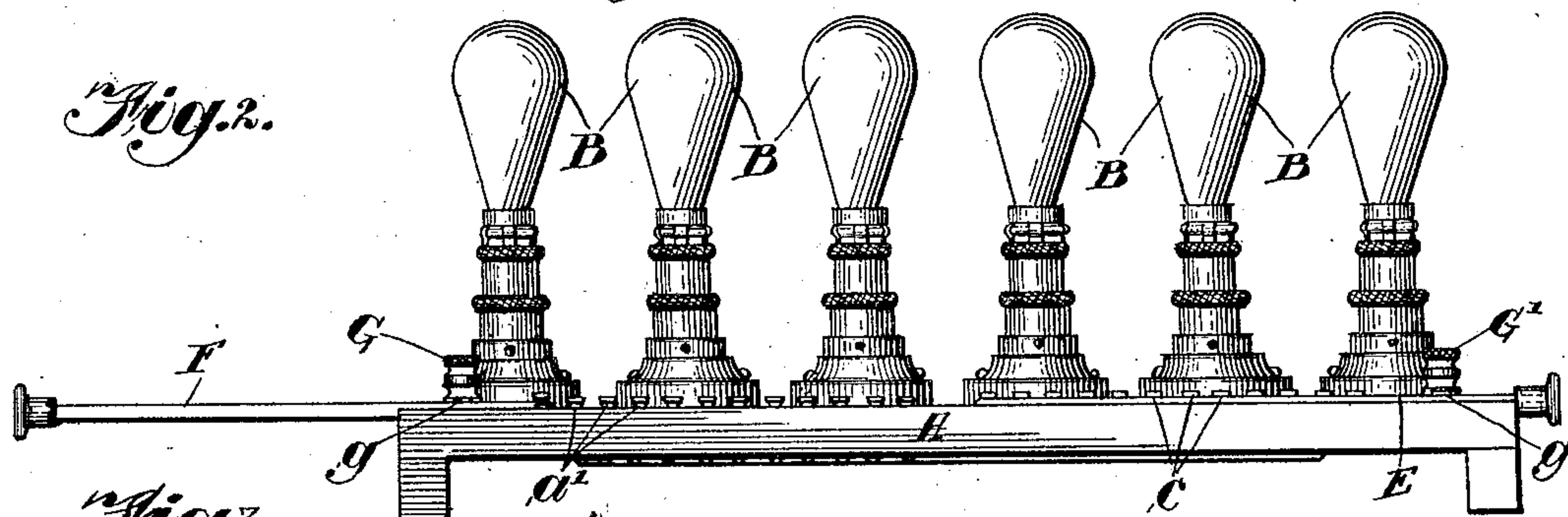
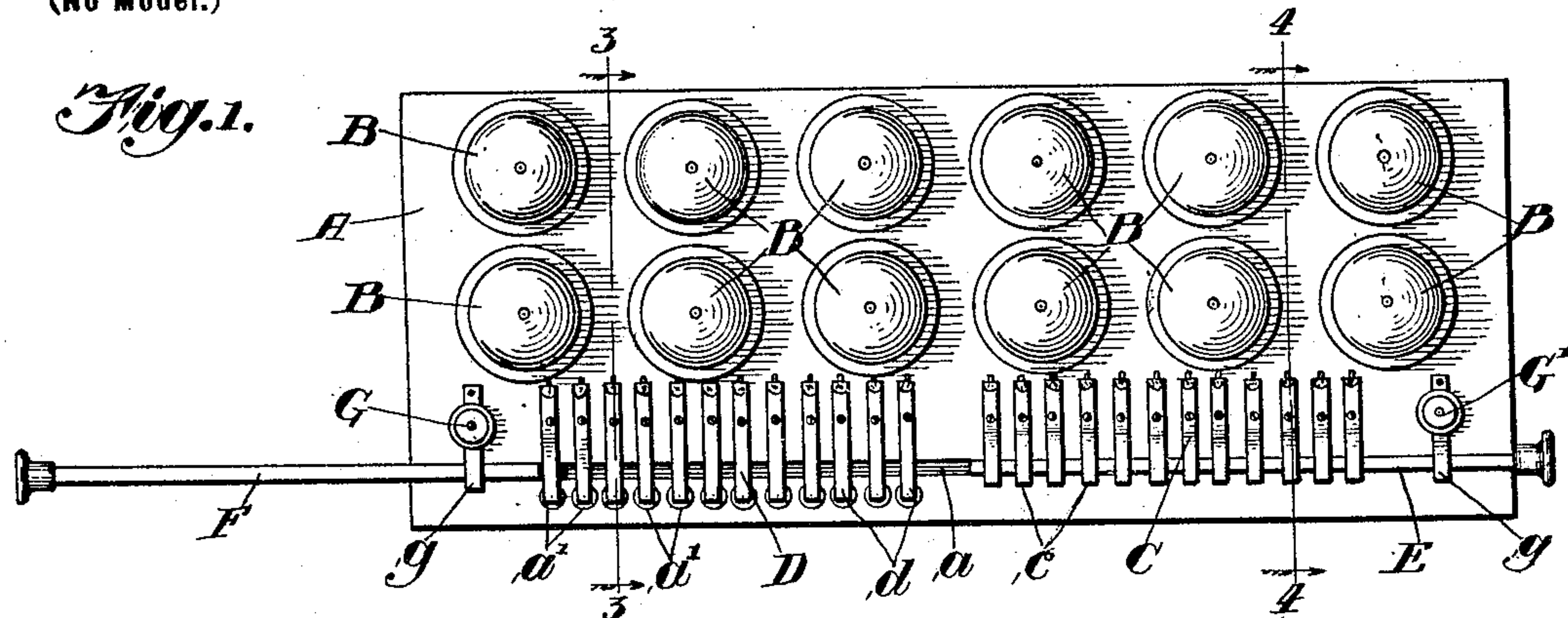
No. 698,136.

Patented Apr. 22, 1902.

A. B. PORTER.
SERIES MULTIPLE SWITCH.

(Application filed Feb. 24, 1902.)

(No Model.)



Witnesses:

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UNITED STATES PATENT OFFICE.

ALBERT B. PORTER, OF EVANSTON, ILLINOIS.

SERIES-MULTIPLE SWITCH.

SPECIFICATION forming part of Letters Patent No. 698,136, dated April 22, 1902.

Application filed February 24, 1902. Serial No. 95,168. (No model.)

To all whom it may concern:

Be it known that I, ALBERT B. PORTER, a citizen of the United States, residing in Evanston, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Series-Multiple Switches, of which the following is a specification.

This invention relates to improvements in series-multiple switches for variously connecting up the several resistances, capacities, inductances, or the like of electrical apparatus in the nature of rheostats or capacity devices; and it has for its object to provide a switch device of this character more particularly suited for laboratory and experimental work, although capable of being advantageously employed in other connections as well.

The improvement comprehends in its construction a plurality of connections for separate resistances, such as ordinary incandescent lamps or separate capacities, such as condensers and switch devices, by which all or any portion of such resistance or capacity connections may be connected up either in series or in parallel, as desired.

The invention consists in the matters herein set forth, and particularly pointed out in the appended claims, and will be fully understood from the following description of the apparatus shown in the accompanying drawings, which illustrate the invention as embodied in a variable-resistance device or rheostat.

In said drawings, Figure 1 is a top plan view of a rheostat embodying my improvements in one form. Fig. 2 is a front elevation thereof. Fig. 3 is a transverse section taken on line 3 3 of Fig. 1. Fig. 4 is a similar view taken on line 4 4 of Fig. 1. Fig. 5 is a diagrammatic view showing the manner in which the rheostat is wired. Fig. 6 is a sectional detail of the insulated end of one of the switch-bars.

In said drawings, A designates a base plate or board, to which are fixed the several socket connections *b* for the individual resistances B. Conveniently, and as herein illustrated, these resistances are ordinary incandescent lamps, and twelve such lamps are in this instance provided. Mounted on the board at one side of the bank of lamps are two sets

of switches C and D, consisting, as herein shown, of spring-metal fingers *c* and *d*, of which each finger is rigidly secured to the board at one end and left unattached at the other. The fixed ends of all the spring-fingers are wired to the lamps in a manner presently to be explained, while the free ends of the fingers *d*, constituting the set of switches D, normally rest upon metallic contacts *a'*, which are also wired to the lamps, as hereinafter described.

The base plate or board A is grooved longitudinally along a line *a*, located directly beneath the spring-fingers and extending transversely thereof, and within this groove are mounted two independent switch-bars E and F, which are adapted to slide beneath and make connection with the fingers of the two sets of switches C and D, respectively. Adjacent to these rods and near opposite ends of the boards are located binding-posts G and G', and from each of these binding-posts an additional spring-finger *g* projects forwardly over the groove *a*, so as to tightly engage the subjacent switch-bars E and F. In the operation of the device connection will be made between these binding-posts and the terminals of the circuit to be controlled or tested, and when both of the switch-bars E and F are thrust in far enough to engage with any of the spring switch-fingers the circuit will then be completed from one circuit-terminal and binding-post through its spring-finger *g* and adjacent switch-bar to the switches of one set, thence through the lamps or part of them (according to the distance the bars are thrust in) to the switches of the other set, and through the other switch bar and finger *g* to the other binding-post and circuit-terminal.

The manner of wiring the apparatus is shown diagrammatically in Fig. 5. Each separate resistance or lamp B is put in a bridge *b* between one of the switch-fingers *c* of set C and one of the fingers *d* of set D—that is to say, the twenty-four switches are divided into twelve pairs, across each of which one of the separate resistances or lamps B is bridged, each pair of switches consisting on one of the switch-fingers of set C and one of set D. A shunt or leg B' furthermore leads from the switch-finger *c* of each lamp to the metallic

contact a' , that is normally engaged by the switch-finger d of the next lamp. This completes the wiring and constitutes the whole of the necessary connections. Now when the switch-bar E is pushed in far enough to make contact with the first switch-finger of set C and the switch-bar F is pushed in far enough to make contact with the first switch-finger of set D the circuit will be completed through all of the lamps in series; but the pushing in thereafter of either bar to engage the succeeding switch-fingers in succession will cut out the lamps one by one until but a single lamp remains in the circuit, it being understood that the pushing in of the bar F beneath each switch-finger d will in turn lift the latter and break connection between it and its subjacent contact a' . Then with one bar in if the other be pushed in to engage its adjacent switch-fingers in succession connection through the lamps will be restored one by one until the whole twelve lamps are again in circuit, but in parallel instead of in series. The formation of a short circuit between the bars E and F in case the bar E is first thrust in and then followed by a thrusting in of the bar F is prevented by making the tip f of the latter of insulating material, so that the lifting of each spring-finger d clear of its metallic contact a' will be insured before any electrical connection is made between the bar and the finger.

By manipulating the switch-bars in the manner described the resistance may be varied from that which obtains when all of the lamps are in parallel, amounting to one-twelfth of the resistance of a single lamp, to that which obtains when all of the lamps are in series, amounting to twelve times the resistance of a single lamp, so that the ultimate limit of variation may be said to be from one to one hundred and forty-four. The same limits of variation will also obtain with capacities or inductances substituted for the resistances B, and obviously such substitution will not require any alteration whatever in the construction of the switch itself, although it will be understood that various changes may be made therein without involving any departure from the spirit of the invention claimed.

I claim as my invention—

1. A series-multiple switch comprising a plurality of connections separately bridged between pairs of switch members, the corresponding members of the several pairs being arranged in sets, and a movable switch member for each set arranged to be connected with a circuit-terminal, said movable members constituting means for connecting up any desired number of said connections either in series or multiple as desired, substantially as described.

2. A series-multiple switch comprising a plurality of connections separately bridged between pairs of switch-fingers, the corresponding fingers of the several pairs being arranged in sets, contacts upon which the switch-fingers of one set normally rest, the contact for each finger being connected in a shunt to the switch-finger of the opposite set and next succeeding pair, and movable switch members for each set arranged for connection with the circuit-terminals and movable across the switch-fingers to make contact therewith and open the shunt-circuits, substantially as described.

3. A series-multiple switch comprising a plurality of separate connections b , a corresponding number of fingers c forming one set of switches, a corresponding number of fingers d forming another set of switches, each connection b being bridged across one pair of said fingers c and d , a contact a' for each of the fingers d normally engaged thereby, shunts connecting the contacts a' with one of the fingers c , and switch-bars E and F connected with the circuit-terminals and sliding across the respective sets of fingers to make successive contact with the several fingers thereof, the engagement of the bar F with each spring-finger d serving to separate the finger from its contact a' , substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two subscribing witnesses, this 17th day of February, A. D. 1902.

ALBERT B. PORTER.

Witnesses:

HENRY W. CARTER,
K. A. COSTELLO.