

(No Model.)

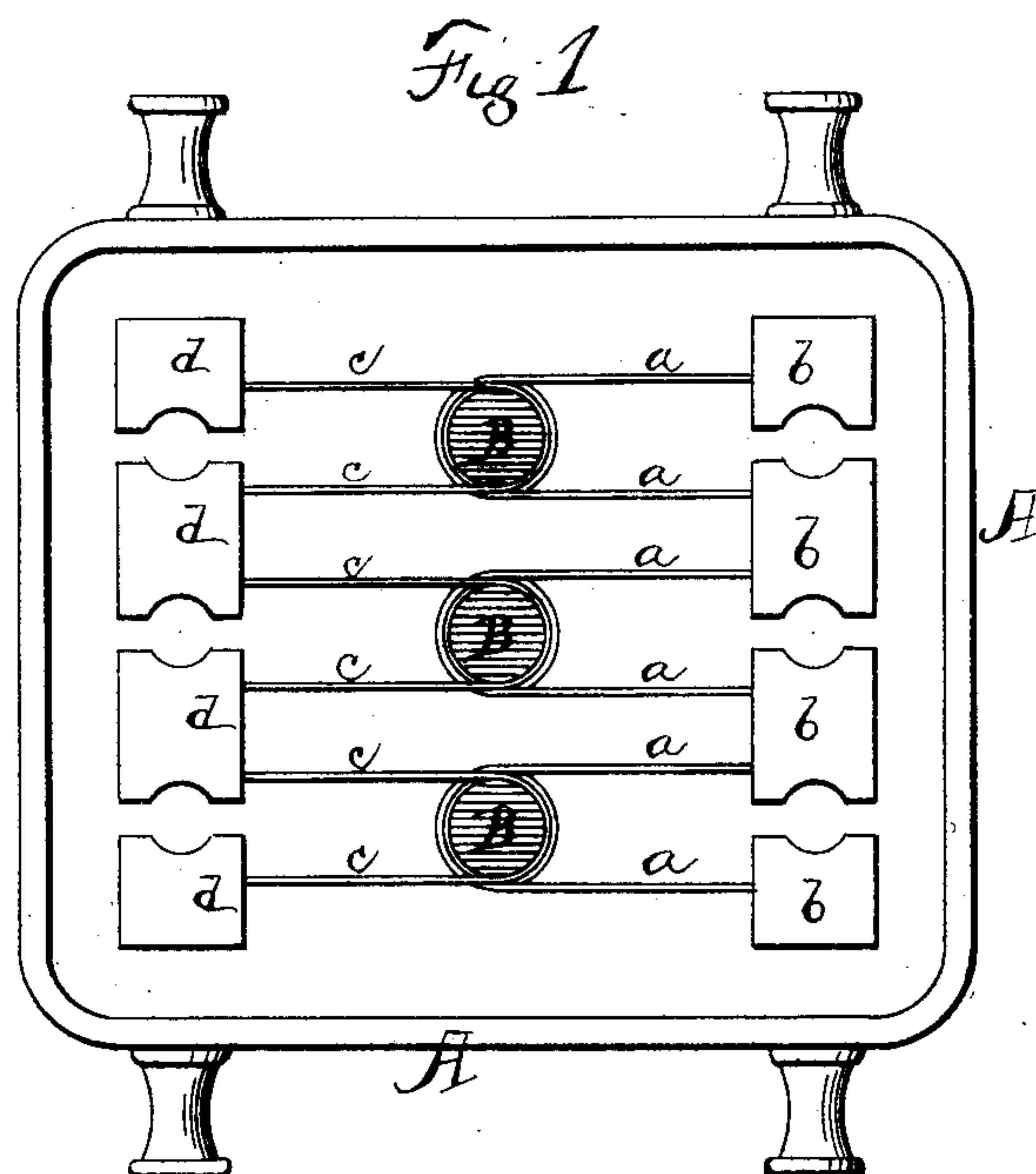
2 Sheets—Sheet 1.

M. BUELL.

RHEOSTAT FOR MULTIPLE TELEGRAPHY.

No. 256,458.

Patented Apr. 18, 1882.



Witnesses:

D. H. Parsons.

J. R. Drake.

Madison Buell,

Inventor, by

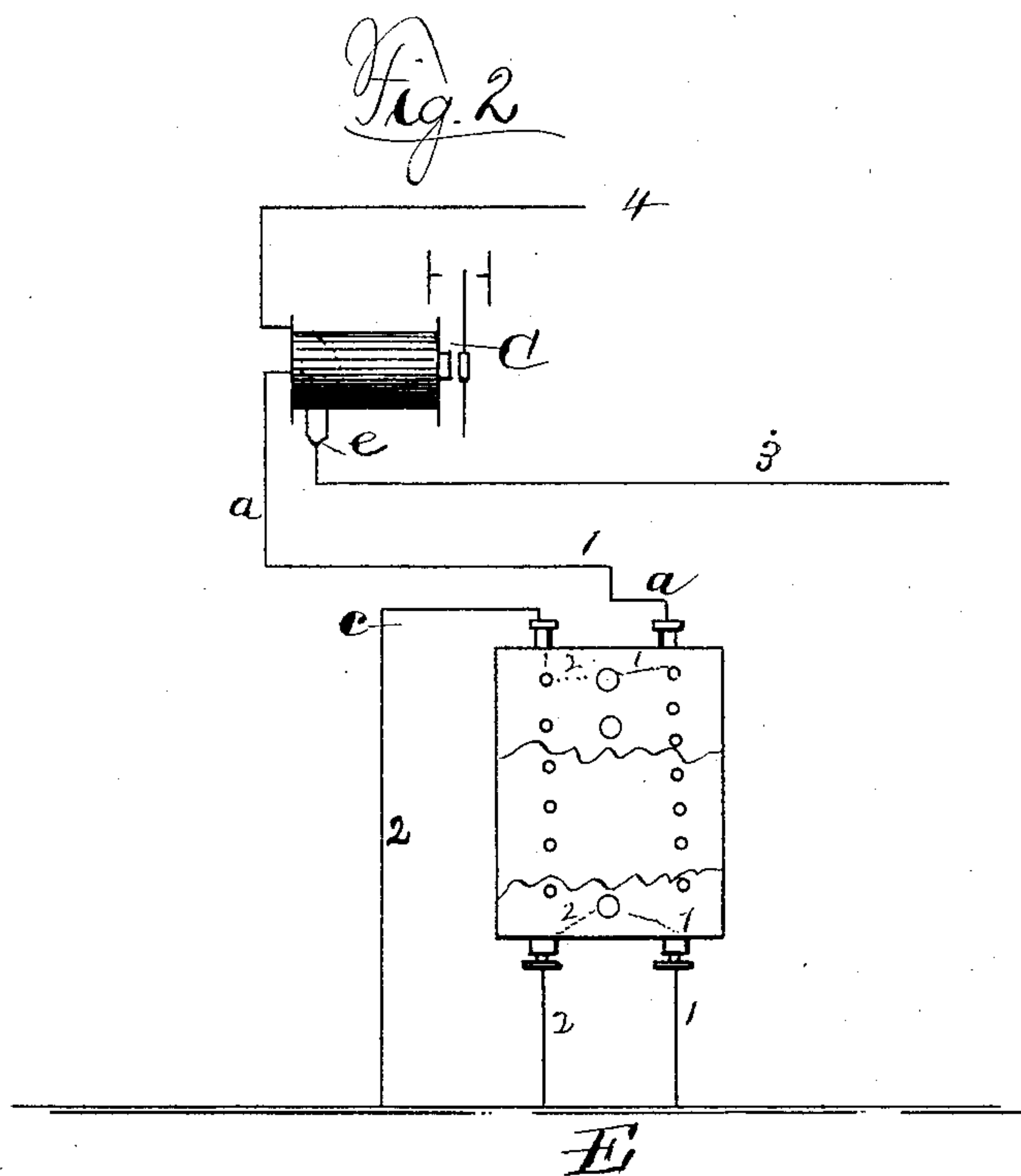
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# UNITED STATES PATENT OFFICE.

MADISON BUELL, OF BUFFALO, NEW YORK.

## RHEOSTAT FOR MULTIPLE TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 256,458, dated April 18, 1882.

Application filed January 23, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, MADISON BUELL, a citizen of the United States, residing at Buffalo, county of Erie, and State of New York, have made certain Improvements in Rheostats for Duplex or Multiplex Telegraphy, of which the following is a specification.

The object of this invention is to improve the manner of regulating or adjusting the artificial lines or circuits in systems of duplex or multiplex telegraphy; and the invention consists in introducing an insulated and adjustable earth-circuit side by side of and throughout the entire length of the artificial lines in the rheostat.

In all systems of duplex and multiplex telegraphy a differential arrangement of the transmitting and receiving instruments is employed, and the accuracy of the system depends upon an artificial circuit having exactly the same electrical resistance and capacity as the real line.

In my invention I adjust for the variations of the insulation of the main line by merely adjusting the insulated artificial resistances of the earth-circuit until it equalizes the static condition of the main line, thereby preventing the false signals which occur by what are termed "charge" and "discharge" currents.

To this end my invention consists more especially in a new and improved construction of the rheostat, in order that it may not only bear a proper proportion to the main line, so far as its adjustable resistances are concerned, but also an adjustable and proper proportional electro-static capacity, as fully hereinafter explained.

In the drawings, Figure 1, is represented a top plan of a rheostat, the box cut off longitudinally, and without the cover being shown. Fig. 2 is a plan showing the invention in circuit.

A represents the box of the rheostat; B B B, three spools, this number being sufficient to show my invention.

As is well known, the rheostat, as usually constructed and used in connection with duplex and multiplex telegraphy, consists of a series of spools, B, of one wire, having resistances ranging from one ohm up to ten thousand or

more ohms, so as to give any resistance of a whole number of ohms up to the desired amount. The terminals of each of the spools are two pieces of brass fixed on top of the box containing the spools, with a space between each piece for the insertion of conical brass plugs, and which serve to throw the spools in and out of circuit. This construction is that in common use.

My improvement consists in so constructing a rheostat that each and every spool shall have two wires side by side, instead of one. The ends of the first wire, *a*, of every spool are brought to their proper terminal pieces *b* on the right-hand side of the top of the box. The second wire, *c*, of every spool is brought to its proper terminal piece *d* on the left-hand side of the top of the box, as shown. By this arrangement the second wire, *c*, or inductive earth-circuit can be adjusted in the same manner as the first wire, *a*, or usual artificial lines in the same spool.

In Fig. 2 the rheostat as thus constructed is connected in duplex telegraphy as follows: The currents formed by each contact of the transmitter (not shown, as any will do) by the line 3 are divided into two parts, as shown at *e*, one portion going through a relay, C, to the main line 4, and operating the receiving-instrument at the distant station, the other portion passing through relay C to wire *a* (No. 1) of spools of rheostat, thence to earth E. The wire (No. 2) *c* is also connected to earth.

In using the improved rheostat as thus constructed the first wire, *a*, of the spools is used for the artificial line or resistance in precisely the same manner as is usual. Both terminals of the second wire, *c*, of the spools are connected with the earth, and in consequence of such connection the artificial line *a* or resistances are brought into close proximity through any portion or throughout its entire length, and thereby by proper adjustment an electro-static condition is, so far as practical results are concerned, established in it—the artificial line. By this new, and I believe novel, arrangement in the rheostat of an adjustable earth-circuit alongside of or in close proximity to that of the artificial line *a*, or any portion thereof, as stated, the latter line *a* can be made to have an in-



ductive capacity proportional to that of the main line, and when the proper adjustments are made upon both wires *a* and *c* of the rheostat the charge and discharge currents take place equally upon the main and artificial lines and transmission of false signals is entirely obviated. All changes in the main-line insulation are compensated for by adjusting the resistances of the earth-circuit—that is to say, suppose the resistance of the artificial line *a* to be six thousand ohms corresponding to that of the main line, all insulation variations can be balanced by adjusting the resistance of the earth-circuit *c* anywhere from one ohm up to six thousand ohms, or more, if necessary.

I claim—

1. An adjustable artificial line or circuit which consists of the adjustable artificial line-circuit *a* and an adjustable artificial earth-cir-

cuit, *c*, both combined together in one or more spools, substantially as and for the purpose hereinbefore set forth.

2. A rheostat composed of a series of spools of adjustable resistances, each separate spool having two wires, *a c*, thereon, side by side, one representing the artificial line *a*, the other the earth-line *c*, and insulated from each other, and arranged and operating substantially in the manner and for the purpose herein specified.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

MADISON BUELL.

Witnesses:

J. R. DRAKE,  
T. H. PARSONS.