

C. J. REED.

RHEOSTAT AND RESISTANCE ELEMENT THEREFOR.

APPLICATION FILED JUNE 3, 1902.

2 SHEETS—SHEET 1.

NO MODEL.

Fig. 1.

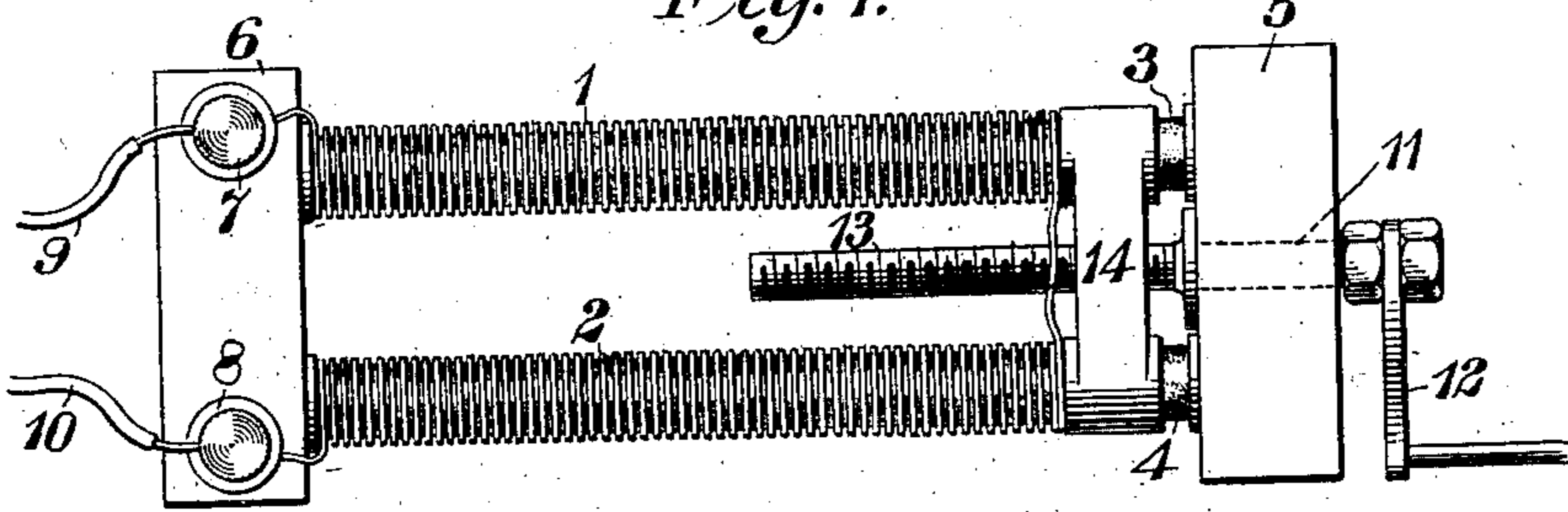


Fig. 2.

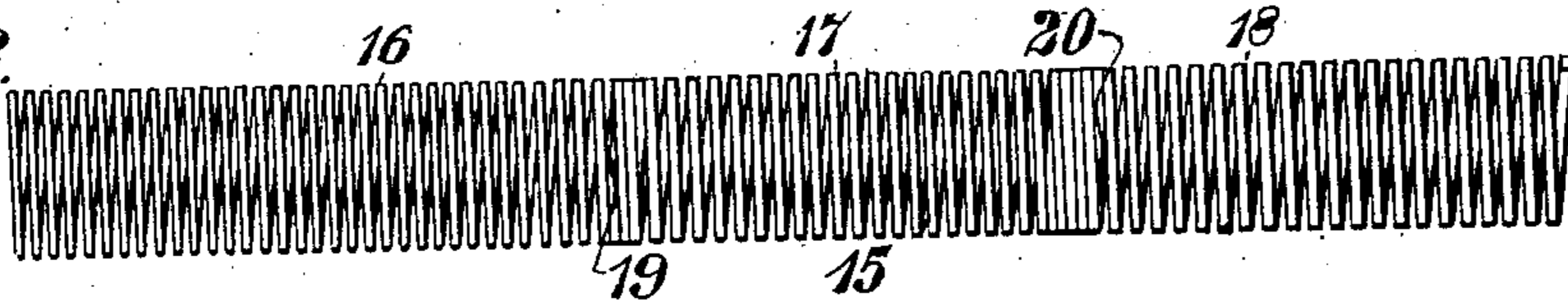


Fig. 3.

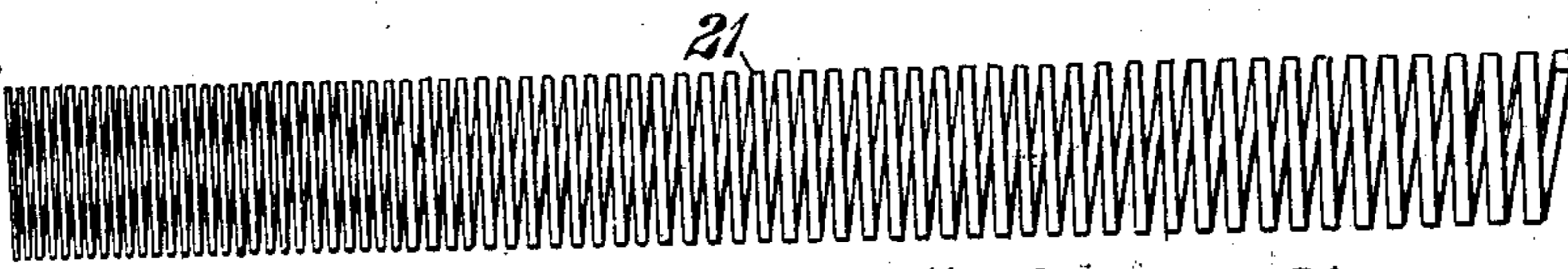
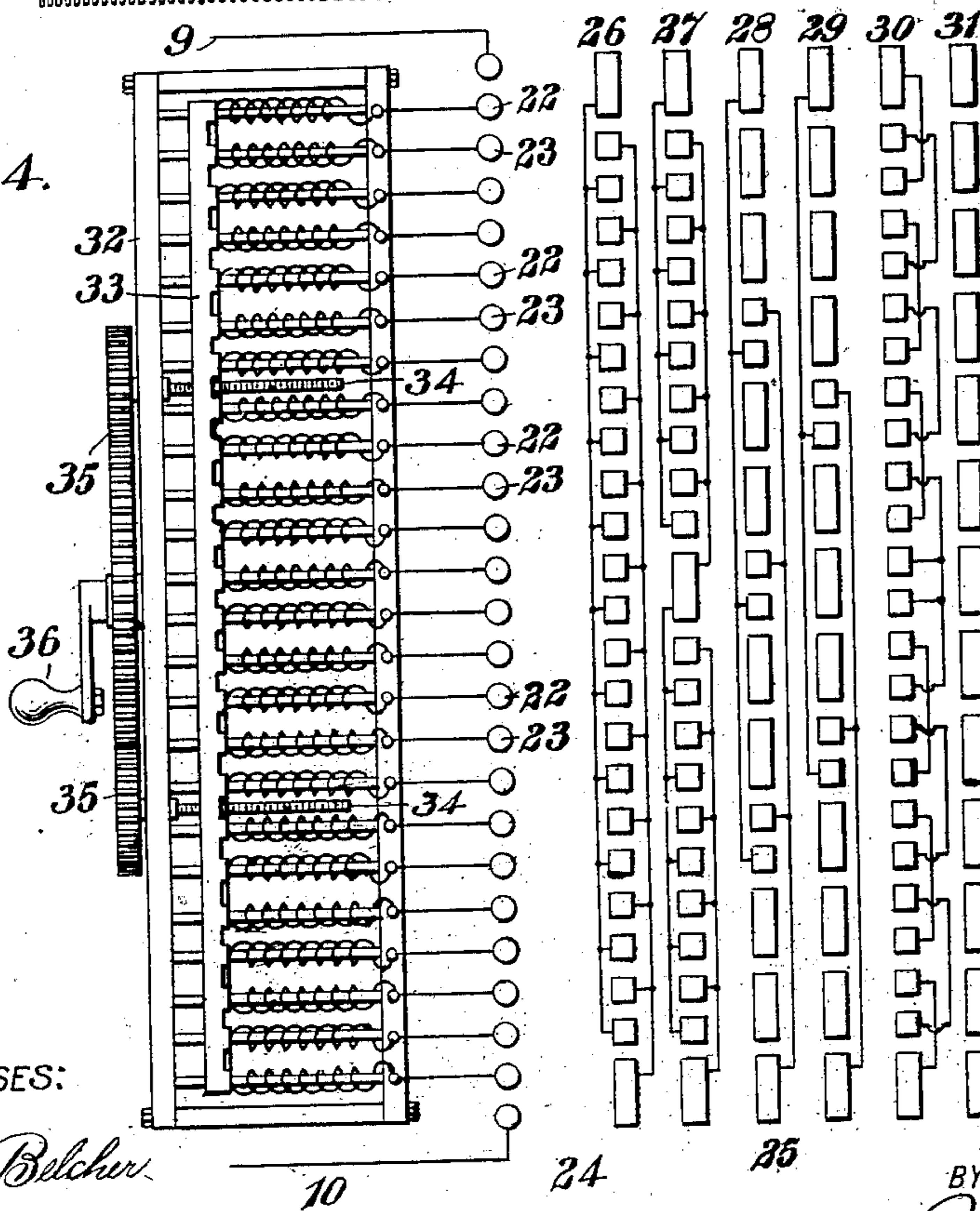


Fig. 4.



WITNESSES:

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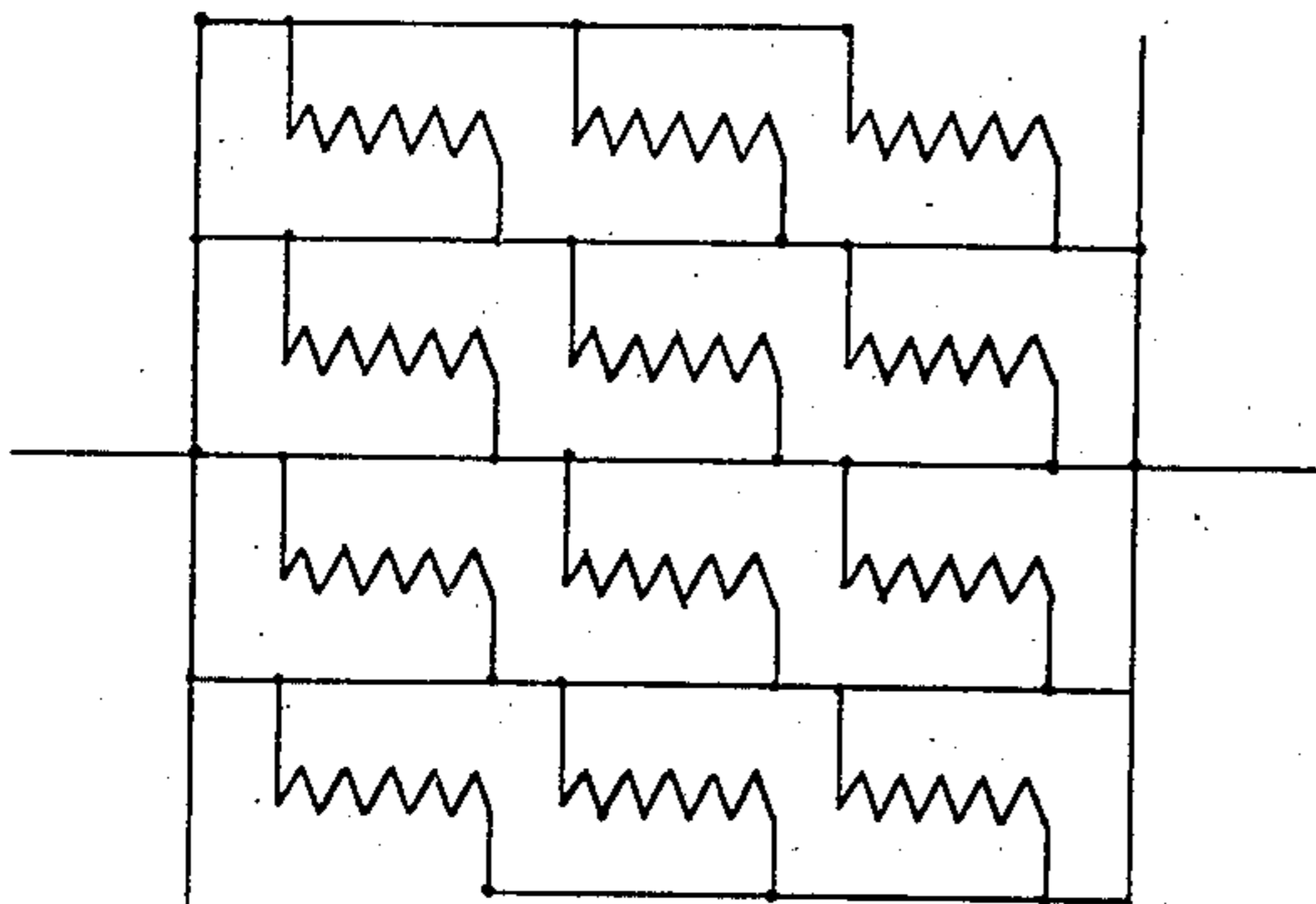
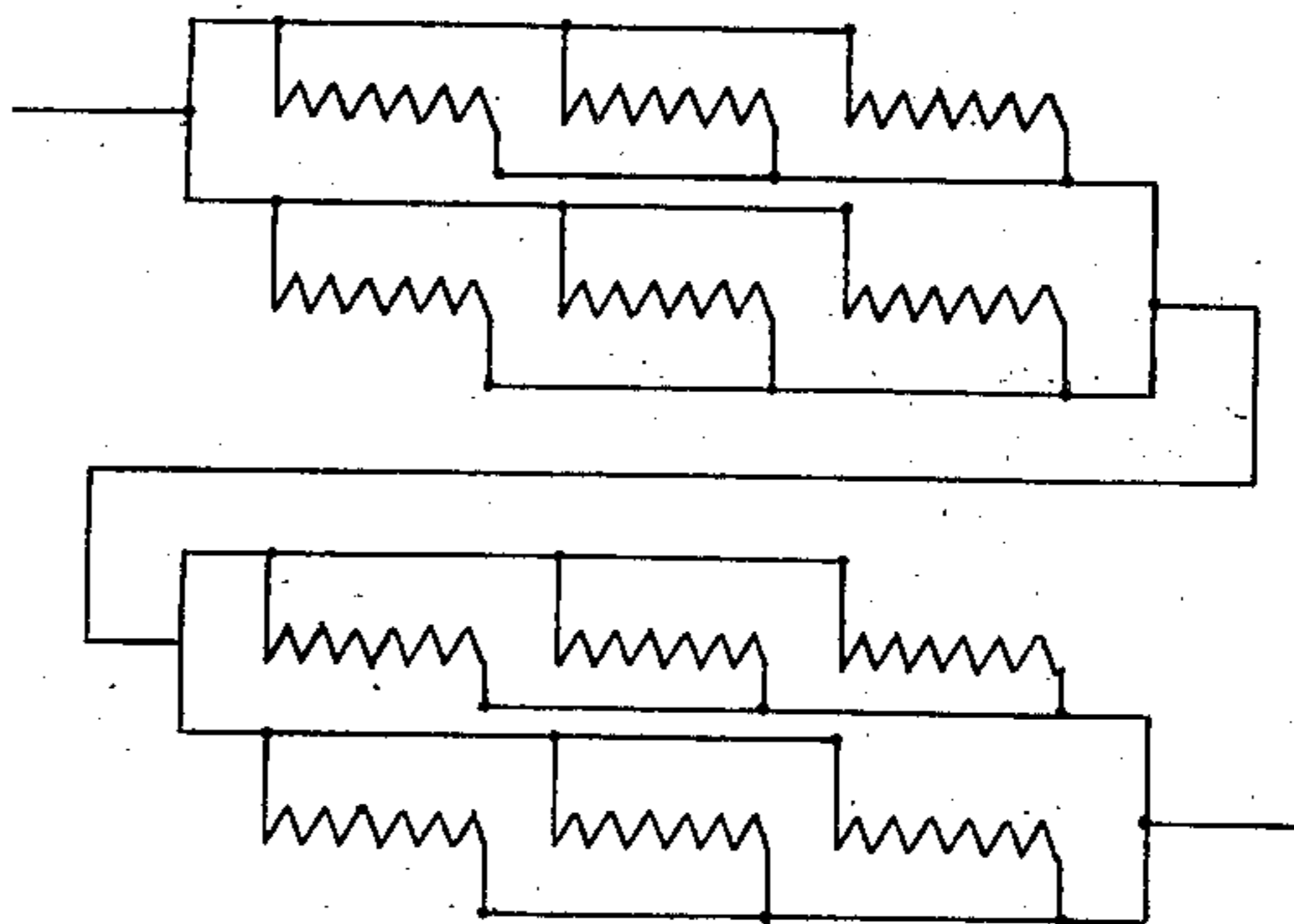
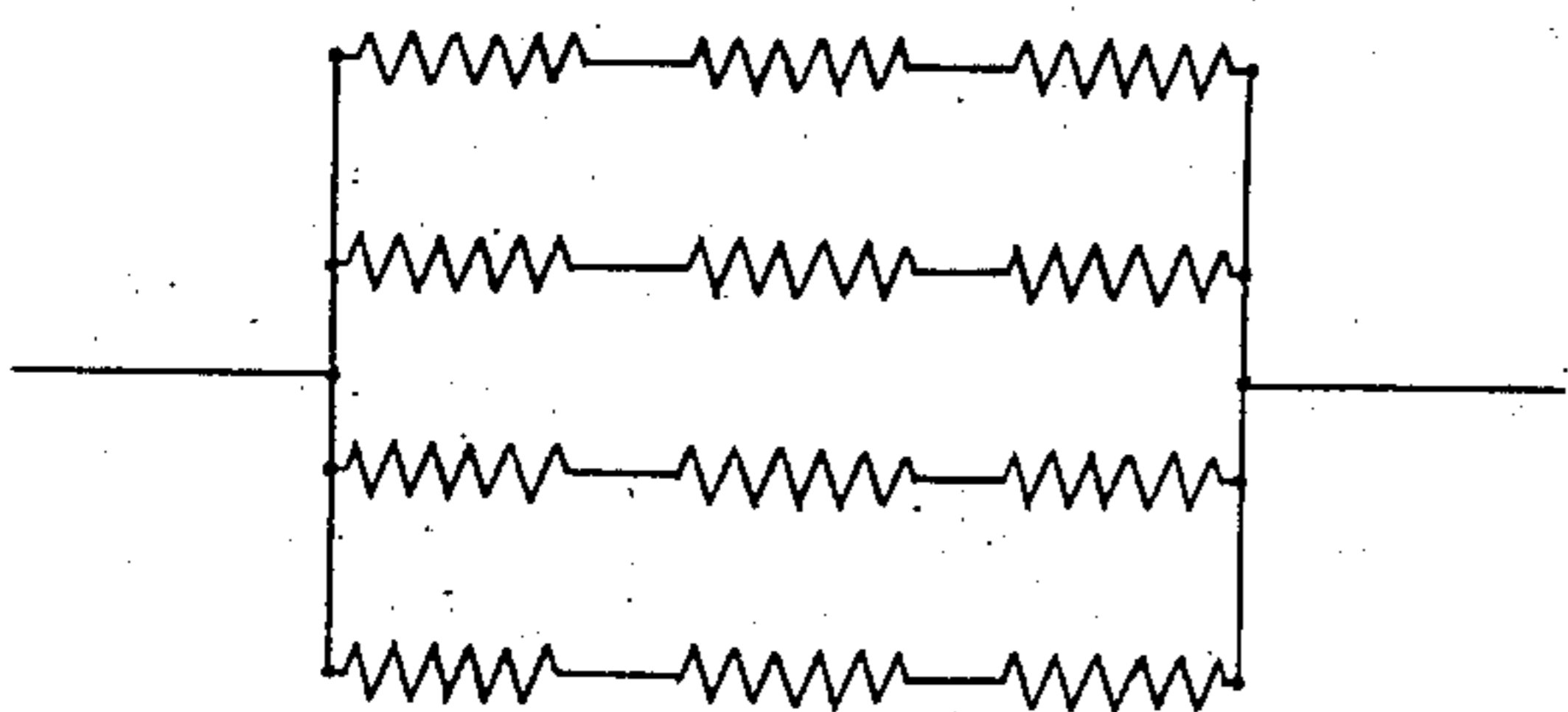
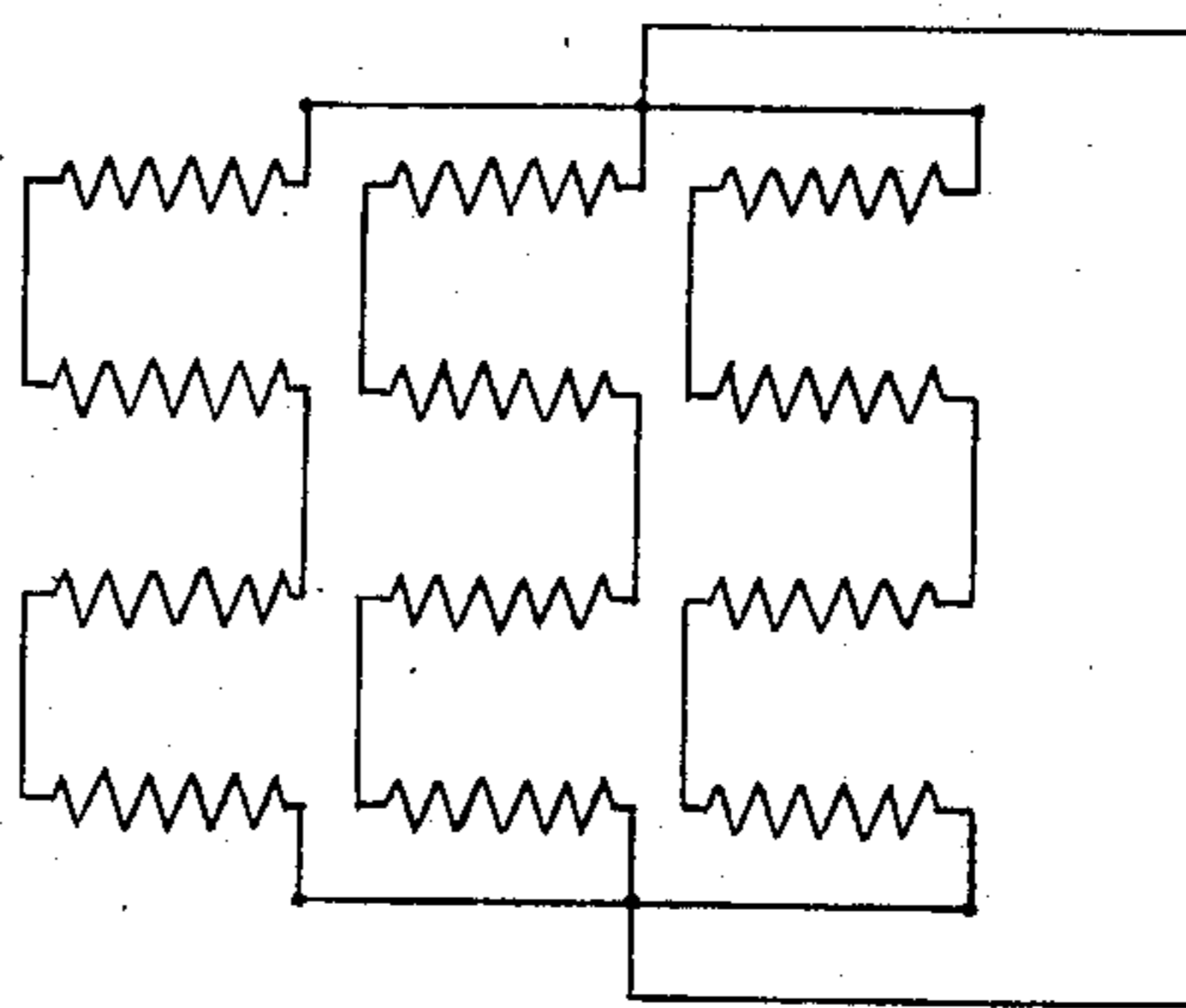
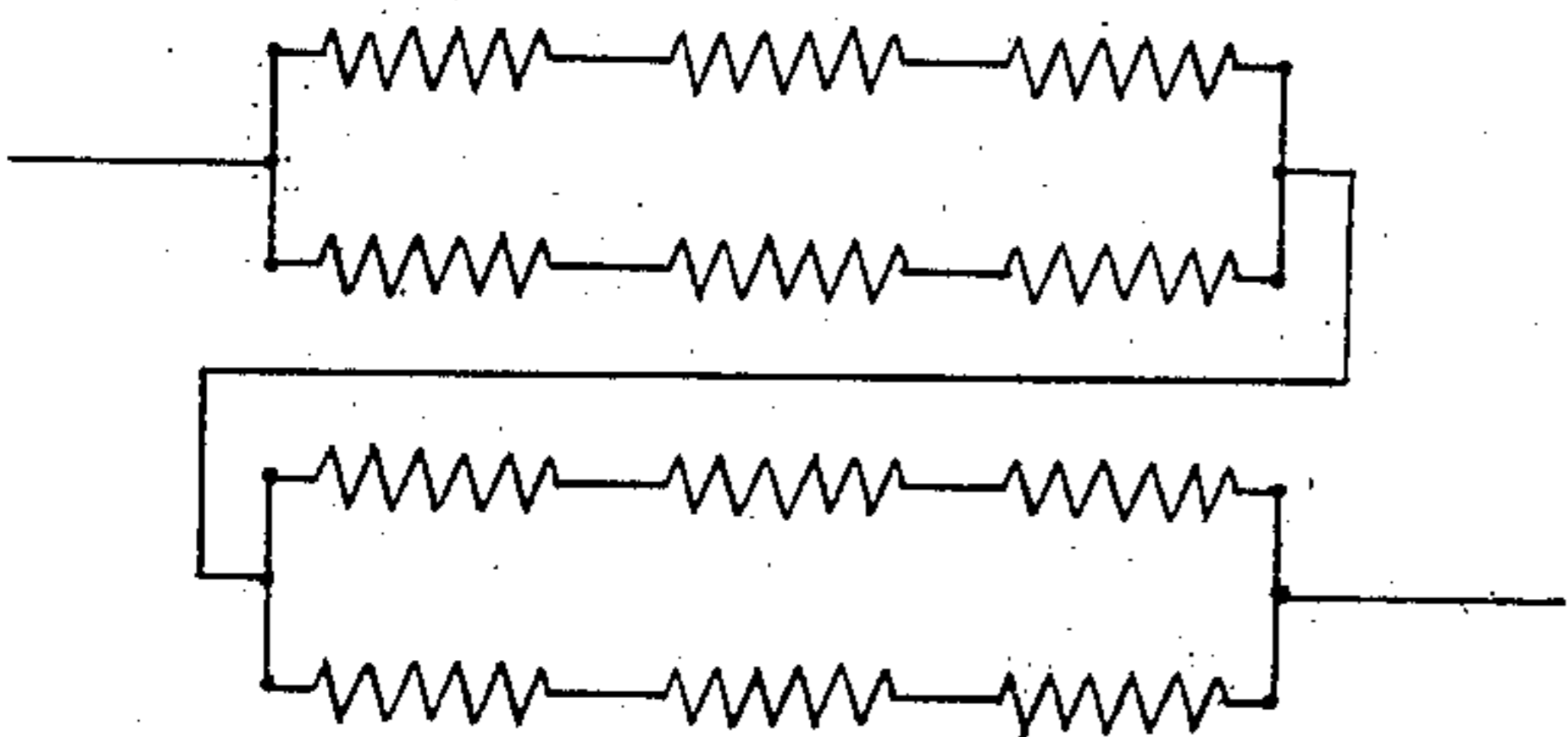
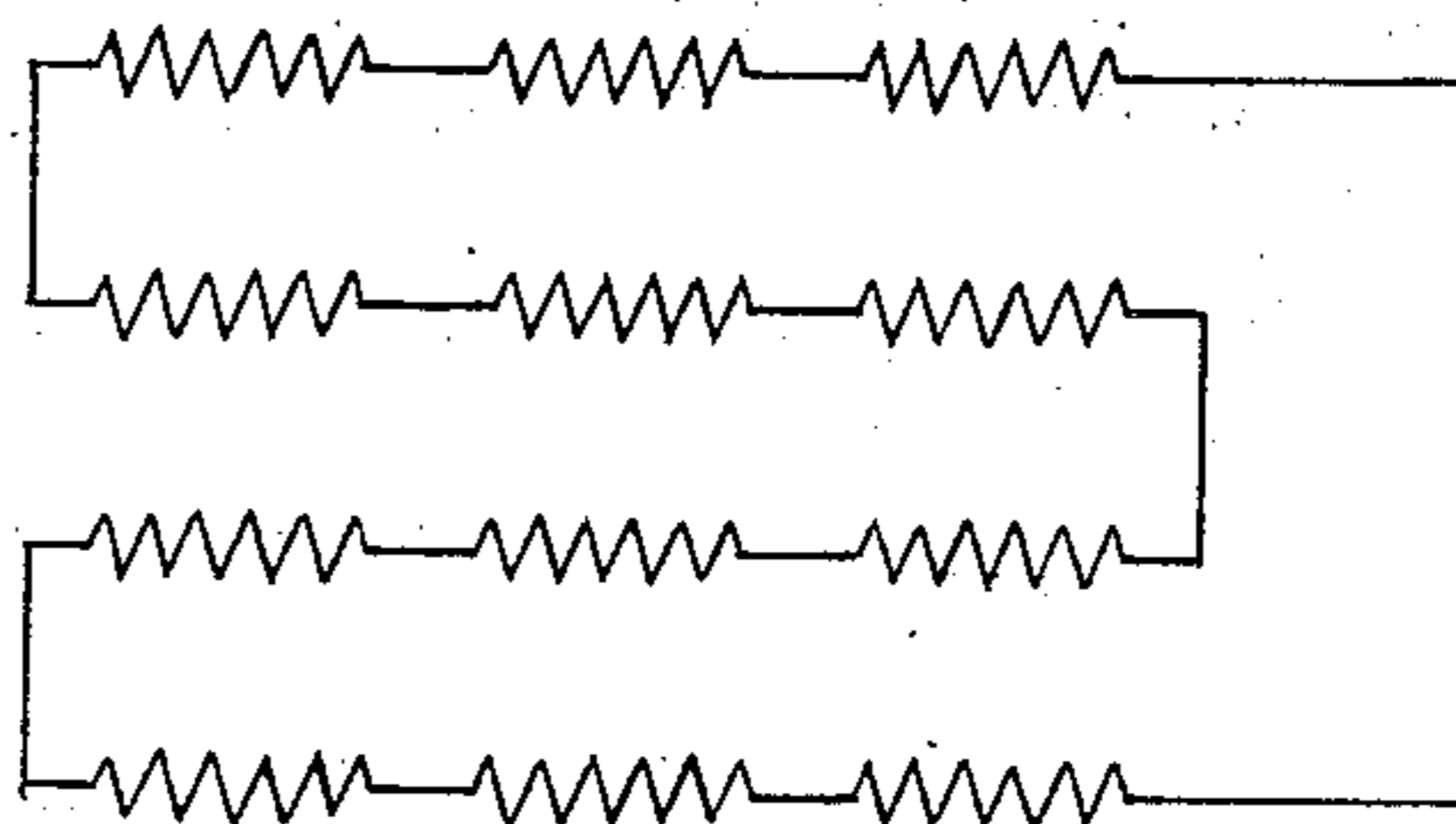
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2 SHEETS—SHEET 2.

Fig. 5.*Fig. 6.**Fig. 7.**Fig. 8.**Fig. 9.**Fig. 10.*

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UNITED STATES PATENT OFFICE.

CHARLES J. REED, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
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RHEOSTAT AND RESISTANCE ELEMENT THEREFOR.

SPECIFICATION forming part of Letters Patent No. 736,297, dated August 11, 1903.

Application filed June 3, 1902. Serial No. 110,029. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. REED, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Rheostats and Resistance Elements Therefor, of which the following is a specification.

My invention relates to adjustable rheostats and resistance elements therefor; and it has for its object to provide compact, easily-constructed, and inexpensive elements which may be readily combined with adjusting mechanism so as to provide uniformly-progressive variations of resistance in an electric circuit through a wide range of adjustment.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of an adjustable rheostat provided with a single resistance element constructed in accordance with my invention. Fig. 2 is a detail view of a resistance-coil of modified construction, and Fig. 3 is a similar view of a further modification. Fig. 4 is a diagram of a controller for coupling a plurality of rheostat elements so as to provide different degrees of resistance for an electric circuit. Figs. 5, 6, 7, 8, 9, and 10 are diagrams of the circuit connections of the resistance elements corresponding to the respective positions of the movable member of the controller shown diagrammatically in Fig. 4.

Referring now particularly to Fig. 1, the rheostat or resistance element is shown as comprising two helical coils 1 and 2, formed of a single length of German-silver or other suitable wire, preferably, but not necessarily, rectangular in cross-section. The coils 1 and 2 are respectively mounted upon rods 3 and 4, which may be of insulating material or of metal covered with sheaths of insulating material and which are supported at one end by a block 5 and at the other end by a block 6. The block 6 is provided with binding-posts 7 and 8, to which are connected the respective terminals of the two coils 1 and 2, and to which may also be connected the conductors

9 and 10 of the electric circuit in connection with which the rheostat is used.

Mounted in suitable bearings in the block 5 is a spindle 11, provided with an operating-handle 12 and having a screw-threaded portion 13, which engages with a nut formed or seated in a head 14, that is mounted upon the rods 3 and 4, so as to slide thereon.

Since each of the coils 1 and 2 engages the block 6 at one end and the movable head 14 at the other end, the movement of the latter by means of the rotation of the screw-spindle will move the turns of the coils nearer together or farther apart, according to the direction of rotation of the spindle. Any other suitable means may obviously be employed for increasing and decreasing the lengths of the coils 1 and 2, if desired, the device shown being merely indicative of a suitable means for doing this work. It will also be understood that the rheostat element may consist of a single coil or of more than two coils, if desired, and that the wire of which the coils are formed need not necessarily be rectangular in cross-section, although such form is regarded as preferable. By forming two coils from a single length of wire and arranging them substantially as shown I am enabled to use two binding-posts only and to locate them at one end of the apparatus.

It will be understood that when the coils shown in Fig. 1 are extended so that the turns of the helices are out of engagement the entire length of wire comprised in the two coils is in circuit and the maximum amount of resistance is therefore included.

When the head 14 is moved inward a sufficient distance to bring adjacent turns of the coils into engagement, more or less of the current will be conducted directly through the coil from turn to turn and the resistance of the circuit be thus reduced. The amount of this reduction of resistance depends upon the amount of surface contact between the adjacent turns and the closeness of the engagement, and consequently the resistance may be progressively reduced by moving the head 14 forward against the coils until they constitute substantially solid tubes of metal,

which conduct the current directly from end to end.

In Fig. 2 I have shown a coil 15 comprising three sections 16, 17, and 18, the section 16 being formed of wire having a relatively small cross-section, the section 17 being formed of wire having a greater cross-section than that of the section 16, and the section 18 being formed of wire of greater cross-section than that constituting the section 17. The coils may obviously be made of as many sections of different-sized wire as may be desired, and the sections may be joined together in any desired manner. As indicated, the meeting ends of the sections are screwed into each other, which affords a sufficiently secure connection, and in order that the entire helix may constitute a substantially solid tube when compressed the connected ends of the several sections are formed of wedge shape, as indicated at 19 and 20.

By making each helix of a plurality of sections of different diameters of wire the compression of the coil to bring the adjacent turns into engagement with each other takes place in the different sections successively, and thus affords a wider range of resistance variation.

In Fig. 3 I have shown a coil 21 formed of a single length of wire which is of uniformly-varying cross-section from end to end. This also has the same advantage in operation that is set forth in connection with the coil shown in Fig. 2 and is further advantageous in that the gradation in size of wire varies uniformly from end to end.

In Fig. 4 I have shown a rheostat comprising twelve pairs of coils 1 and 2, respectively connected to fingers 22 and 23 of a controller 24, the drum 25 of which is indicated as developed into a plane and as provided with six longitudinally-disposed sets of contact-pieces 26, 27, 28, 29, 30, and 31. The drum 25 may be constructed and operated in accordance with the usual practice, and it is not, therefore, deemed necessary to illustrate the structural details of either the drum or the means for operating it.

When the drum is rotated to bring the series of contact-pieces 26 into engagement with the fingers 22 and 23, the pairs of coils 1 and 2 will be all connected in parallel, as indicated in Fig. 5. Movement of the drum to bring the series of contact-pieces 27 into engagement with the fingers 22 and 23 will serve to connect the pairs of coils in two groups, the two groups being in series and the coils of each group being in parallel, as indicated in Fig. 6. Movement of the drum to bring the contact-pieces 28 into engagement with the fingers 22 and 23 will serve to connect the pairs of coils in four parallel groups, each of which contains three pairs of coils in series, as indicated in Fig. 7. A further movement

of the drum to bring the contact-pieces 29 into engagement with the fingers 22 and 23 will serve to connect the pairs of coils in three parallel groups, each of which has four pairs of coils in series, as indicated in Fig. 8. A further movement of the drum to bring the contact-pieces 30 into engagement with the fingers 22 and 23 will serve to connect the pairs of coils in two series-connected groups, each having six pairs of coils, as indicated in Fig. 9. A further movement of the drum to bring the contact-pieces 31 into engagement with the fingers 22 and 23 will serve to connect the pairs of resistance-coils all in series, as indicated in Fig. 10.

All of the pairs of coils shown in Fig. 4 may be mounted in a suitable frame 32 and simultaneously adjusted by means of a head 33, screw-spindles 34, gears 35, and a handle 36, as indicated, or by any other suitable means. It will be understood, however, that the resistance elements may be constructed and arranged otherwise than as shown and that each element or each pair or set of elements may be provided with its own adjusting means, if desired, and that other variations within the knowledge of those skilled in the art may be made without departing from the spirit and scope of the invention.

I claim as my invention—

1. In a rheostat, the combination with a plurality of helical resistance-coils and means for subjecting said coils to variable endwise compression, of means for coupling said coils in different relations to vary the total resistance.

2. The combination with a plurality of helical resistance-coils or sets of coils and means for subjecting them to variable endwise compression, of means for varying the grouping of said coils or sets of coils to vary the resistance of the circuit in which they are connected.

3. The combination with a plurality of helical wire coils or sets of coils and means for subjecting them to variable endwise compression, of a controlling device for coupling said coils or sets of coils in various relations to vary the total resistance of the circuit of which they form a part.

4. The combination with a plurality of resistance-coils or sets of coils severally formed of conductors of varying cross-section from end to end and means for subjecting said coils to endwise compression, of means for varying the grouping of said coils or sets of coils to vary the resistance of the circuit in which they are connected.

In testimony whereof I have hereunto subscribed my name this 19th day of May, 1902.

CHARLES J. REED.

Witnesses:

ROBT. B. FLETCHER,
THOMAS B. SMITH.