

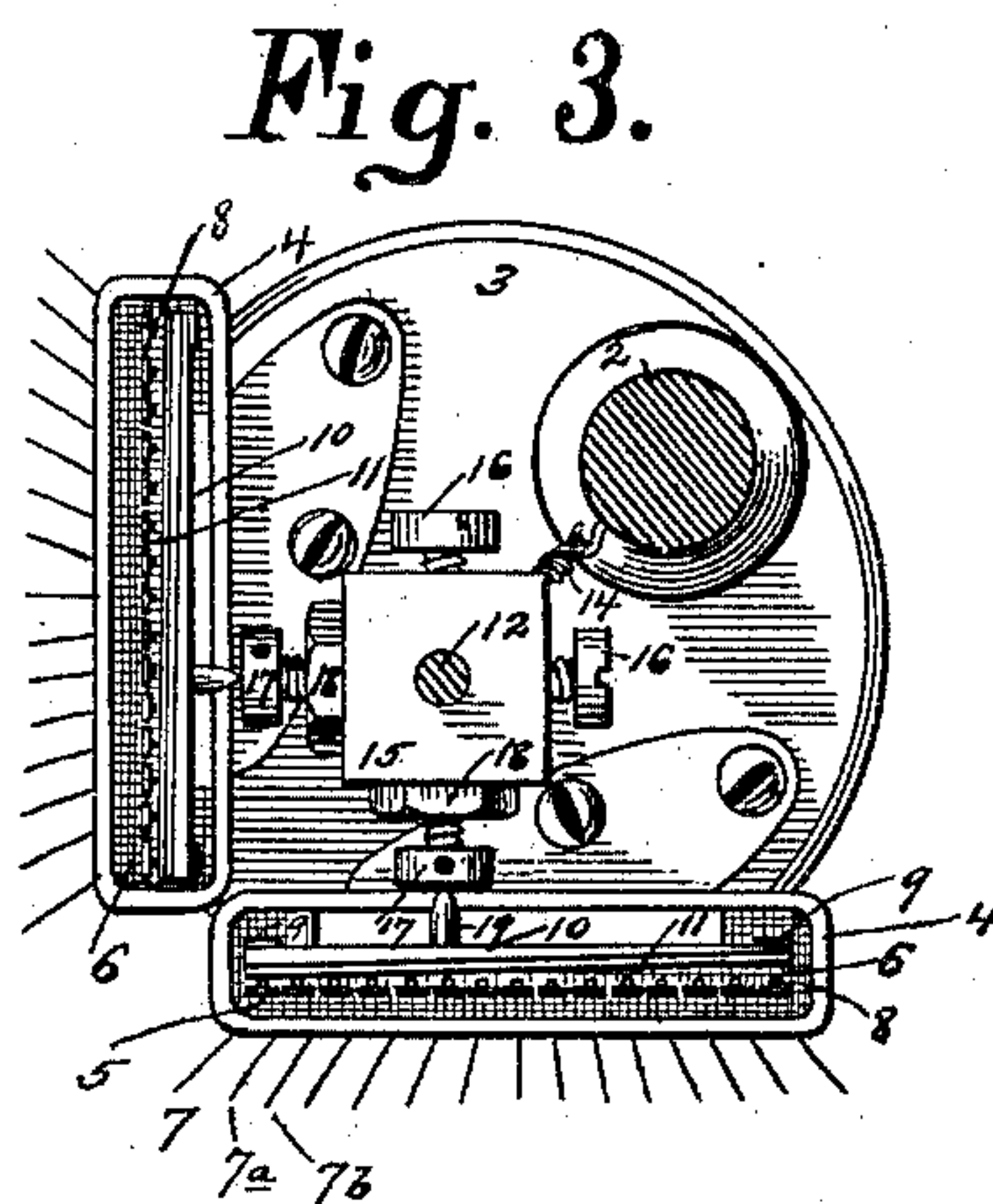
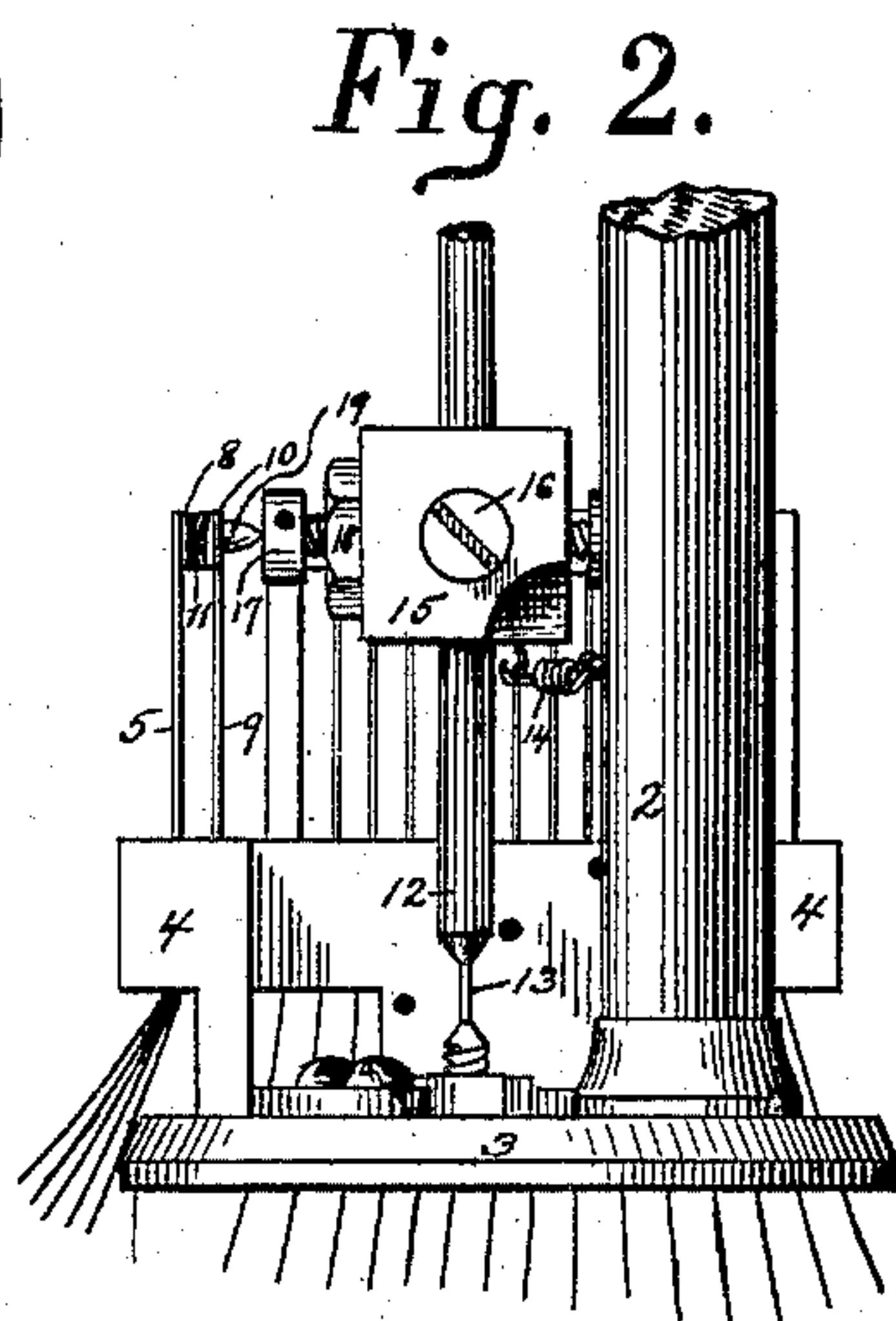
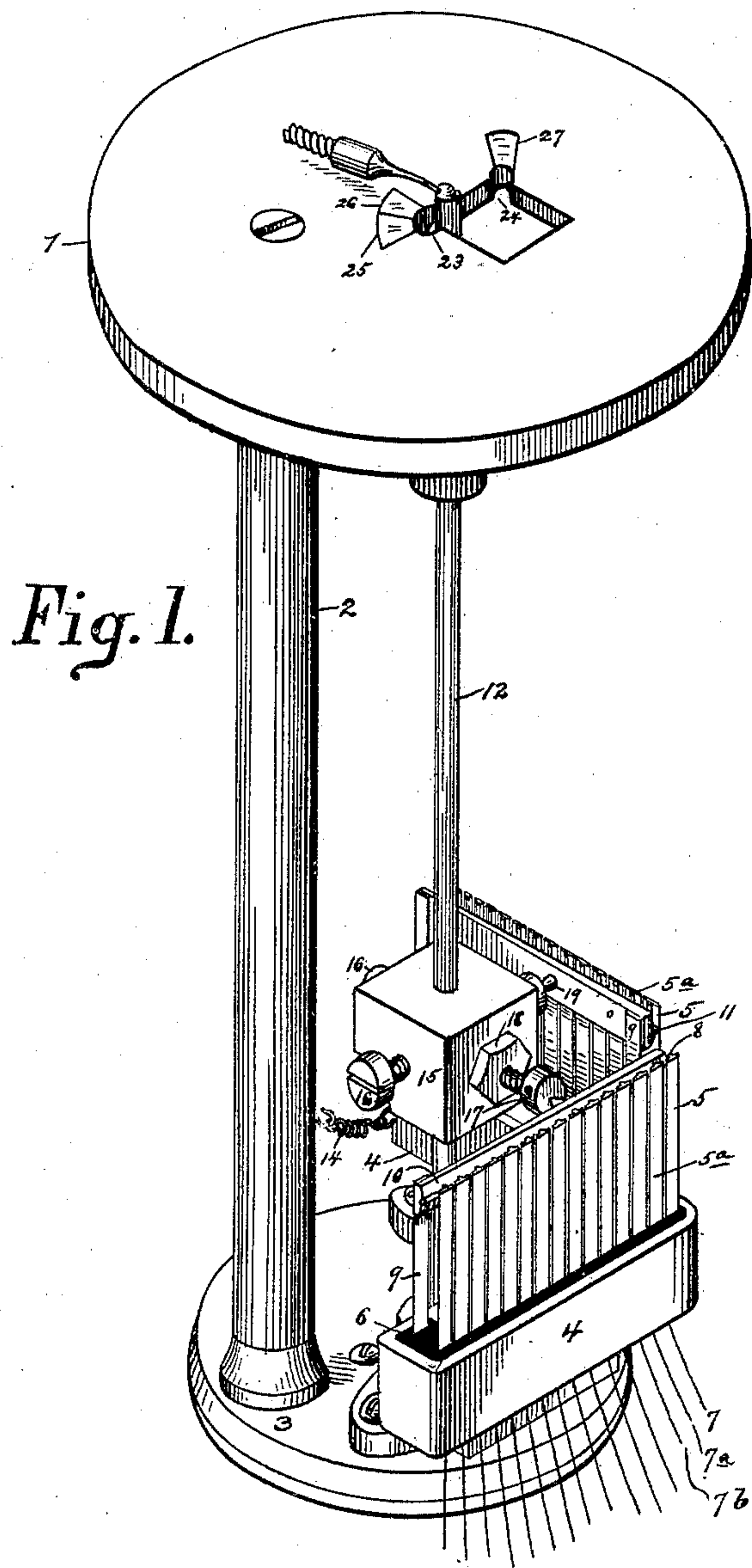
(No Model.)

2 Sheets—Sheet 1.

H. ETHERIDGE.  
AUTOGRAPHIC TELEGRAPH.

No. 445,715.

Patented Feb. 3, 1891.



Attest:  
Geo. H. Potts,  
N. E. Rogers

Inventor  
Harry Etheridge  
per H. C. Schmidt  
Atty.

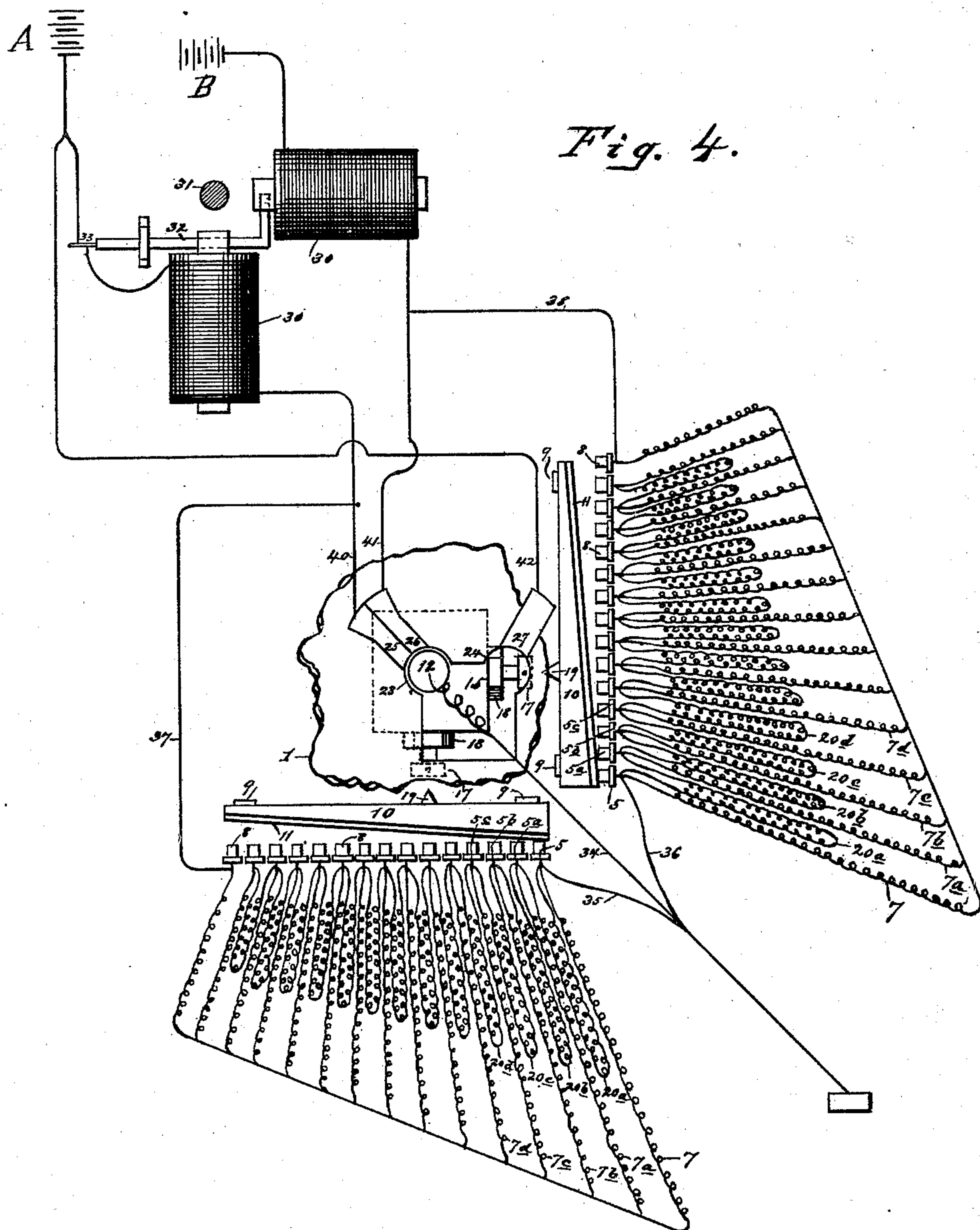
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Geo. H. Batts.  
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Inventor  
Harry Etheridge  
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# UNITED STATES PATENT OFFICE.

HARRY ETHERIDGE, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE  
WRITING TELEGRAPH COMPANY, OF NEW YORK, N. Y.

## AUTOGRAPHIC TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 445,715, dated February 3, 1891.

Application filed March 7, 1890. Serial No. 343,073. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY ETHERIDGE, a subject of the Queen of Great Britain, and a resident of Pittsburg, Pennsylvania, have invented a new and useful Improvement in Autographic Telegraphs, of which the following is a specification.

My invention relates to autographic telegraphs; and it consists in improvements in the transmitter whereby greater certainty and reliability in the variations of resistance, as well as quicker action, are secured and oxidation of contacts prevented.

In the accompanying drawings, forming part of this specification, Figure 1 is a perspective view of a part of my improved transmitter. Fig. 2 is a side view of the same. Fig. 3 is a plan view of Fig. 2, and Fig. 4 is a plan of the transmitter embodying the several features of my invention.

Referring to the drawings, 1 represents the top plate of the transmitter, adapted to be held by an inclosing case. (Not shown.) A rod 2 depends from said top plate and supports the base 3. Secured to said base and arranged at right angles to each other, as shown, are two receptacles or holders 4, in which two series of steel spring-tongues 5 5<sup>a</sup> 5<sup>b</sup>, &c., are separately held in a vertical position by an insulating-cement 6. The spring-tongues 5, &c., are placed in line with each other edge to edge, with a sufficient space between them to avoid contact. They are hardened and tempered, so as to readily return to normal position after pressure thereon is released. To the lower ends of these tongues a series of resistances 7 7<sup>a</sup> 7<sup>b</sup>, &c., are secured, as shown in Fig. 4, while their upper ends are provided with platinum contacts 8.

Secured in the insulating-cement of each holder are two spring-strips 9, which carry a contact-bar 10, of brass, having its side next the spring-tongues arranged at an angle thereto, as shown in Figs. 3 and 4. These two contact-bars are each provided with a platinum strip or surface 11, placed opposite the platinum contacts of the spring-tongues, and, by reason of their spring-supports, can be brought into contact with said tongues, each tongue making contact independently of the rest. A

stylus-rod 12, screw-threaded on its lower end, is screwed into the base 3, being held tightly in position by a lock-nut. Its spring part 13 allows free movement of the upper end in any direction. A spring 14 is preferably employed to bring the stylus back to normal position. Said stylus-rod carries a pressure-block 15, secured thereto by two set-screws 16, the stylus-rod passing through a hole in said block. Two adjustable pressure-heads 17 are screwed to the block, and can be held tightly by lock-nuts 18 in whatever position they may have been adjusted. The faces of these pressure-heads are hardened and polished to secure a free and easy action when said heads press against the projections 19 on the contact-bars. These projections are likewise hardened and preferably terminate in a point, so as to present the smallest possible surface to the pressure-heads. When the stylus is in its normal position, the pressure-heads are so adjusted that contact is made with the projections 19, whereby any lost motion is prevented. The pressure-heads are uninsulated, as well as the pressure-block, from the stylus-rod.

The advantages of a stylus-rod provided with uninsulated pressure head and block are that it is much more cheaply and easily constructed, and permits the attachment of hardened-steel pressure-heads for preventing wear. When the stylus is operated, the contact-bar is pressed against the tongues, making contact with all or a lesser number, according to the extent of movement of the stylus, thus cutting in or out the resistances required to regulate the movement of the receiving-pen.

Heretofore in autographic telegraph-transmitters the resistances have been arranged in series. This arrangement is objectionable, for any break of circuit at the points of contact means a break of the whole circuit and oxidation at the contact-points. To overcome this objection, I arrange the resistances as shown in the drawings. I employ two series of resistances 7 7<sup>a</sup> 7<sup>b</sup>, &c., and 20<sup>a</sup> 20<sup>b</sup>, &c., the former arranged in parallel arc, the latter in series, and I combine these two in a manner to avoid an electrical break in the circuit. The objection to the series system is to a considerable extent overcome by the re-



sistances 7 7<sup>a</sup> 7<sup>b</sup>, &c., arranged in parallel arc, for as the current is distributed through several branches, which are broken when the contacts are separated, the possibility of oxidation at contact-points is proportionately reduced. The objection to the series system is, however, entirely overcome by combining with said resistances 7 7<sup>a</sup> 7<sup>b</sup>, &c., another set of resistances arranged in series, independently considered, both sets of resistances being connected to the tongues. The resistance 7<sup>a</sup> is of the same resistance, measured in ohms, as resistance 20<sup>a</sup>. The resistance 7<sup>b</sup> is less than 7<sup>a</sup>, but is of the same resistance as 20<sup>b</sup>, &c., the resistances continuing to decrease—that is to say, the resistances are graded from a maximum resistance arranged farthest from the receiver to a minimum resistance of practically zero.

The operation is as follows: When the tongues are all out of contact with the contact-bar, the current circulates in every branch, of course proportionately to resistance. When, through the movement of the stylus, tongue 5<sup>a</sup> touches contact-bar 10, the resistance 7<sup>a</sup> is placed in parallel arc with resistance 7, while the resistance 20<sup>a</sup>, of equal resistance with 7<sup>a</sup>, is practically electrically cut out, the amount of current still circulating in 20<sup>a</sup> being so extremely little as to be practically disregarded. The resistance 20<sup>a</sup>, therefore, prevents an open circuit in 7<sup>a</sup> when 5<sup>a</sup> breaks contact with the contact-bar, balancing the resistance 7<sup>a</sup>, then practically cut out, and so preventing an open circuit and consequent sparking. In other words, the resistance 20<sup>a</sup> offers another and equivalent passage for the current the moment 7<sup>a</sup> is separated from 7. The resistance 20<sup>b</sup> stands in the same relation to resistance 7<sup>b</sup> that 20<sup>a</sup> stands to 7<sup>a</sup>, and so on throughout the remainder of the arrangement of resistances.

In the position of the stylus-rod shown in Fig. 4 the same makes contact with contact-pieces 25 and 26, and the circuits are then from the batteries A and B through the magnets 30 of the receiver and by conductors 40 and 41 to contacts 25 and 26 to stylus-rod 12, and thence to ground by conductor 34, the transmitter being cut out. When the stylus-rod is pulled over to make contact with contact-piece 27, the circuit is from battery A by conductor 42 to contact-piece 27 to stylus-rod 12, and thence to ground by wire 34. The purpose of this is fully described in my application, Serial No. 289,428, filed October 29, 1888, and as it forms no part of this invention further description here is unnecessary. When the stylus-rod is being operated to write, it is of course out of contact with contact-points 25, 26, and 27, and the circuits are from batteries A and B through the magnets 30 of the receiver, and by conductors 37 and 38 through the resistances of the transmitter in manner as previously hereinbefore explained and by wires 35 and 36 to ground.

In Fig. 4 the opening in the top plate 1 for

the passage of the stylus-rod is provided with notches 23 and 24 in two of its four corners. Contact-pieces 25 and 26, connected to receiver 30 by wires 40 and 41, are arranged in notch 23, and contact-piece 27, connected with line 42 to connect with a central-office switch-board, (not shown,) is arranged in notch 24. These contact-pieces serve the same purpose, as described in my application, Serial No. 289,428, filed October 29, 1888, and will need no further description here. In the construction shown in my said former application, in which the said contact-pieces are placed in the corners of the square opening, it would frequently happen if the operator was not very careful in handling the stylus that the stylus-rod would come accidentally into contact with said contact-pieces, and thus disturb the operation of the instrument; but by notching or cutting out the corners of the square opening, as shown in Figs. 1 and 4, I avoid this objection, and no matter how careless the operator is in moving his stylus about he cannot accidentally bring his stylus-rod into contact with said contact-pieces. By means of the notches I have not only moved the contact-pieces farther away from the center of the square opening than before, but have rendered them less easily accessible by the stylus-rod.

In Fig. 4, 31 represents a cross-section of the receiving-stylus; 32, a part of the paper-feed-releasing mechanism, and 33 the contact-points closed by said mechanism; 34, the connection from transmitting-stylus to ground; 35 and 36, the connections of the transmitter resistances with ground, and 37 and 38 the wires connecting receiver to transmitter; but these features constitute no part of this invention, being fully described in my said application hereinbefore referred to, and any fuller description in this application is unnecessary. I have arranged the resistances of the transmitter so that the last tongue to make contact with the contact-bar controls the lowest resistance, and this resistance is most directly connected with the receiver.

What I claim, and desire to secure by United States Letters Patent, is—

1. In an autographic telegraph, two series of contacts in which the contacts of each series are separated from each other, two series of resistances, each graded from a maximum to a minimum resistance, and two movable contact-bars, each arranged at an angle to its series of contacts, in combination with a stylus arranged when operated to press against said contact-bars and press the latter against said contacts, substantially as described.

2. In an autographic telegraph, two series of movable contacts in which the contacts of each series are arranged in line with but separated from each other and are movable at right angles to said line, two series of resistances, each graded from a maximum to a minimum resistance, and two movable contact-bars, each arranged at an angle to its se-



ries of contacts, in combination with a stylus arranged when operated to press against said contact-bars and press the latter against said contacts, substantially as described.

5 3. In an autographic telegraph, two series of flexible contacts in which the contacts of each series are separated from each other, and two movable contact-bars, each carried by flexible supports and arranged at an angle to its series of contacts, in combination with a stylus arranged when operated to press against said contact-bars and press the latter against said contacts, substantially as described.

15 4. In an autographic telegraph-transmitter, a series of contacts connected to flexible supports, insulated from each other and arranged in line with and movable at right angles to said line, in combination with a laterally-movable contact-bar arranged at an angle to said contacts and to press laterally against the same, substantially as described.

25 5. The combination, with a transmitting-stylus provided with a pressure-block, of two contact-bars carried by flexible supports and arranged to be moved by the operation of said stylus, substantially as described.

30 6. The combination, with a transmitting-stylus, of a pressure-block secured directly thereto and provided with a pressure-head, a movable contact-bar provided with a projection co-operating with said pressure-head, and a series of electrically separate contacts, substantially as described.

35 7. The combination, with a transmitting-stylus, a top plate provided with a notched opening and contacts in said notch arranged to co-operate with the stylus-rod, of the stylus-rod arranged to pass through said opening and a spring for returning the stylus-rod to its normal position in said notch, substantially as described.

45 8. The combination, with a transmitting-stylus and a top plate provided with a notched opening, of contacts in said notch arranged to co-operate with the stylus-rod, and a stylus-rod arranged to pass through said opening and to be pressed against said contacts in said notch, substantially as described.

50 9. In an autographic telegraph-transmitter, the combination, with two sets of contacts and connecting means for electrically connecting the contacts of each set of two sets of

resistances, each set arranged to act in parallel arc, and a stylus-rod co-operating with said connecting means, substantially as described. 55

10. In an autographic telegraph-transmitter, the combination, with two sets of contacts and connecting means for electrically connecting the contacts, of two sets of resistances, each set arranged to act in parallel arc, and two sets of resistances, each set arranged in series, substantially as described. 60

11. In an autographic telegraph-transmitter, two sets of resistances connected to contacts and each set arranged to act in parallel arc, in combination with two sets of resistances, each set arranged in series, substantially as described. 65

12. In an autographic telegraph-transmitter, the combination, with two sets of contacts, of two sets of graded resistances, each set arranged to act in parallel arc and graded from a maximum to a minimum resistance, substantially as described. 70

13. In an autographic telegraph-transmitter, the combination, with two sets of contacts, of two sets of graded resistances, each set arranged to act in parallel arc, and two sets of graded resistances, each set arranged in series, substantially as described. 75

14. In an autographic telegraph, the combination, with the receiver and transmitter, of two sets of contacts and two sets of graded resistances, each set arranged to act in parallel arc, the lowest resistances of each set arranged nearest the receiver, substantially as described. 80

15. The combination, with the transmitting-stylus provided with an uninsulated pressure-block and a contact-bar co-operating therewith, of a set of contacts and a set of graded resistances, arranged with the lowest resistance next to the receiver, said contact-bar arranged to make contact with the contact of least resistance last, substantially as described. 85

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 24th day of February, 1890. 90 100

HARRY ETHERIDGE.

Witnesses:

F. V. McMULLEN,  
JAMES H. PORTE.