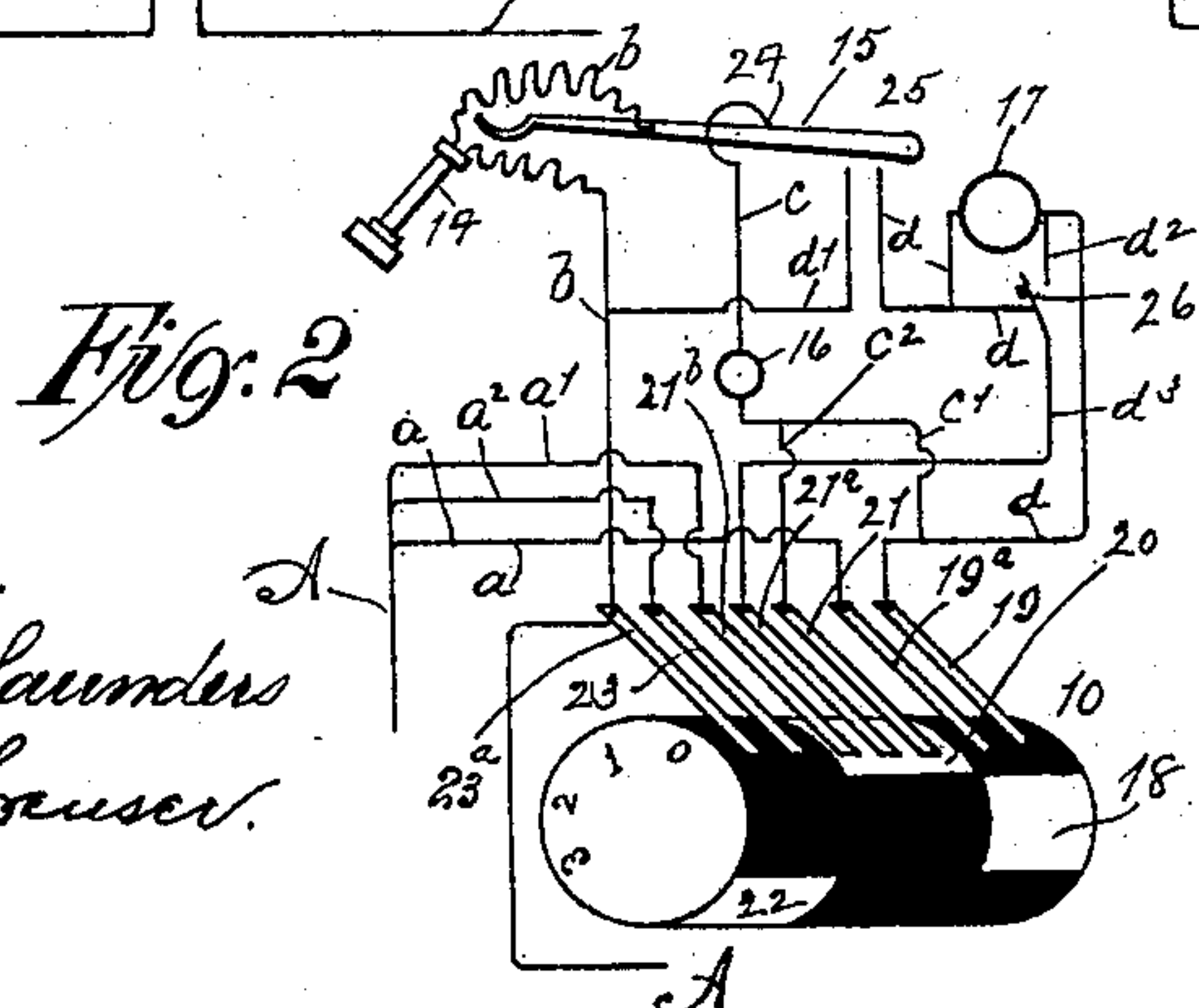
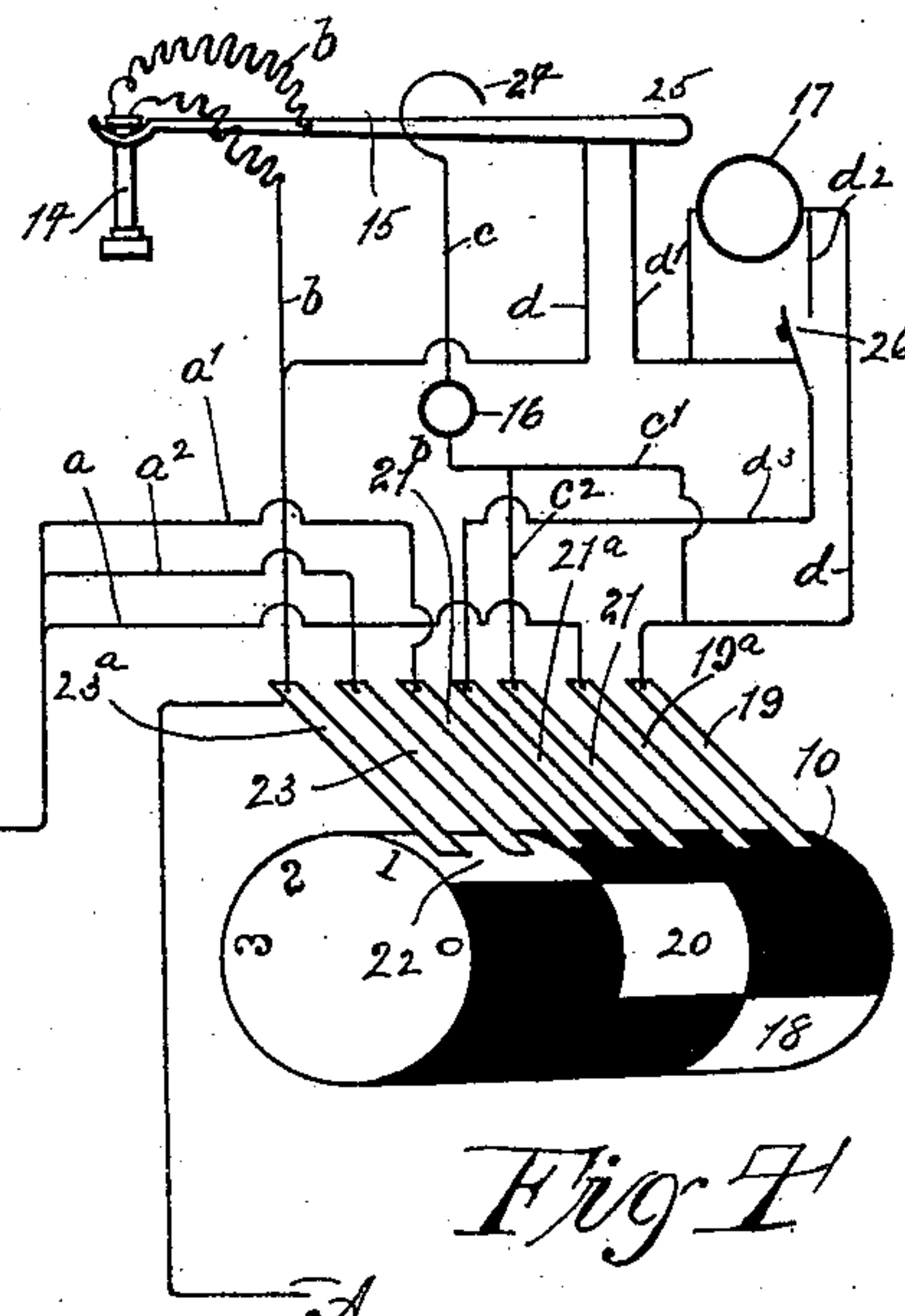
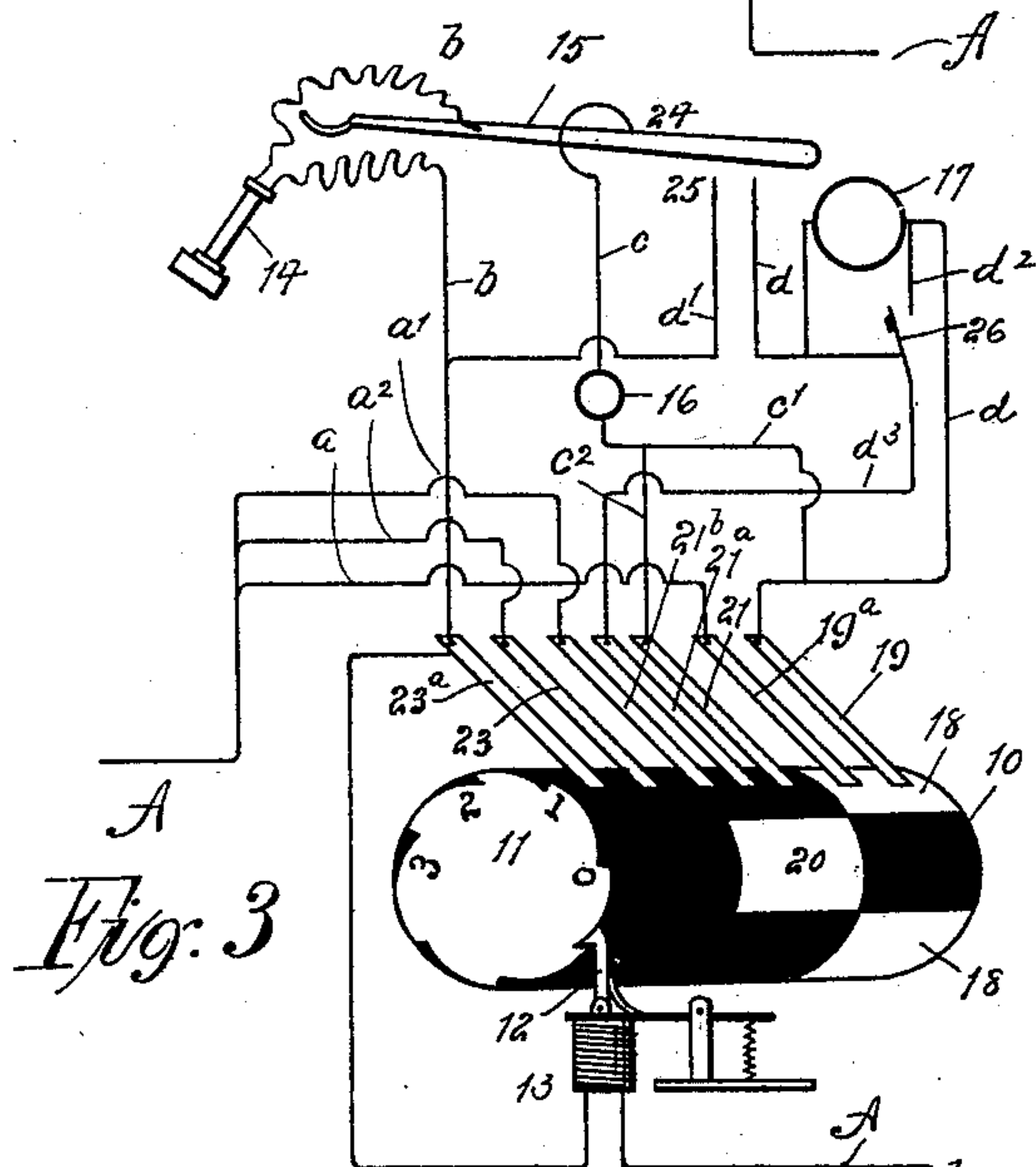
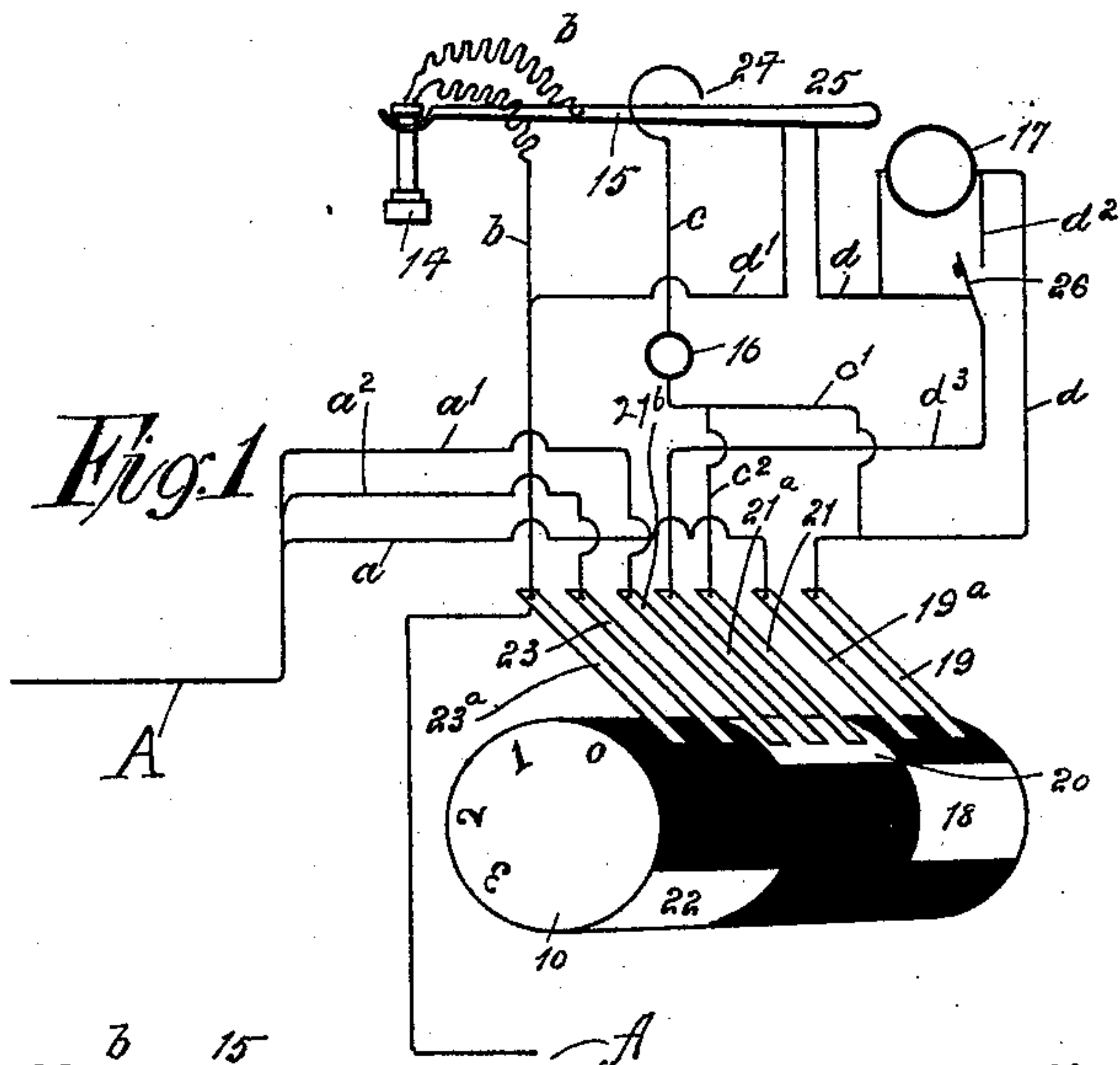


2 Sheets—Sheet 1.

No. 594,363.

Patented Nov. 23, 1897.



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(No Model.)

2 Sheets—Sheet 2.

A. F. SWAN.  
TELEPHONE SYSTEM.

No. 594,363.

Patented Nov. 23, 1897.

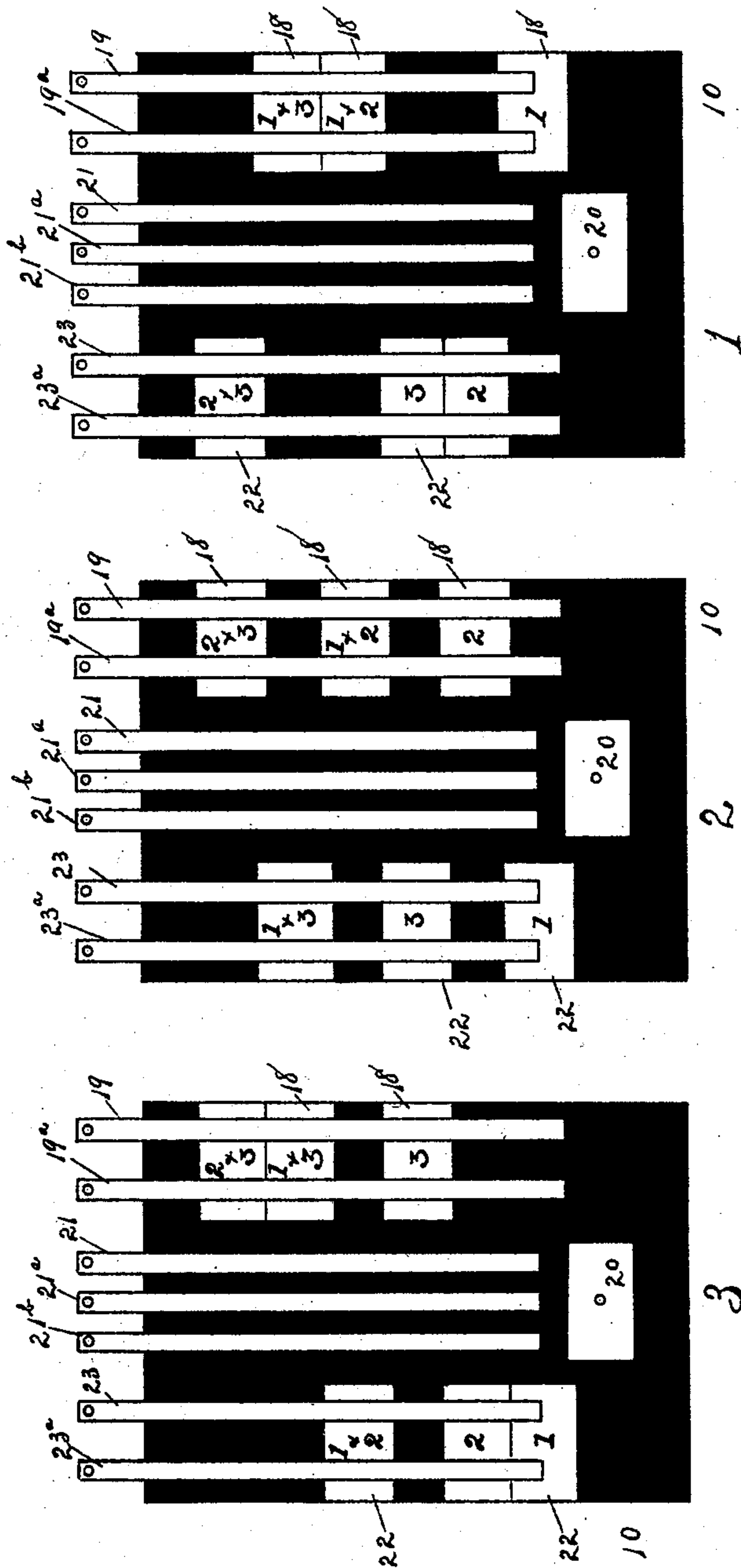


Fig. 5.

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# UNITED STATES PATENT OFFICE.

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## TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 594,363, dated November 23, 1897.

Application filed December 10, 1896. Serial No. 615,103. (No model.)

*To all whom it may concern:*

Be it known that I, ALFRED F. SWAN, of Bayonne, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Telephone Systems, of which the following is a full, clear, and exact description.

My invention relates to improvements in telephone systems, and my present invention is an improvement on that for which I obtained Letters Patent of the United States No. 572,840, dated December 8, 1896.

The object of my invention is to produce a comparatively simple system, which is adapted for use on party-lines and in suburban business, although it can be used in large places to advantage, and especially to produce a system which can be worked with a very small battery-power, which is an open-circuit system, the battery only being used when the telephone is in actual use, and which is constructed in such a way that when one telephone on the line is in use the others on the line are effectually cut out, so effectually, in fact, that they cannot interfere with the one using the instrument even to ring up the central office.

To these ends my invention consists of a telephone system the construction and arrangement of which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a diagrammatic view of the apparatus when in normal position. Fig. 2 is a similar view, but with the apparatus in position for talking with the central office. Fig. 3 is a diagram showing the position of the apparatus in talking-circuit. Fig. 4 is a diagrammatic view of the apparatus when cut out—that is, when another instrument on the line is in circuit; and Fig. 5 is a diagrammatic view showing a development of three of the switch drums or barrels arranged in series with one of the instruments in talking-circuit.

The apparatus shown in diagram is the complete apparatus for each telephone and has a drum 10, which is provided with a ratchet-

wheel 11 at one end, this being stepped around by a pawl 12, which is operated by the makes and breaks in the magnet 13, the latter being included in the line and the stepping mechanism being precisely like that illustrated in my former application already referred to.

Besides the drum the apparatus includes the telephone proper, 14, the usual hook 15, the transmitter 16, and the signal-bell 17, which can be the ordinary magneto-generator and bell, the above parts being shown in diagram only because they are exactly like the corresponding parts of all instruments, the receiver and transmitter comprising the ordinary talking set.

The drum 10, unlike the drum in any other invention, is provided with three series of insulating and conducting strips, each being circumferentially arranged on the drum, one series of conducting-strips 18 being near one end of the drum, and these contact with the brushes 19 and 19<sup>a</sup>, the free ends of which brushes ride on the drum, and it will be understood that the normal surface of the drum is of ordinary insulating material. The drum has near the center and next in order to the series 18, just mentioned, a conducting-strip 20, which is out of alinement with the strips 18, and is adapted for use when the talking set is in normal position to connect it with the central office, as hereinafter described. The strip 20 contacts with a triple set of brushes 21, 21<sup>a</sup>, and 21<sup>b</sup>, as the drawings show. The third series of conducting-strips 22 lie near one end of the drum out of alinement with the other strips referred to and are used for shunting the telephone apparatus out, as hereinafter described, the strips contacting with the brushes 23 and 23<sup>a</sup>. The brushes are of the kind generally employed to contact with a rotary switch barrel or drum and need no particular description. In fact the entire apparatus is made up of old elements not new in themselves, but combined and connected to serve the functions and attain the ends already referred to.

The line-wire A includes the mechanism for stepping around the switch drum or barrel, and it connects directly with the brush 23<sup>a</sup> and connects by the branches *a*, *a'*, and *a''* with the brushes 19<sup>a</sup>, 21<sup>b</sup>, and 23. From the brush 23<sup>a</sup> leads a wire *b*, which includes



the telephone proper or receiver 14, and connects with the hook 15. The hook 15 has a make and break at 24 with the wire *c*, which includes the transmitter 16, and connects by the branches *c'* and *c<sup>2</sup>* with the brushes 19 and 21, the connection with the brush 19 being through the medium of the wire *d*, which extends from the brush to the signal-bell 17, and from there to a make and break with the hook 15 at 25, an extension *d'* of the wire connecting from this point with the wire *b*. The wire *d* also connects, by means of a wire *d<sup>2</sup>* and push-button 26, with a wire *d<sup>3</sup>*, leading to the brush 23<sup>a</sup>. This push-button serves to cut the signal-bell out and in, as will be seen by reference to the drawings.

When the several talking sets on a line are not in use, they are all at zero, as shown in Fig. 1, in which case the three brushes 21, 21<sup>a</sup>, and 21<sup>b</sup> connect with the conducting-strip 20, while the other brushes on the switch barrel or drum are insulated. Consequently when the subscriber wishes to call up the central office he pushes the button 26, thus making and breaking the circuit which enters from the line, passes through the wire *b*, the wire *d'*, the hook 15, the wire *d* and signal-bell 17, the wire *d<sup>2</sup>*, the button 26, the wire *d<sup>3</sup>*, the brush 21<sup>a</sup>, the conducting-strip 20, the brush 21<sup>b</sup>, and the wire *a'* back to the line. It will be noticed that this arrangement shunts out the signaling apparatus except when the button 26 is used, in which case the button being pressed closes the circuit through the wires *d<sup>2</sup>* and *d<sup>3</sup>*, as specified, and the subscriber holds the button so as to close said circuit and then rings his bell in the usual manner. It will be seen then that the bell is cut out except when in actual use. After signaling, the subscriber releases the button, removes the receiver from the hook as usual, and this breaks the circuit at 25 and closes it at 24, as shown in Fig. 2. The circuit is then through the line A, the wire *b*, the receiver 14, the hook 15, the wire *c*, the transmitter 16, the wire *c<sup>2</sup>*, the brush 21, the conducting-strip 20, the brush 21<sup>b</sup>, and the wire *a'* back to the line.

The series of strips on the different switch-barrels of a party-line are dissimilarly arranged, as shown clearly in Fig. 5, in order that a desired instrument may be shunted in and the others shunted out by a definite number of makes and breaks in the line, this stepping being accomplished by turning on a heavier current at the central office in a well-understood manner and then turning it off after the instruments are ready for use. The arrangement of the conducting-strips is not arbitrary and varies with the number of instruments on the line.

As illustrated in Fig. 5, the party-line is supposed to be provided with three telephone sets, which are numbered 1, 2, and 3. When in normal position, the brushes 21, 21<sup>a</sup>, and 21<sup>b</sup> are in contact with the strips 20 of the several switch-barrels, and we will suppose that the subscriber at telephone No. 1 wishes

to be placed in line. In this case the subscriber rings up the central office in exactly the usual way, except for the manipulation of the push-button, as above described, and the drum at No. 1 is stepped around until the brushes 19 and 19<sup>a</sup> contact with one of the strips 18, as shown in Figs. 3 and 5. The other drums at 2 and 3 will of course be similarly moved, and this will bring the series of brushes 21, 21<sup>a</sup>, and 21<sup>b</sup> and their brushes 19 and 19<sup>a</sup> on insulation and will bring the series of brushes 23 and 23<sup>a</sup> at telephones Nos. 2 and 3 on the strips 22, thus shunting out instruments 2 and 3, the circuit at each of these telephones passing from the line A through the brush 23<sup>a</sup>, the strip 22, the brush 23, and the wire *a<sup>2</sup>* back to the line; but the telephone No. 1 is in circuit, the circuit being from the line A through the wire *b*, the telephone 14, the hook 15, the wire *c*, the transmitter 16, the wires *c'* and *d*, the brush 19, the strip 18 of the switch-barrel, the brush 19<sup>a</sup>, and the wire *a* back to the line.

Referring now to Fig. 5, it will be seen that if the drums are turned forward a sufficient distance to bring telephone No. 1 in circuit—that is, bring the brushes 19 and 19<sup>a</sup> on the strip 18 marked 1—the other drums at 2 and 3 will be shunted out, as just referred to. We will suppose now that telephone No. 2 is to be put in line in the manner described. This will bring the brushes 19 and 19<sup>a</sup> of said instrument on the strip 18 numbered 2 in Fig. 5, and therefore the brushes 19 and 19<sup>a</sup> and the brushes 21, 21<sup>a</sup>, and 21<sup>b</sup> on telephone No. 1 will rest on insulation, the corresponding brushes on telephone No. 3 will rest on insulation, and the brushes 23 and 23<sup>a</sup> on telephones Nos. 1 and 3 will rest on the strips 22 marked 2, and therefore these instruments will be shunted out. If the drums are moved a step farther, the telephone No. 3 is shunted into the line by the brushes 19 and 19<sup>a</sup> coming in contact with the strip 18 numbered 3. The brushes 19 and 19<sup>a</sup> and 21, 21<sup>a</sup>, and 21<sup>b</sup> of the other instruments rest on insulation, and the brushes 23 and 23<sup>a</sup> of the other instruments will rest on the strips marked 3 at telephones 1 and 2, and therefore the instruments will be shunted out. If No. 1 wishes to speak with No. 2, the drums are stepped around until the brushes 19 and 19<sup>a</sup> of instruments 1 and 2 rest on the strips 18 marked 1 and 2 at telephones 1 and 2, and this will therefore bring these telephones into line, so that they can talk together, and by reference to Fig. 5 it will be noticed that this movement will bring the brushes 23 and 23<sup>a</sup> of telephone No. 3 on the strip 22 of such instrument marked 1 and 2, thus shunting this instrument out.

Without going into all the different combinations it will be observed from the above description that when Nos. 1 and 3 are in circuit No. 2 is shunted out, when Nos. 2 and 3 are in circuit No. 1 is shunted out, and that when desired either talking set can be placed in circuit and the others shunted out.



I purposely omit the circuits in Fig. 5 to avoid confusion, as these circuits are clearly shown in Figs. 1 to 4, inclusive.

It will be understood from the above examples that any reasonable number of talking sets can be placed on a party-line and that if it is not desirable to arrange the conducting-strips so that several parties on the line may talk together some of such strips 18 or 22 can be left off, so as to make such an arrangement impossible without affecting the nature of the invention.

From the foregoing description it will be seen that the instruments on a party-line are normally in circuit with the central office by means of the brushes 21, 21<sup>a</sup>, and 21<sup>b</sup>, that the switch-barrels can only be stepped around from the central office, that either instrument can be shunted in by means of the brushes 19 and 19<sup>a</sup>, that the other instruments are by such action normally shunted out or short-circuited by the brushes 23 and 23<sup>a</sup>, and that any two instruments on the party-line can be placed in circuit and the other one effectually shunted out.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination with the telephone apparatus, the line, and the switch-barrel having means as shown for stepping it around, of the series of insulating and conducting strips on the switch-barrel, a series of brushes to contact with the aforesaid strips, and connections between the brushes, the bell and talking set and the line whereby one position of the switch-barrel cuts the bell to line, the second position cuts the talking set to line, and the third position cuts the bell and talking set out of line by short-circuiting, substantially as described.

2. The combination with the telephone ap-

paratus, the line, and the switch-barrel having means as shown for stepping it around, of a triple series of circumferentially-arranged insulating and conducting strips on the switch-barrel, a set of brushes to contact with one series of conducting-strips and cut the bell to line and the talking set into the line-circuit controlled by the telephone-hook, a second set of brushes arranged to connect with a second series of conducting-strips and cut the talking set to line, a second set of brushes to contact with the third series of conducting-strips and cut the talking set and bell out by short-circuiting, and suitable connections between the brushes, the telephone apparatus and the line, substantially as described.

3. The combination with the telephone apparatus, the line, and the switch-barrel having a triple series of insulating and conducting strips and means as shown for stepping it around, of a triple set of brushes contacting with one series of conducting-strips, connections between said brushes, the line, the bell, and the talking set, the latter connections being controlled by the telephone-hook, a pair of brushes contacting with the second series of conducting-strips, connections between the second set of brushes, the talking set and the line, a pair of brushes contacting with the third series of conducting-strips, and connections between the third pair of brushes and the line whereby the talking set is cut out by short-circuiting, the said series of brushes and conducting-strips being arranged so that only one set of brushes can contact with a conducting-strip at any one time, substantially as described.

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