

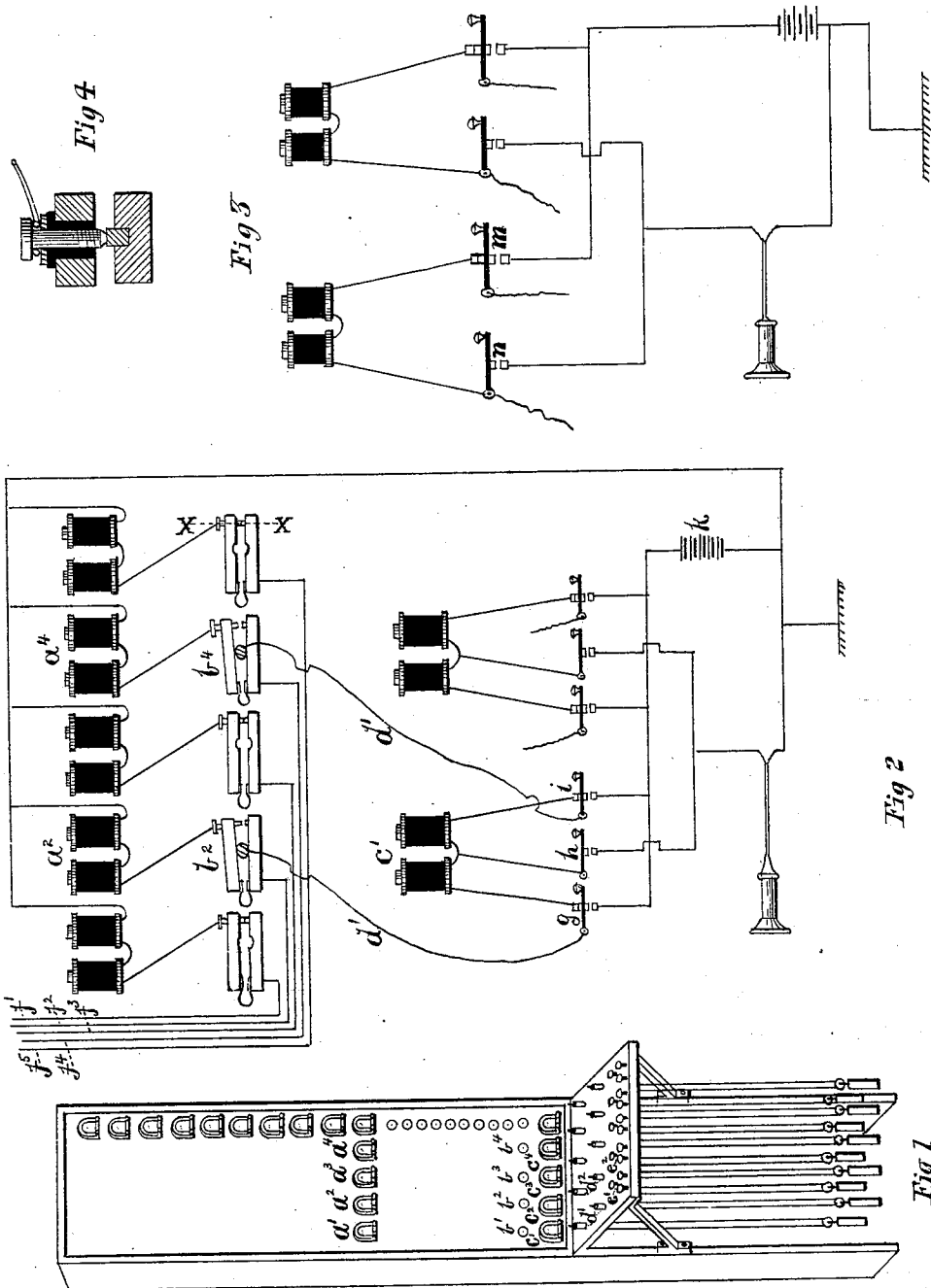
(No Model.)

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TELEPHONE EXCHANGE APPARATUS.

No. 247,199.

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Witnesses

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TELEPHONE-EXCHANGE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 247,199, dated September 20, 1881.

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To all whom it may concern:

Be it known that I, MILO G. KELLOGG, of Hyde Park, Illinois, and doing business in Chicago, in said State, have discovered certain new and useful Improvements in Telephone-Exchange Apparatus, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to the apparatus at the central office of a telephone-exchange system whereby the signals are sent to or received from the terminal or subscribers' stations and the connections and disconnections made between the various telephone-lines.

In the drawings, Figure 1 is a front elevation of the switch-board. Fig. 2 is a detail diagram of the circuits. Fig. 3 is a detail diagram of a modification of the circuits of the clearing-out annunciators and listening operator's outfit. Fig. 4 is a section of a switch, as indicated by dotted line xx of Fig. 2.

The switch-board is provided with a switch and annunciator for each telephone-line, and also with a suitable number of clearing-out annunciators, pairs of conducting-cords, with pegs, and keys or circuit-closers.

I prefer to place the individual annunciators $a^1 a^2 a^3$, &c., upon the upper portion of the board, the switches $b^1 b^2 b^3$, &c., lower down on the board, and the clearing-out annunciators $c^1 c^2$, &c., below the switches, as shown in Fig. 1. A leaf or shelf is conveniently arranged to accommodate the pairs $d^1 d^2$, &c., of flexible conducting-cords and the sets $e^1 e^2$, &c., of keys.

The flexible cords may be held taut in the usual manner by weights. Each set of keys should consist of three, as shown. I find that a clearing-out annunciator for every ten subscribers is sufficient. Each clearing-out annunciator has its own pair of cords and plugs and its set of keys.

In Fig. 2, $f^1 f^2$, &c., are individual telephone-lines, which are connected at the subscribers' stations in any well-known way, and provided with any well-known subscribers' outfits. These lines pass to the central office, where they are severally connected, as shown, with their respective switches, and pass from their switches through their respective annunciators and to ground.

The telephone-lines f^2 and f^4 are shown connected through the clearing-out annunciator c^1 by the pair d^1 of cords and plugs of said clearing-out annunciator. The three keys of the set are designated, respectively, as $g h i$. The calling-annunciators a^2 and a^4 are thus cut off when lines f^2 and f^4 are connected by the pair of cords and plugs and the keys g and i through the clearing-out annunciator c^1 . The listening operator, by means of key h , may tap the circuit thus completed between the two subscribers, and by means of the derived circuit thus obtained passing through his telephone determine whether the subscribers have stopped talking. The operator has thus a check on the clearing-out annunciator, which is very convenient when both subscribers forget to send in the clearing-out signal. When a subscriber's line has been connected by means of a plug and cord with the key h , the listening operator, by depressing said key, at once completes said subscriber's circuit through his (the listening operator's) ground-line. The subscriber thereupon informs the listening operator what other subscriber he wishes to converse with. After the call of the subscriber is received by the listening operator the other cord of the pair is connected, by means of its plug or peg, with the switch of the subscriber asked for. The called subscriber's circuit is thus cut off from his calling-annunciator and connected with the other side of the clearing-out annunciator. The two subscribers' lines are thus connected together and formed into a single circuit, passing through the pair of cords and plugs from their switches and through the clearing-out annunciator of the said pair of cords. It is necessary, however, to notify the called subscriber that he is wanted. By depressing the key i the calling-battery k is thrown to line f^4 , and the called subscriber is thereby informed that some one wishes to communicate with him. It will be seen that when the key i is thus depressed its cord is disconnected from the clearing-out annunciator and connected with the calling-battery, and in like manner when the circuit of the other cord of the pair is diverted from the clearing-out annunciator by depressing key g the calling-battery k is thrown to line f^2 .

It is evident that all necessary work can be

done without using the key *g*, in which case it would always be necessary to connect key *i* with the switch of the subscriber called for, as shown in the drawings, so that a current may

5 be sent to his line by depressing the key *i*.
The switches that I have used are of the forms known as the "jack-knife," the "spring-jack," or some modification thereof, so constructed that when a plug is inserted the line

10 is automatically cut off behind the switch.

In Fig. 3 I have shown a three-point key, *m*, and a two-point key, *n*, with each clearing-out annunciator and pair of cords and plugs.

When thus connected it is necessary to connect the cord of the key *n* with the switch of the subscriber who sends in the call, in order that the three-point key *m* may be used for signaling after its cord is connected with the called subscriber's switch. It is convenient to

15 use cords of one color on the three-point switches and cords of another color on the two-point switches. The circuit of two connected subscribers may be tapped by depressing key *n*, and the listening operator, by means

20 of the derived circuit, may determine whether they have ceased talking.

I claim—

1. The combination of normally-closed ground-circuits with switches, one switch for

30 each line, and annunciators, one annunciator in each line between the switch and the ground-connection, and a pair of cords and plugs, and a clearing-out annunciator and keys, one key for each cord and one key or its equivalent for

35 obtaining a derived circuit, whereby the ground and respective annunciators of any two lines may be cut off and the circuits of said lines diverted from the switches through the clearing-out annunciator, and the listening operator

40 enabled to determine whether the subscribers have stopped talking.

2. The combination of normally-closed ground-circuits with switches, one switch for each line, and annunciators, one annunciator

45 in each line between the switch and the ground-connection, and a pair of cords and plugs, and a clearing-out annunciator and keys, one key

for obtaining a ground-circuit through the telephone, and means for signaling, whereby the ground and respective annunciators of any two

50 lines may be cut off and the circuits of said lines diverted from the switches through the clearing-out annunciator, and the listening operator be enabled to signal to one of the lines, or to determine whether the subscribers have

55 stopped talking.

3. In a telephone-exchange, two lines connected together for conversation, in combination with a key for grounding the lines through the central-office telephone, and key *i*, whereby

60 the lines may be disconnected and one of them closed to ground through the signaling-battery, as and for the purpose set forth.

4. In a telephone-exchange, two lines connected together for conversation, in combination with two keys, one for each line, either of which, on being depressed, disconnects the lines and grounds its own line through the central-office signaling-battery.

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5. The combination of normally-closed

70 ground-circuits with switches, one switch for each line, and annunciators, one annunciator in each line between the switch and the ground-connection, and a pair of cords and plugs, and a clearing-out annunciator, whereby when the

75 plugs are inserted in the switches which belong to any two lines their annunciators are disconnected from the lines and the lines connected together through the circuit of the clearing-out annunciators, substantially as set

80 forth.

6. In a telephone-exchange, two lines connected together for conversation, in combination with two keys, one for each line, either of which, on being depressed, disconnects the lines

85 and grounds its own line through the central-office signaling-battery, and a third key, which on being depressed grounds the lines through the central-office telephone.

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Witnesses:

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