

No. 783,279.

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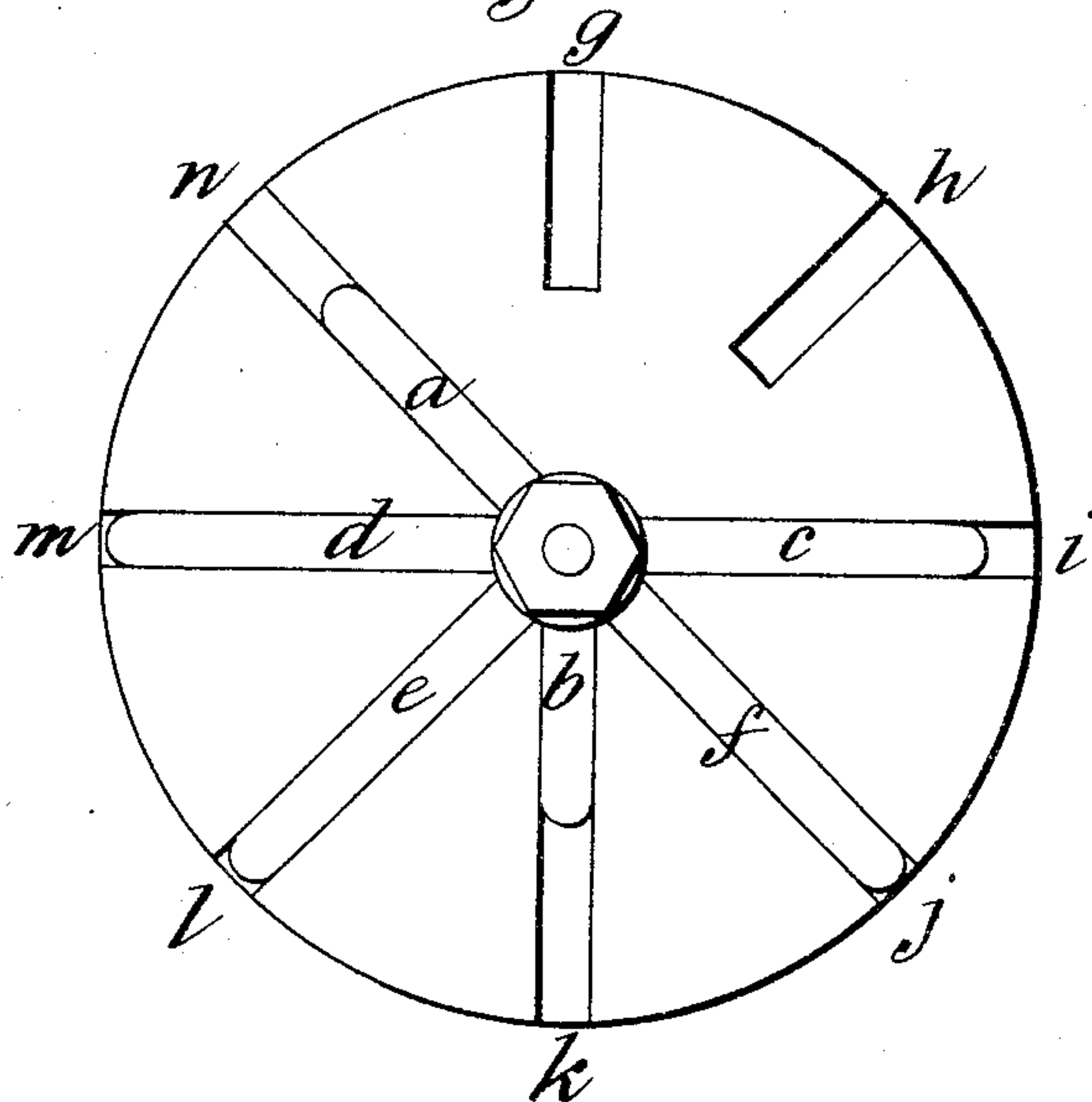
C. M. JACOBS & A. H. NICHOLSON.

SWITCH FOR SELECTIVE ELECTRIC SIGNALING APPARATUS.

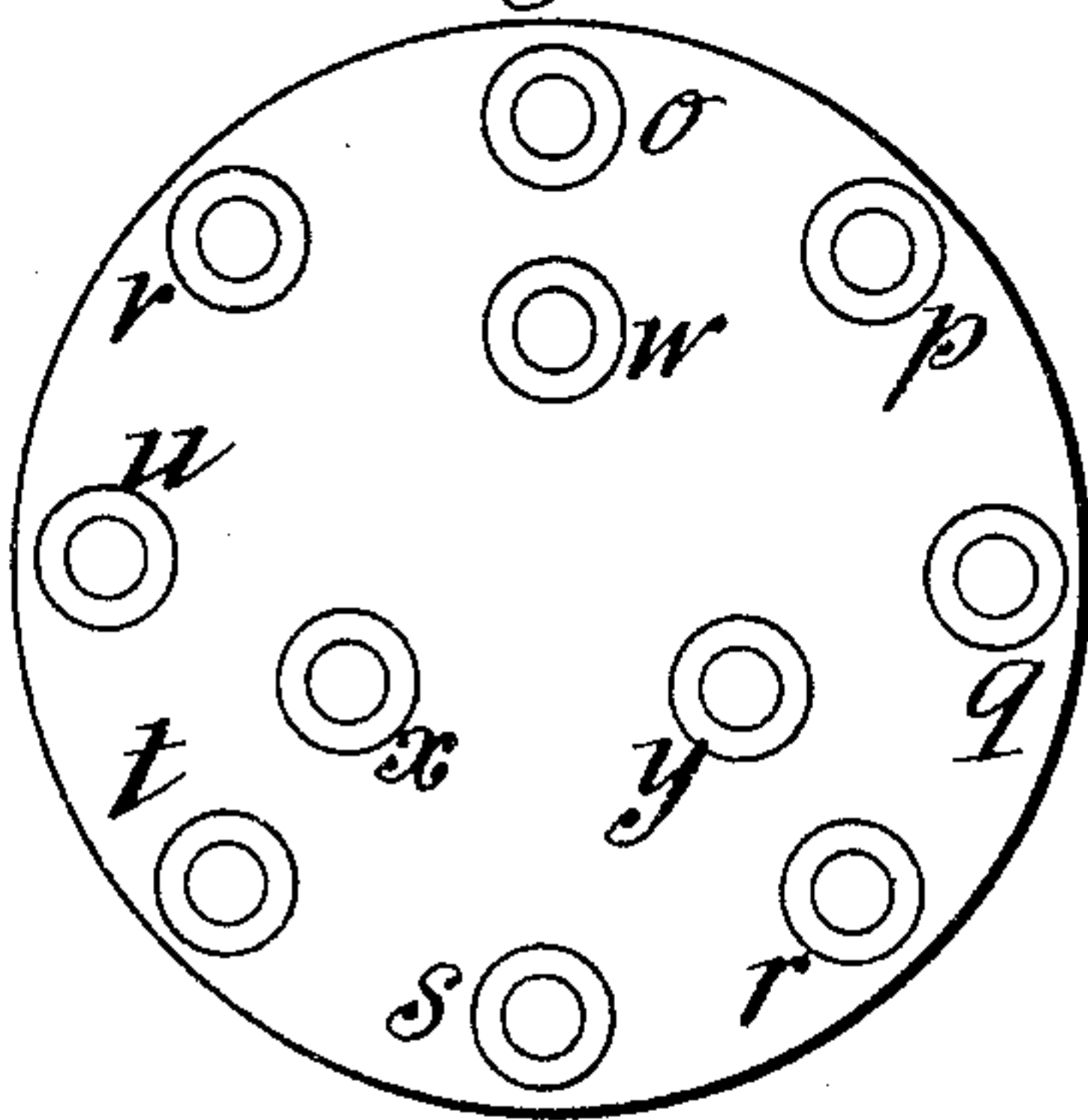
APPLICATION FILED APR. 18, 1904.

3 SHEETS—SHEET 1.

*Fig. 1.*



*Fig. 2.*



*Witnesses:*

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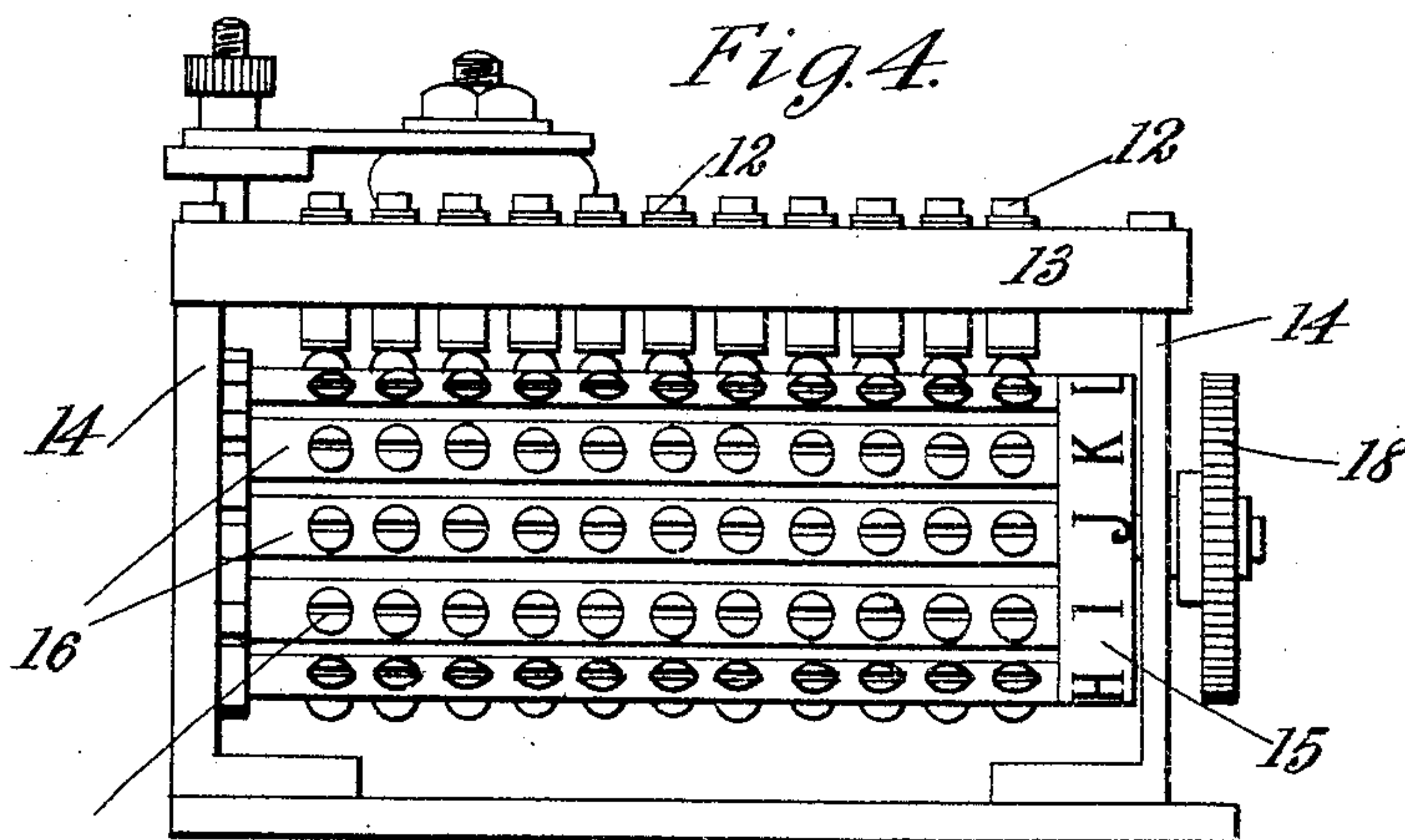
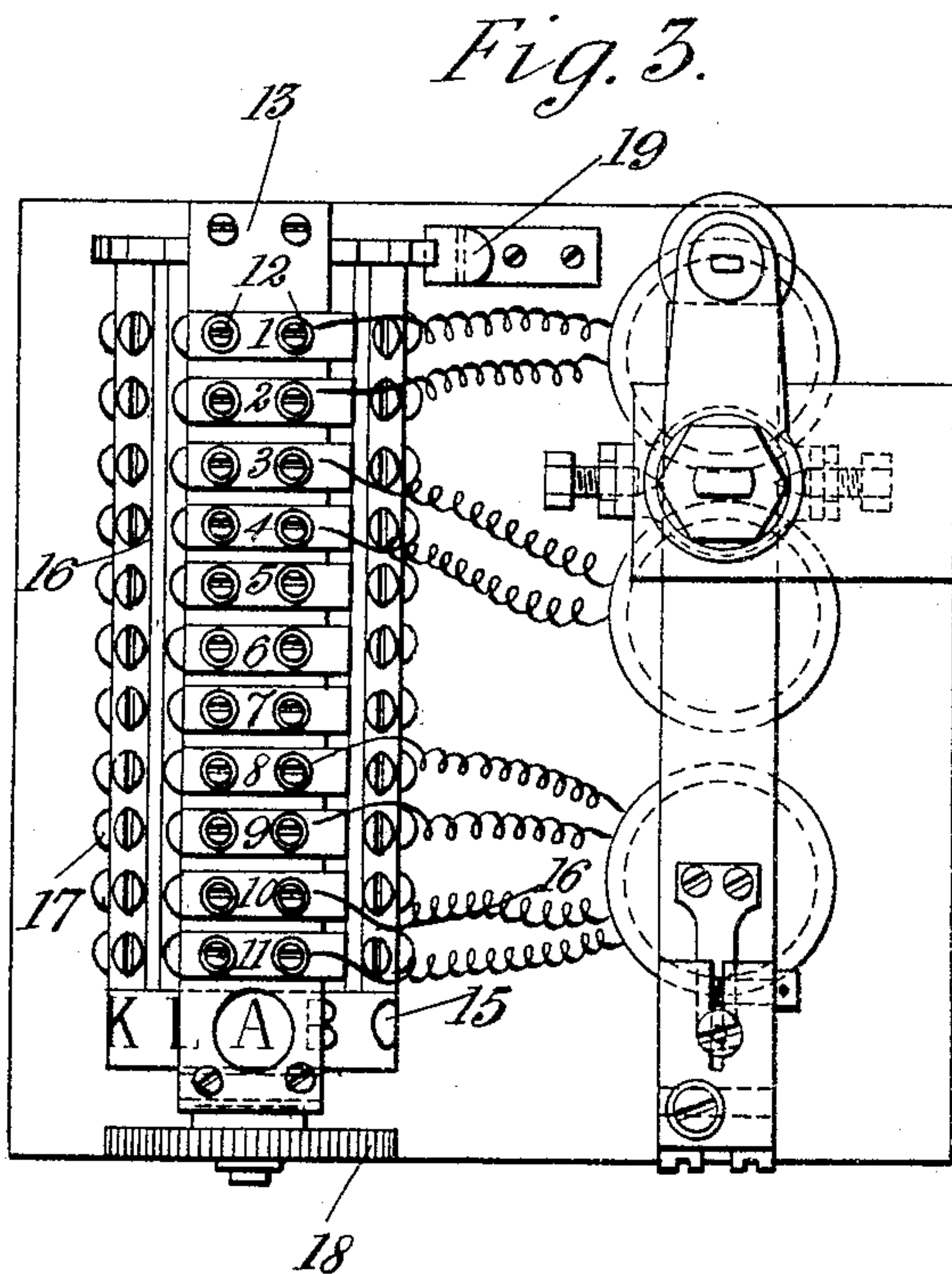
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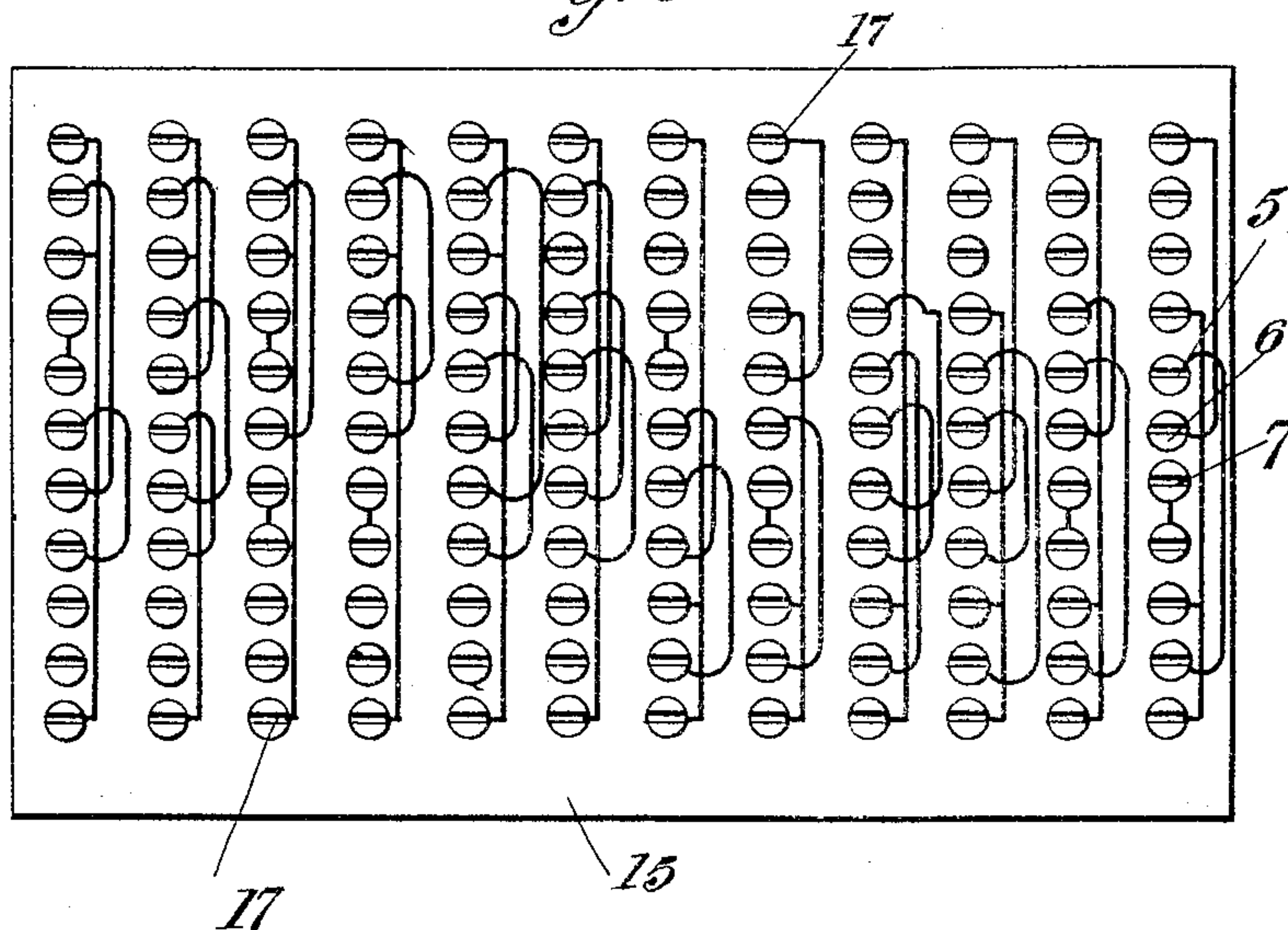
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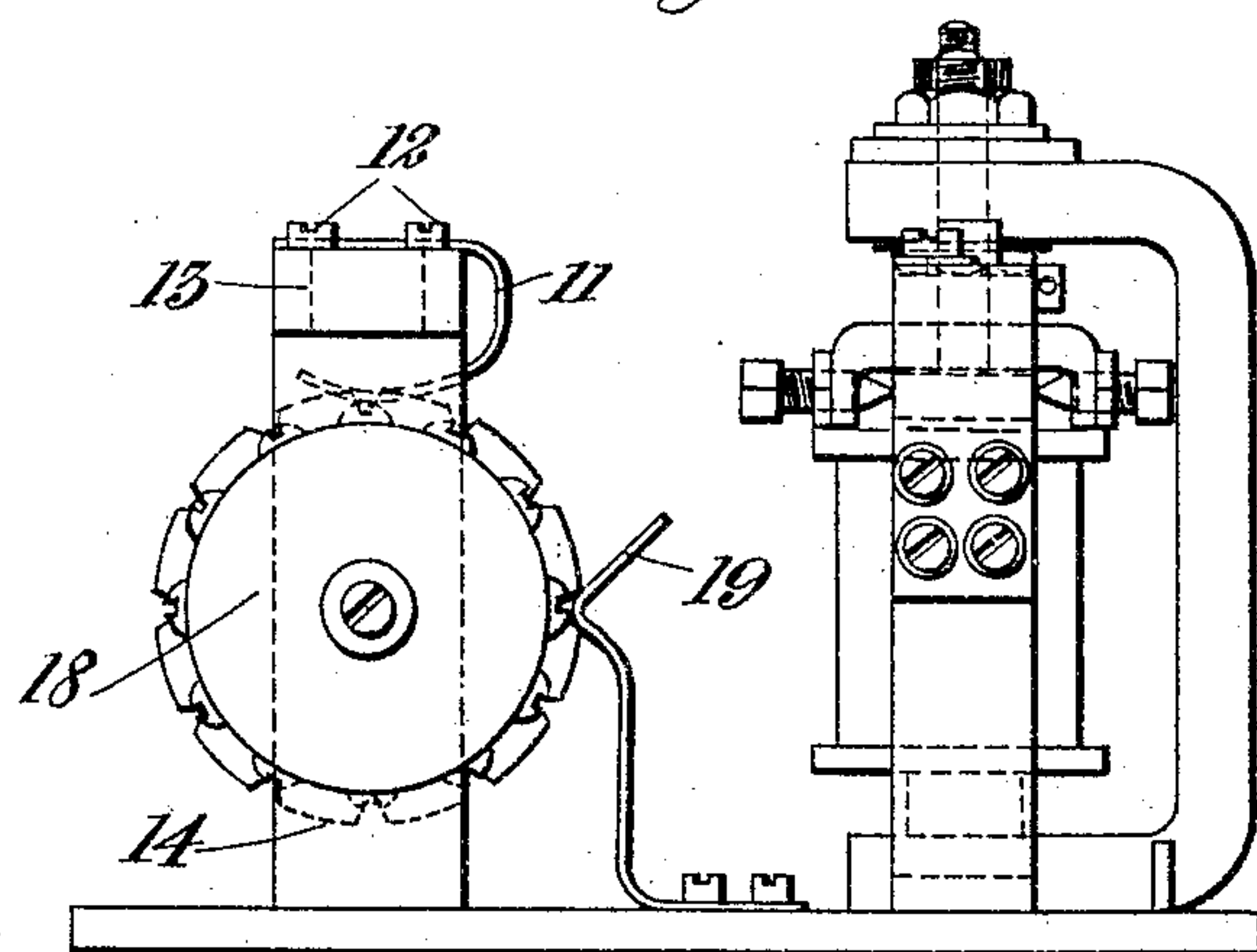
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3 SHEETS—SHEET 3.

*Fig. 6.*



*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

CHARLES M. JACOBS, OF MAIDENHEAD, AND ARTHUR H. NICHOLSON, OF WENDOVER, ENGLAND.

## SWITCH FOR SELECTIVE ELECTRIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 783,279, dated February 21, 1905.

Application filed April 18, 1904. Serial No. 203,795.

*To all whom it may concern:*

Be it known that we, CHARLES MARK JACOBS, residing at 110 Grenfell road, Maidenhead, in the county of Berks, and ARTHUR HAROLD NICHOLSON, residing at 5 Chiltern road, Wendover, in the county of Bucks, England, subjects of the King of Great Britain and Ireland, have invented new and useful Improvements in Switches for Use in Connection with Selective Electric Signaling Apparatus, (for which we have applied for a patent in Great Britain, dated June 27, 1903, No. 14,375,) of which the following is a specification.

In selective signaling installations the relay at each station is connected with the main conductors in such a manner that it responds to one alone of the several combinations of positive and negative currents which can be sent through the conductors. A consideration of an installation of this kind will show that the connections between the relays and the main conductors require to be very carefully planned, so that in introducing an installation or adding a new station to an existing installation or repairing an existing station it is difficult to give directions for making the connections.

Our invention relates to a switch having for its object to facilitate the connection of the relay at a station with the main conductors and to render possible a variation of the particular combination of currents to which the relay at a station will respond if at any time it be desired to make two stations respond to the same combination of currents. For this purpose we connect the main conductors and the terminals of the relay-windings with a sufficient number of contacts mounted on a base of insulating material and arrange sliding conductors, whereby any two or more of these contacts are connected. We may provide suitable lengths of flexible wire having as terminals suitable plugs, which can be pushed into sockets in the contacts. Again, when a rapid change of connections is desirable we connect the main conductors and the terminals of the coils of the relay with a sufficient number of springs, which can be brought into contact with

an equal number of studs or suitable pieces of metal mounted on an insulating-base and interconnected so as to produce connections between the main conductors and the relay-coils. We arrange a number of these sets of studs, any one of which sets can be brought into contact with the springs, as desired. By making different interconnections between the studs in the different sets it is evident that corresponding connections between the springs must result. Whichever of these methods be adopted, it will be understood that the terminals of the switch at each station may be connected anyhow with the relay, on the one hand, and with the main conductors, on the other hand, the proper combination being attained merely by setting the switch in a position different from that at any of the stations responding to a different combination or similar to that at a station which is to respond to the same combination. Thus the switch may be made a stock article and supplied merely with a direction how it is to be set.

For the sake of illustration we will describe a switch constructed according to our invention for use in an installation such as is described in British Specification No. 146 of 1902, in which twelve stations are served by three main conductors, (two lines and earth,) there being three relays at each station, or a compound relay of the kind described in British Specification No. 23,255 of 1902.

In the accompanying drawings, Figures 1 and 2 are diagrammatic plans of two forms of the switch. Fig. 3 is a plan, Fig. 4 a side elevation, and Fig. 5 an end elevation, of a third form of the switch, Fig. 6 being a developed plan of the drum of Fig. 3, showing the interconnections of the studs.

It must be premised that as the sets of three relays (British Specification No. 146 of 1902) or the compound relays (British Specification No. 23,255 of 1902) are made so that they can be introduced into any of the twelve stations irrespective of the combination of currents to which they are to correspond there must be four coils, and therefore eight terminals at each station, for connection with the main con-



ductors and with each other, although only three coils are in use at any one station—that is to say, in the case of separate relays there must be in all three polarized and one non-

5 polarized, or there must be one polarized and one non-polarized, each with a double winding. In the case of a compound relay both the polarized and non-polarized portions must have double windings.

10 Referring now to Fig. 1, the eight contacts *ghijklmn*, constituting the terminals of the relays, are arranged radially on an insulating-base, and at the center from which they radiate is a spindle whereon are mounted, free to turn

15 independently of each other, three conducting-arms *a b c*, insulated from each other and connected, respectively, with the three main conductors. On the same spindle are also mounted, free to turn independently of each other,

20 three conducting-arms *d e f*, which, however, are electrically connected with each other. It is evident that when the arms *a b c* are turned to touch three of the eight contacts, respectively, these contacts will be connected

25 each with a main conductor, while when the arms *d e f* are turned to touch three contacts, respectively, these terminals are interconnected. Thus taking the positions shown in Fig. 1 it may be supposed that current flows

30 through arm *a* to contact *n* and thence through one of the three coils, returning to contact *l*, whence it flows through arm *e* to divide itself, part flowing through arm *d* to contact *m* and through the second coil back to contact *k*, and

35 so to a main conductor through arm *b*, the other part flowing through arm *f* to contact *j* and through the third coil back to contact *i* to pass into a main conductor through the arm *c*. It will be seen that by properly adjusting the

40 arms any of the combinations of currents described in the aforesaid specifications can be obtained, so that by fitting a switch of this kind at a station the relays or relay thereat can be set at once to respond to any one of

45 the combinations.

In Fig. 2 the terminals of the relay-coils are plug-contacts *opqrstuv*, and the main conductors are connected, respectively, with plug-contacts *wxy*. Three pieces of flexible

50 insulated conductor having each a plug at each end serve to connect any of the main conductors with any of the terminals, while three flexible insulated conductors each connected with both the others at one end and with a

55 plug at the other end serve to interconnect any three of the terminals.

In Figs. 3 to 6, which represent the preferred form of the switch, we have shown the switch in connection with a relay of the type

60 described in British Specification No. 23,255 of 1902, but differing from that there illustrated in that the polarized part of the relay has two bobbins which are so wound that when the core of one attracts the armature that of the

65 other repels it. This renders the action of

the relay more certain, but forms no part of the present invention and needs no further description.

It will be understood that there are four windings—two on the polarized core (or in 70 this case cores) and two on the non-polarized core. Only three are in use, however, for response to a particular combination. The ends of one winding are connected with contact-

75 springs 1 and 4, respectively; those of the second with springs 2 and 3, respectively; those of the third with springs 8 and 9, respectively, and those of the fourth with springs 10 and 11, respectively. The main conductors are

80 connected with springs 5, 6, and 7, respectively. The said springs are fastened by screws 12 to an insulating-bar 13, supported on up-

85 rights 14. In these uprights is journaled a drum 15, made up of twelve strips of insulating material 16, each carrying eleven contact-

90 studs 17. The drum can be rotated by a milled nut 18, so as to bring any one of the twelve rows of contact-studs in the position in which each stud is in contact with a spring. This posi-

95 tion is indicated by the appearance of a letter on the periphery of the drum beneath a hole in the bar 13, as indicated in Fig. 3, and is maintained by a detent 19, Fig. 5. Fig. 6 shows how the contact-studs 17 are intercon-

100 nected in each row to allow the currents to pass through the relay in the desired manner. The relay, with its switch, having been fixed at a station, it is only necessary to connect the

main conductors with springs 5, 6, and 7 and to turn the drum until the letter proper to

105 the station can be seen through the hole in bar 13.

Having thus described the nature of this invention and the best means we know of carrying the same into practical effect, we claim—

105

1. A switch for use in connection with selective signaling apparatus, comprising a set of contacts insulated from each other, three contacts insulated from each other, means for electrically connecting the said three contacts

110 with any three of the contacts of the said set, respectively, sets of three contacts, electrical connections between the three contacts of each set, and means for bringing the contacts of any

115 one of the said sets of three contacts in electrical connection with three of the contacts of the said set, respectively.

2. A switch for use in connection with selective signaling apparatus, comprising springs insulated from each other, series of

120 contact-studs insulated from each other and so mounted that the studs of any series can be brought into electrical contact with the said springs respectively and electrical intercon-

125 nections between three of the studs in each series, and between three pairs of the studs in each series, such that when the series is in contact with the springs, three of the latter are electrically interconnected while another three

130 are electrically connected each with another



spring not included among the three which are interconnected.

3. A switch for use in connection with selective signaling apparatus consisting of  
5 eleven springs, an insulating-bar on which the said springs are mounted, a drum mounted to revolve, twelve strips of insulating material carried by the said drum, eleven contact-studs carried by each of the said strips, a device for  
10 turning the said drum to bring the contacts of any of the said series to touch the said springs respectively, and electrical interconnections between the said studs of each series such that the same three of the said springs are elec-

trically connected each with another of the 15 springs and that there is electrical connection between three pairs of the springs other than the said three, whichever series of studs is in contact with the springs.

In testimony whereof we have signed our 20 names to this specification in the presence of two subscribing witnesses.

C. M. JACOBS.

A. H. NICHOLSON.

Witnesses:

JOSEPH WILLARD,

WALTER J. SKERTEN.