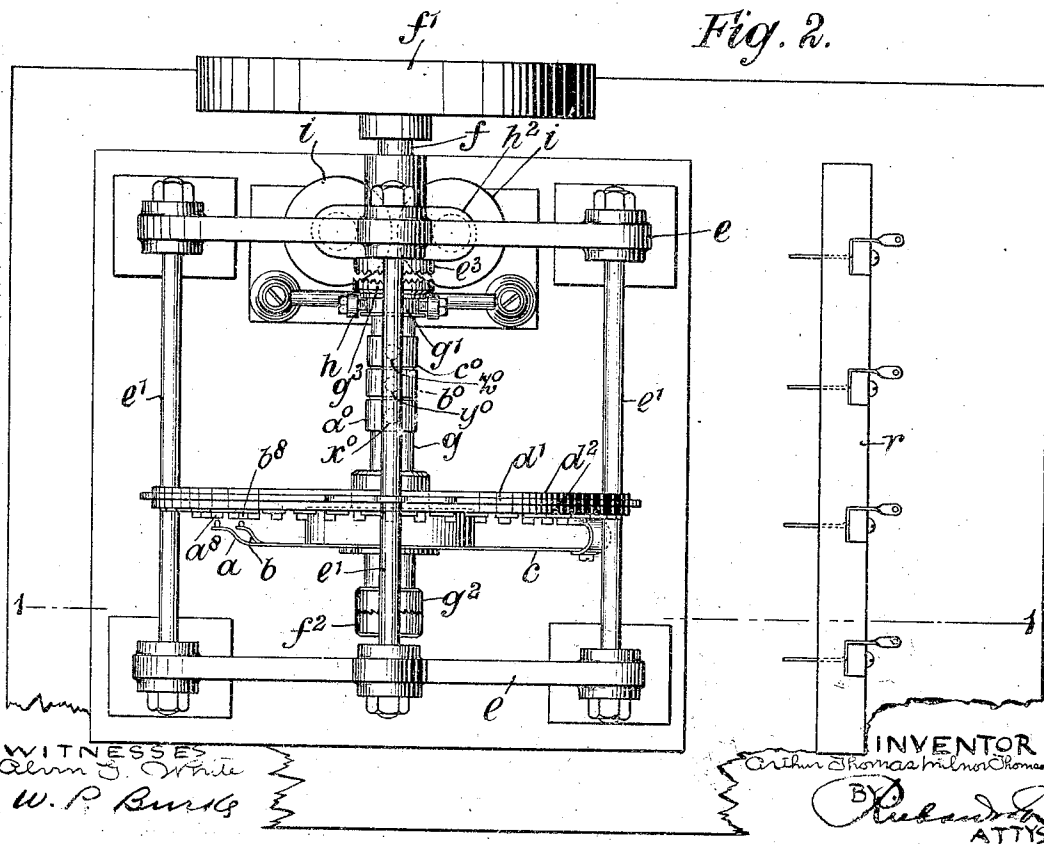
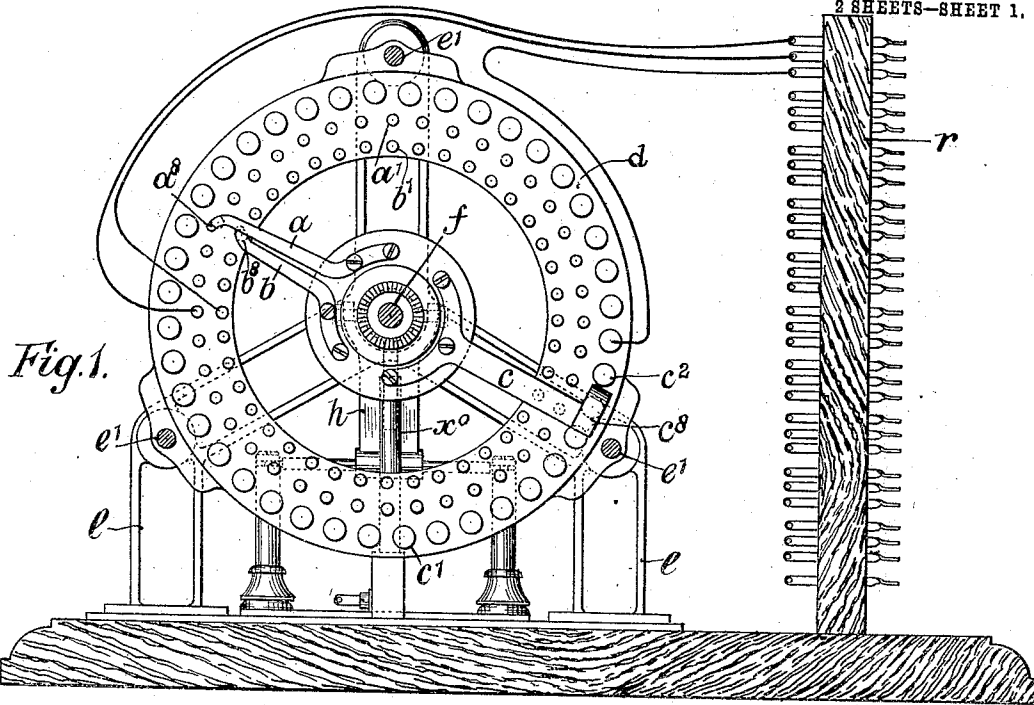


A. T. M. THOMSON.
 APPARATUS FOR FACILITATING COMMUNICATION BETWEEN TELEPHONE EXCHANGES.
 935,285. APPLICATION FILED AUG. 28, 1906. Patented Sept. 28, 1909.

2 SHEETS—SHEET 1.



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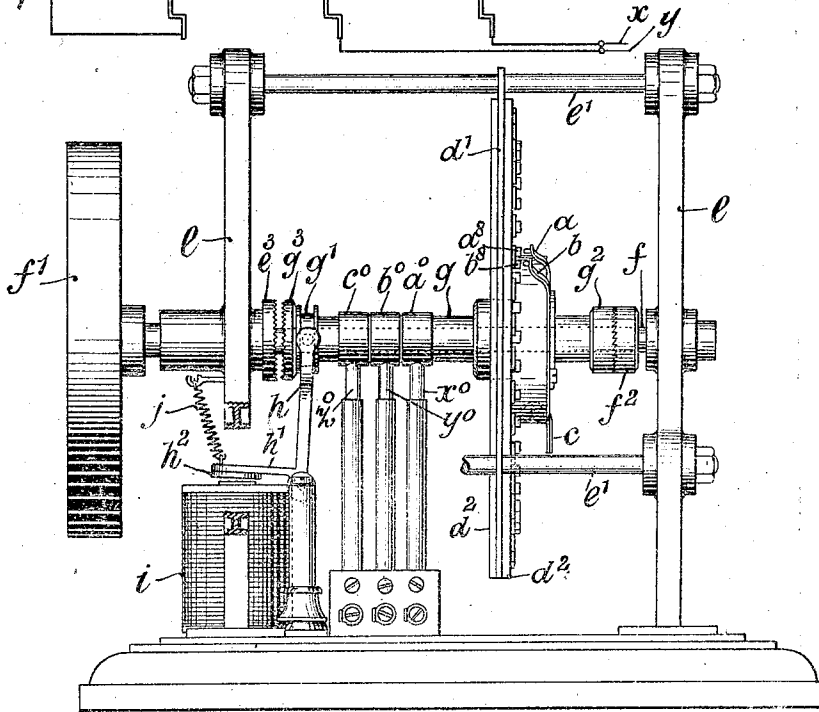
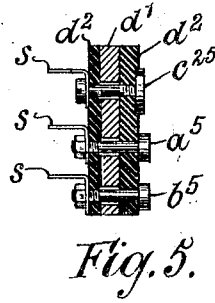
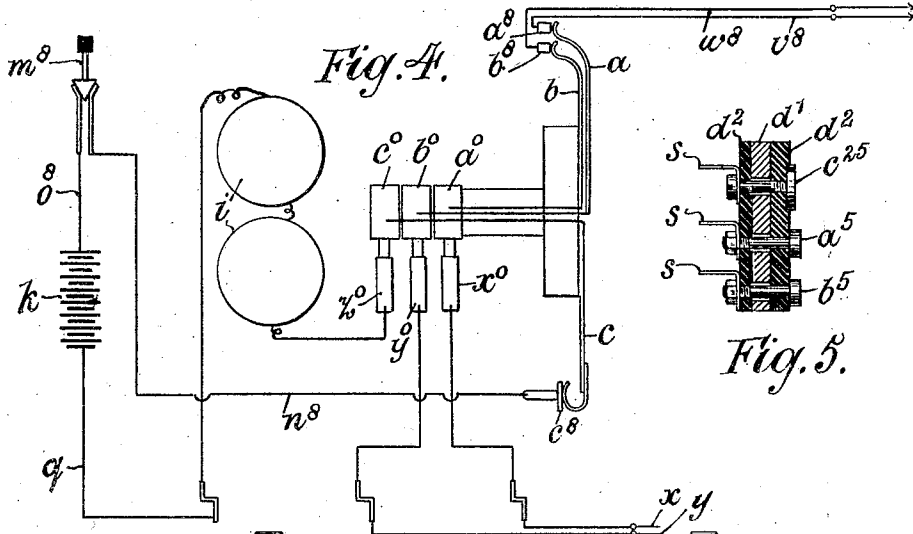
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2 SHEETS—SHEET 2.



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ARTHUR THOMAS MILNOR THOMSON, OF LONDON, ENGLAND.

APPARATUS FOR FACILITATING COMMUNICATION BETWEEN TELEPHONE-EXCHANGES.

935,285.

Specification of Letters Patent. Patented Sept. 28, 1909.

Application filed August 28, 1906. Serial No. 332,363.

To all whom it may concern:

Be it known that I, ARTHUR THOMAS MILNOR THOMSON, a subject of the King of Great Britain, residing at 22 and 23 Charles street, Hatton Garden, in the county of London, England, have invented new and useful Improved Apparatus for Facilitating Communication Between Telephone-Exchanges, of which the following is a specification.

This invention relates to telephone apparatus whereby any one of a limited number of telephone operators, in the neighborhood of one another, can in turn obtain the exclusive use of the wire circuit leading from that neighborhood to another station and returning through earth, or as is usual by a second wire.

The contrivance is adapted to enable each in turn, of the subscribers who are connected with a telephone exchange on the party system, to place himself in communication with the exchange and exclude, as long as his requirements demand, all the other subscribers of the party, without necessitating the employment of a human intermediary. It is also even more particularly adapted to enable any one of a set of operators at a home exchange to obtain each in turn, the exclusive possession of the call or order wire which connects that exchange with a distant exchange or with another branch of the home exchange.

The principle of operation consists in providing in the neighborhood of the several operators of the set or party an instrument in which is mounted what may be described as a visiting organ which organ is, by some convenient mechanical energy, caused to travel on circuit and in turn present itself successively to the service of each operator of the set or party, each operator being provided with means for rendering the engagement of such service automatic when so presented subsequently to being desired.

The accompanying drawings show a form of construction whereby the above described functions can be efficiently performed, the instrument shown, of which the diameter of the disk is about 7 inches being adapted to serve the requirements of 40 associated operators and the visiting organ moving in an efficient manner at the rate of one revolution per second when not arrested.

In these drawings:—Figure 1 is a sectional end elevation taken along the line 1—1 of Fig. 2. Fig. 2 is a plan. Fig. 3 is a

side elevation, parts being omitted. Fig. 4 is a diagrammatic representation of the instrument showing the electric connections, and:—Fig. 5 is a section showing a detail of the construction of the instrument.

In these figures for each of a number of operators, three contact studs $a^1 b^1 c^1$, $a^2 b^2 c^2$ &c. are provided. These are secured symmetrically in an insulated manner around a disk d which is secured to a frame e in which is mounted a spindle f adapted to be maintained in a state of uniform rotation by some convenient source of energy transmitted by a band to the pulley f^1 . To the spindle is secured the crown-toothed ratchet-wheel f^2 and on the spindle is mounted a sleeve g adapted to slide and turn thereon, having near one end a ring groove g^1 where with the extremities of a pivoted fork h can engage and effect the longitudinal displacement of the sleeve while permitting it to freely rotate. At the other extremity of the sleeve is secured a crown-toothed ratchet-wheel g^2 adapted to engage with f^2 and cause the sleeve to be rotated thereby. To the end of the sleeve, opposite to g^2 , is secured another crown-toothed wheel g^3 having V-shaped teeth adapted to engage with a similar toothed disk e^3 which is secured to the frame e and the sleeve thereby be brought to rest in one of a number of precise angular positions, such number being equal to the number of teeth in the wheels $e^3 g^3$ and equal to the number of sets of studs $a^1 b^1 c^1$ &c. and number of operators. To the sleeve is secured, in an insulated manner, three spring arms $a b c$ the extremities of which are adapted to make metallic contact with one of the sets of studs $a^1 b^1 c^1$, &c., $a b$ with $a^1 b^1$, &c., respectively, when the sleeve is arrested, and c with c^1 , c^2 , &c., successively, when the sleeve is rotating. On the sleeve are secured, also in an insulated manner, three rings $a^0 b^0 c^0$ which are electrically connected to the arms $a b c$ respectively. In permanent rubbing contact with the rings $a^0 b^0 c^0$ are three spring mounted brush contacts $x^0 y^0 z^0$.

The above mentioned pivoted fork h constitutes one arm of a bell-crank lever the other h^1 carrying an armature h^2 of an electromagnet i . When this latter is energized, the attraction of the armature will draw the sleeve g out of engagement with the rotating spindle and cause its abrupt arrest by effecting an engagement between the teeth of g^3

and e^s and, when subsequently the electromagnet becomes deenergized by the breaking of the circuit, the spring j will withdraw the armature and displace the sleeve to re-
 5 new engagement with the rotating spindle through the medium of the ratchet-wheels f^2 g^2 and cause the arms a b c to re-commence visiting the sets of stud contacts a^1 b^1 c^1 &c.

10 The electrical connections will now be described, especial reference being therein made to Fig. 4 but also to the other figures. In the description it will, as a representative example, be supposed that a calling operator
 15 is in possession of the call or order wire, the arms a b c being arrested in contact with the studs a^s , b^s , c^s respectively. In such a case an electric circuit will be established through the winding of the telephone of the calling
 20 operator and an operator at a distant or branch exchange, through the to and return call or order wires x y which are permanently joined to the before mentioned brush contacts x^o y^o and through electric leads n^s
 25 w^s from the telephone of the calling operator which are permanently joined to the studs a^s b^s respectively, the circuit being temporarily completed by the movement of the arms a b into contact with the studs a^s b^s .

30 The completion of the above described telephone circuit was effected by energizing the electromagnet i from a local source of electrical energy k by the completion of another electrical circuit in the following manner:—Each operator is in command of a
 35 separate circuit closing press key, that forming a portion of the equipment of the calling operator being denoted m^s and shown on Fig. 4. One side of the gap, adapted to be
 40 closed by the key, is permanently joined to the contact stud c^s by the wire n^s and the other side by a wire o^s to one of the poles of a battery h , the other pole of the battery being joined by a wire q to the winding of
 45 the electromagnet i and led therefrom to the before mentioned brush contact z^o . It will thus be seen that should a key be pressed, as for example the key m^s by the calling operator, then when subsequently the arm c in
 50 its periodic visitation brushes the contact stud c^s , the local circuit will forthwith become completed and the consequent energizing of the electromagnet will effect the completion of the telephone circuit as before described. When the calling operator releases
 55 the key m^s the arms a b will spring out of

contact and resume their circular journey until again arrested when arm c next brushes the stud of another operator who has previously pressed the key at his command. 60

To facilitate the making and the tracing of the electrical connections a board r is provided and sets of three wires connect this board to the sets of studs in the manner indicated in Fig. 1. The arm c extends in a
 65 direction opposite to that of the arms a b in order to balance the pressures when the telephone circuit is completed.

Fig. 5 by a section taken through the contact studs a^s b^s and c^s shows in detail the
 70 method of fixing the studs of the disk. This latter is composed of a metal plate d^1 whereby it is secured to 3 rods e^1 which form a portion of the frame e and two vulcanite plates d^2 . The holes in the metal plate are
 75 bored to a large diameter so that on inserting the studs and screwing them tightly, the vulcanite plates and the wiring strips s will be firmly secured without danger of contact of the stud-shanks with the metal plate d^1 . 80

I claim.

In an apparatus of the class described for facilitating communication between each of several operators at a central exchange and a single operator at a distant exchange, a
 85 rotary visiting organ, three contact springs, carried by said organ, for each contact spring, a ring concentrically mounted on the visiting organ to which rings each of said contact springs is permanently electrically
 90 connected, call or order wires connecting the two exchanges, three fixed brush contacts, two of which are in electrical connection with said call wires, a local circuit including the third brush contact, an electromag-
 95 net coil and the source of electrical energy included in said local circuit, the whole being so arranged that after the voluntary closure of a gap in the local circuit by an operator, the subsequent automatic closure
 100 of a second gap in the same circuit by the visiting organ, energizes the electromagnet and thereby completes the telephone circuit of the said operator.

In testimony whereof I have signed my
 105 name to this specification in the presence of two subscribing witnesses.

ARTHUR THOMAS MILNOR THOMSON.

Witnesses:

ROBERT A. BLAKE,
 T. J. OSMAN.