

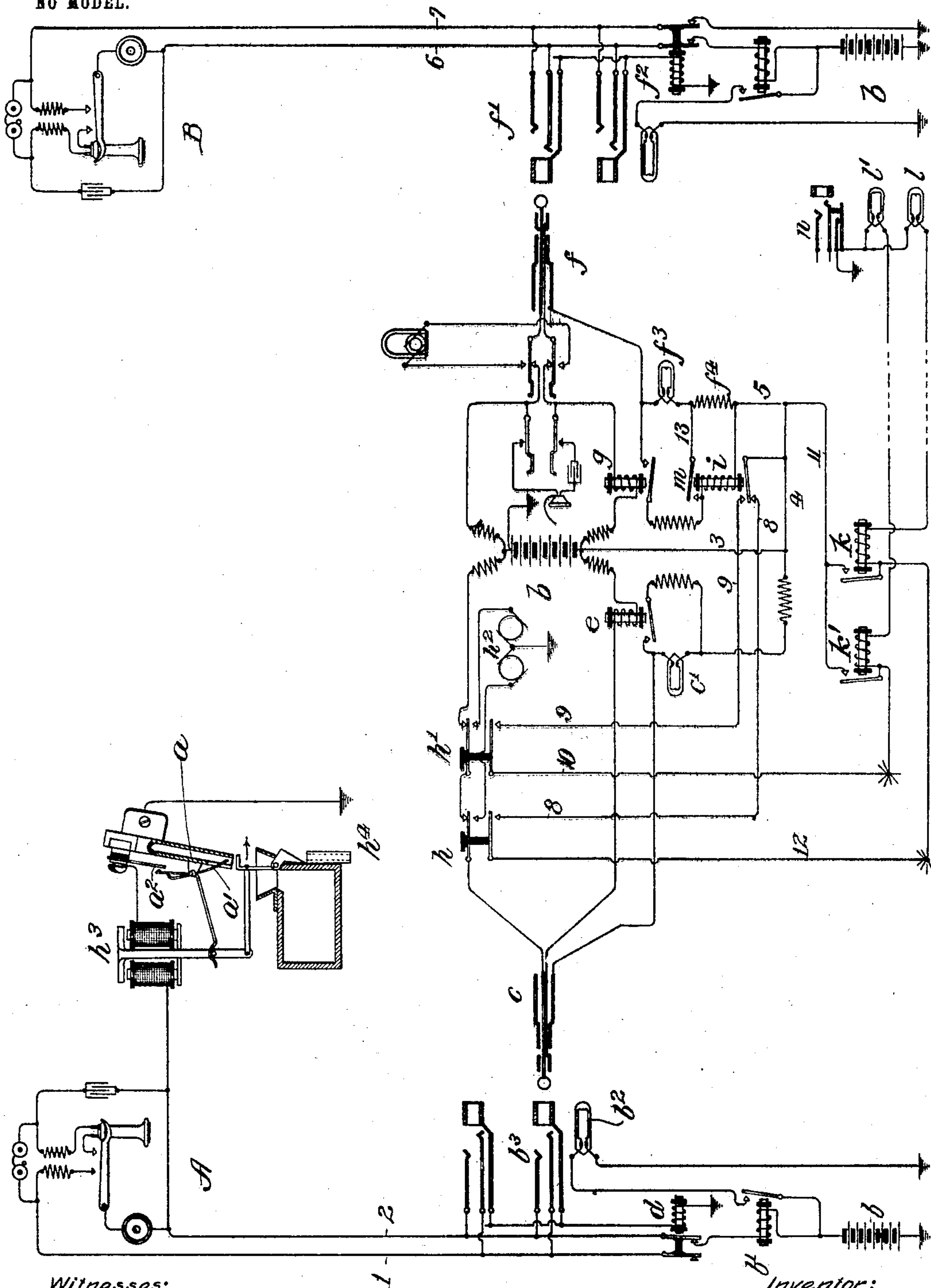
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E. H. SMYTHE.
APPARATUS FOR TELEPHONE SWITCHBOARDS.

APPLICATION FILED JAN. 23, 1903.

NO MODEL.



Witnesses:

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 764,690, dated July 12, 1904.

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To all whom it may concern:

Be it known that I, EDWIN H. SMYTHE, a citizen of the United States, residing at Freeport, in the county of Stephenson and State of Illinois, have invented a certain new and useful Improvement in Apparatus for Telephone-Switchboards, (Case No. 5,) of which the following is a full, clear, concise, and exact description.

My invention relates to a telephone-exchange switchboard system; and its object is to provide means whereby the improper manipulation by the operator of switching mechanism under her control will result in the actuation of a signal which will serve to give notification of the improper act, and thus constitute a check against careless operation.

My invention was designed more particularly for use in connection with telephone toll systems wherein a charge is made or a coin or token collected for each successful use of the line. In a well-known system of the latter type the subscriber on making the call deposits a coin tentatively, the coin serving to complete the connection to operate the line-signal. Once deposited the coin is under the control of the central-office operator, who can by manipulating one key or another key, as the case may be, direct the coin into the cash-box or cause it to fall outside the cash-box, so as to be returned to the subscriber, in which systems it sometimes happens that the operator will manipulate the wrong key, so as to return the coin to the subscriber when it should be directed to the cash-box, or vice versa. My monitor-signal is intended to give notice to the supervising operator of any such erroneous or false manipulation, thus keeping a check upon the operators' errors.

I am describing my invention as particularly adapted to systems in which coin-collecting toll-boxes are employed. It will be apparent from the more detailed description which follows that my invention may be applied in modifications of the particular system which is set forth in this specification—such, for instance, as in those systems well

known in the art wherein connection-registers are employed in place of coin-collectors.

My invention will be more readily understood by reference to the accompanying drawing, in which I have shown two subscribers' stations, a coin-collecting box at one of the stations, and central-office apparatus, including a cord-circuit, combined with my monitor signaling apparatus, which I have illustrated.

A and B may be considered as ordinary subscribers' telephone sets, a coin-collecting box being shown at station A only. This coin-collecting box is provided with a chute a , in which a coin is initially inserted to operate the lever a' and close contact at a^2 , which directs current from battery b at the central office through the line-relay b' to light the line lamp or signal b^2 . The operator on inserting in an answering-jack b^3 the answering-plug c directs current through the supervisory lamp c' and thence through the sleeve of plug c and the thimble of switch b^3 through the cut-off relay d to ground. The subscriber A taking down the telephone causes battery-current to flow through supervisory relay e to the ring of plug c , thence to limb 1 of the telephone-line and back over limb 2 to the tip of plug c and thence to the other side of the battery. Supervisory relay e is thus operated, shunting out lamp c' . The operator having communicated with subscriber A finds out what subscriber is wanted, which we assume is the one at station B. She thereupon inserts plug f in jack f' and throws on the calling-generator. The act of inserting the connecting-plug directs current from the central-office battery through the cut-off relay f^2 , lighting the supervisory lamp f^3 . The path of the current from the central-office battery may be traced, as indicated, by wires 3, 4, and 5, through resistance f^4 and signal-lamp f^3 to the sleeve of plug f , thence to the thimble of switch f' , and thence through the winding of cut-off relay f^2 . When the subscriber B responds, current from the central-office battery will be directed through supervisory relay g to the ring of plug f , limb 6 of the telephone-line of station B, and back

over limb 7 to the spring of jack f' in contact with the tip of the plug, and thence to the other pole of the battery. Relay g being operated shunts out signal f^3 . The deposit-key h and the refund-key h' are connected with the generator h^2 , which is of sufficient electromotive force to operate the polarized magnet h^3 of the coin-collector, current of a given polarity being sent by deposit-key h to throw the coin-stop in the direction indicated by the arrow to cause the coin to fall to the left of said stop and into the cash-box. The refund-key h' on being depressed directs current of the opposite polarity through the polarized magnet h^3 to tilt the coin-stop in the opposite direction to permit the coin to fall into the return-chute h^4 . It will be understood that the general plan of the telephone-circuits, the construction of the coin-collecting box, and the manner of supervising the connection are old in the art.

My invention is embodied more particularly in the switch-relay i , with the circuits thereof, and the locking-relays k k' and the monitor-signals l l' as combined with the deposit and refund keys and the other parts of the apparatus. The last act of the operator before disconnecting two lines is to press deposit-key h to throw the coin into the box. If an unsuccessful attempt is made to make connection with a line—as, for example, if subscriber A should call for subscriber B and fail in the connection—then the operator finding the line to station B busy or being unable for any reason to get the desired connection will return the coin to the subscriber at station A by depressing-key h' . My invention, as before stated, relates primarily to notifying the supervising operator of any false manipulation of keys h h' , and I will describe now the action of the apparatus in making such signal.

Assume that the plugs c and f are inserted in answering-jack b^3 and in multiple jack f' to connect the two telephone-lines together for conversation and that the clearing-out signals c' and f^3 have been displayed. It is then the duty of the operator to press on key h , which being done tilts the coin-stop or partition at station A in the direction indicated by the arrow to guide the coin into the cash-box. If this is done, the signal l will not be lighted, for the reason that the wire 8 will be open at the contact of relay i —that is to say, the supervisory relay g has acted to close the circuit through relay i . A feature of the circuit is the provision of the relay-armature m and its contact in association with the conductor 13, resistance f^4 , signal-lamp f^3 , and switch-contacts of relay g , arranged as shown, so that when relay i is excited by current directed through the contact of relay g current through relay i will be maintained independent of relay g through said armature m and its contact,

while at the same time lamp f^3 will be brought under the control of relay g —that is to say, when relay i has acted to shift connection of battery-wire 4 from wire 8 to wire 9 the condition will continue independent of the condition of relay g . We will now assume that by chance the operator pushed key h' when she should have pushed key h . It is apparent that in such case the battery-current will be closed from wire 4 to wire 9 and thence through the lower part of key h' to wire 10 and thence through relay k' and lamp l' . Relay k' being once closed will remain closed, since battery-current will be directed by wire 11 through the contact of said relay k' and thence through the lamp l' . This lamp being displayed will be notice to the supervising operator of the false connection. On the other hand, assume that the operator fails to get subscriber B: First, that the line is found busy when the tip of plug f is touched to the thimble of the jack f' and the plug f will not be inserted, and therefore supervisory magnet g will not be excited. Second, suppose subscriber at station B fails to respond after plug f is inserted in switch f' . In this case the telephone-switch at station B remaining in its lower or normal position there will be no closing of the circuit between limbs 6 7, and in this case supervisory magnet g will not be excited. In either case it is the duty of the operator to manipulate key h' and so send current through magnet h^3 in a direction to tilt the coin-stop or partition in a direction opposite to that indicated by the arrow. This will cause the coin to pass outside the cash-box to be returned to the subscriber at station A. If key h' is manipulated, there will be no lighting of the lamp l' , because wire 9 will be found open at the contact of relay i . If, however, by mistake key h should be manipulated, the signal l would be disclosed—that is, the circuit would be formed through wire 8 to the lower contact of key h to wire 12 and thence through relay k . The relay k being closed current will be directed by wire 11 through the contact of said relay and the coil thereof through the lamp l to ground.

The keys h h' might be arranged to be manipulated for other purposes than the specific purpose of tilting the coin-stop without departing from my invention—that is to say, the polarized electromagnet p^3 may be utilized for any useful work in association with keys similar to keys h h' . It is evident that if the key h' , with the wires 9 10, the relay k' , and the lamp l' , were omitted the relay i and the remaining connections would be effective to display lamp l in case key h should be manipulated at a time when plug f was not inserted in the jack or on any occasion when the subscriber B had failed to respond by taking down his telephone. The key n , in the general form of a spring-jack, is adapted to re-

ceive the plug to be inserted by the supervising operator to open the circuit of the lamps, and thus efface the signal.

The relays h h' I have found desirable as a feature of my invention. The signaling system, however, would be operative without said relays provided the supervising operator should at all times watch the signals l l' , &c., so as to observe them at the moment any key was falsely pressed.

Having thus described my invention, I claim—

1. The combination with an electromagnetically-actuated toll device, and a switch for applying current to actuate said device, of a monitor-signal, a circuit for said signal completed in contacts of said switch when the same is operated to actuate the toll device, and a blocking device adapted to prevent the display of said signal.

2. The combination with a calling and a called telephone-line, of an electrically-actuated toll device associated with the calling-line, connection-switches and connecting-cords for establishing connection between said lines, a source of current, and a key associated with the connecting - cords for connecting said source of current to the toll device to actuate the same, a monitor-signal, a circuit for said signal controlled in contacts of said key, a telephone-switch at the substation of the called line, a relay in the circuit of the connecting-cords controlled by said telephone-switch, and means controlled by said relay for preventing the display of the aforesaid monitor-signal.

3. The polarized magnet h^3 adapted to control a toll device, in combination with the source of current h^2 and the keys h and h' , the supervisory relay g and the relay i controlled thereby, with the circuit connections 8 and 9, and the signals l l' , whereby false manipulation of either of the keys h and h' is indicated, substantially as described.

4. The combination with the polarized magnet of a toll device, of a telephone-line connecting the same with a central station, of the cord-circuit, the keys h and h' , the signals l l' connected therewith, and the supervisory relay g and relay i for controlling the circuit of said keys and signals, substantially as described.

5. The combination with an electrically-actuated toll device adapted to be alternatively operated by currents differing in character, of two keys for directing currents of different character through said toll device, a monitor-signal for each key, a circuit for each signal including switch-contacts of its associated key, and switch mechanism adapted to alternatively change said signal-circuits to place one or the other of said signals under the control of its associated key, whereby the display of a signal is made dependent upon the condition of the switch mechanism.

6. The combination with a calling and a

called telephone-line, of an electrically-actuated toll device associated with the calling-line, connection-switches and connecting-cords for establishing connection between said lines, a source of current, a key for connecting said source of current to the toll device to actuate the same, a monitor-signal, a circuit for the signal controlled in contacts of said key, and an electrically-actuated switch associated with the called line coöperating with said key in the control of the signal.

7. The combination with a calling and a called telephone-line, and means for making connection therebetween, of an electromagnetically-actuated toll device associated with the calling-line, a switch for applying current to actuate said device, a monitor-signal, mechanism for actuating said signal made effective in operating said switch, and blocking mechanism controlled in making connection with the called line for preventing the display of said signal.

8. The combination with a telephone-line, of a polarized toll device adapted for alternative operation associated with said line, means for connecting said line with another telephone-line, keys for alternatively directing positive or negative polarized current through said toll device to operate the same, a signal device for each key, an energizing-circuit for each signal device adapted to be completed in switch-contacts of its associated key, electrically-actuated switch mechanism associated with the second telephone-line for alternatively changing said signal-circuits to place one or the other of said signals under the control of its associated key, and a switch at the substation of said last-mentioned telephone-line controlling said switch mechanism, substantially as described.

9. The combination with a calling and a called telephone-line, of connection-switches and connecting-cords for making connection therebetween, a polarized toll device associated with the calling-line, said toll device being adapted to be alternatively actuated by currents of opposite polarity, a source of current, two keys associated with the connecting-cords for alternatively connecting the poles of said source of current with the calling-line to actuate said toll device, two monitor-signals, one for each key, an actuating-circuit for each signal controlled in contacts of its associated key, a relay in each circuit and a locking-circuit for the same completed in contacts of the relay, a switch at the substation of the calling-line controlling the flow of current therein, a relay in the cord-circuit responsive to said switch, and switch-contacts of said last-mentioned relay controlling the actuating-circuits of the aforesaid monitor-signals and adapted to alternatively place one or the other of said signals under the control of its associated key, dependent upon the position of the switch at the called substation, whereby the actuation of

the wrong key causes the display of a monitor-signal.

10. The combination with a calling and a called telephone-line, and a cord-circuit for making connection therebetween, of an electromagnetically-actuated toll device associated with the calling-line, a key for applying current to actuate said device, a monitor-signal, a circuit for the signal partially controlled by said key, a supervisory signal f^3 and resistance f^4 associated with the cord-circuit and having their circuit completed when connection is made with the called line, a normally discontinuous shunt of said signal and resistance, a relay i included in said shunt, a supervisory relay g having switch-contacts also included in said shunt, switch-contacts of relay i cooperating in the control of the circuit of

said monitor-signal, a conductor 13 extending from a point intermediate said resistance f^4 and said signal f^3 to a point intermediate of the winding of relay i and the switch-contacts of relay g , and switch-contacts m of relay i adapted to complete said conductor 13 when said relay is energized; whereby said relay i is locked in shunt of resistance f^4 , the circuit of the monitor-signal is placed under the sole control of said key, and the supervisory signal placed under the immediate control of relay g .

In witness whereof I hereunto subscribe my name this 2d day of December, A. D. 1902.

EDWIN H. SMYTHE.

Witnesses:

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