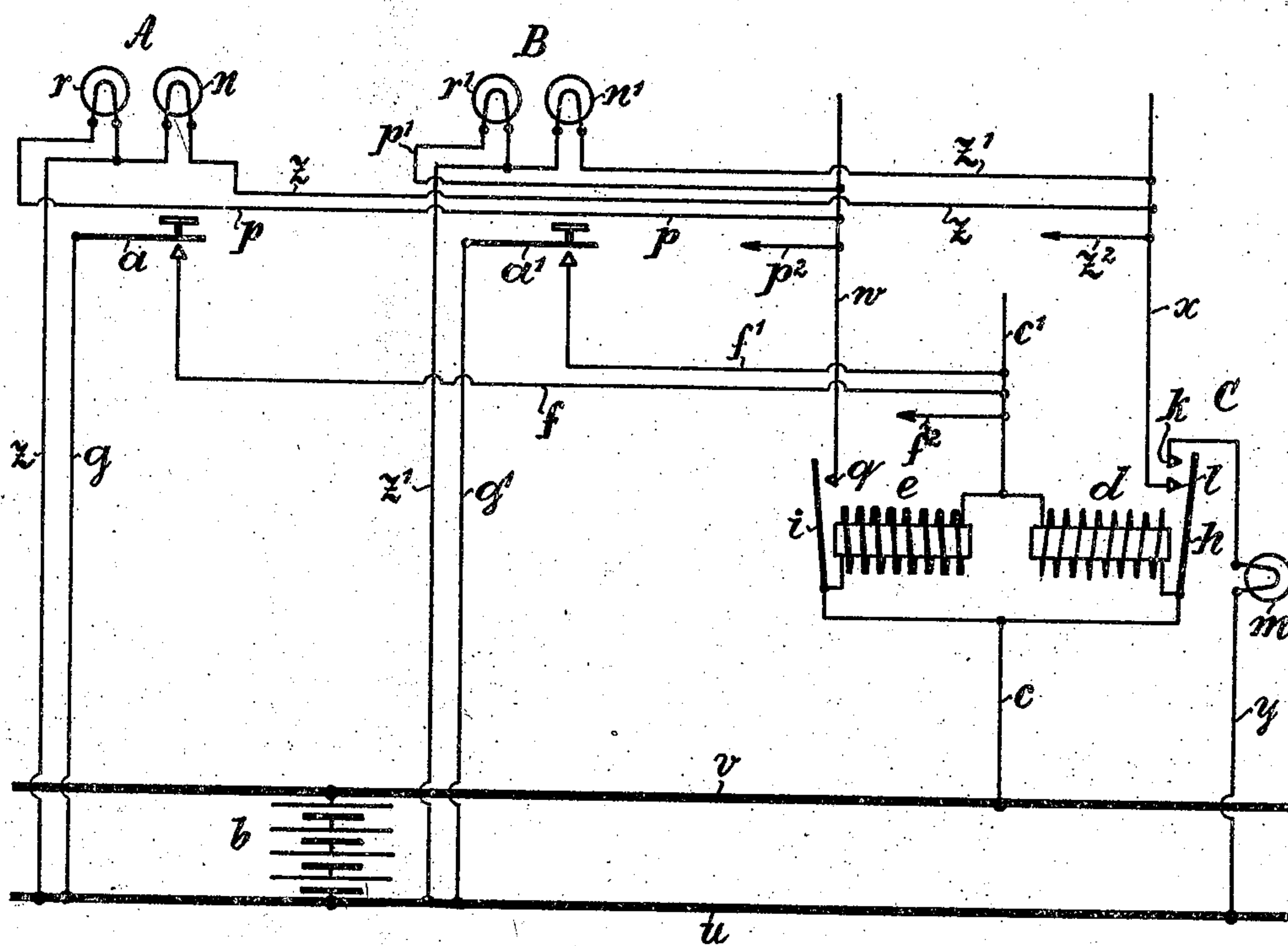


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PATENTED MAR. 13, 1906.

B. SALZMANN.  
TELEPHONE EXCHANGE.  
APPLICATION FILED NOV. 16, 1905.



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# UNITED STATES PATENT OFFICE.

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## TELEPHONE-EXCHANGE.

No. 815,042.

Specification of Letters Patent.

Patented March 13, 1906.

Application filed November 16, 1905. Serial No. 287,723.

*To all whom it may concern:*

Be it known that I, BENNO SALZMANN, a citizen of the Empire of Germany, residing at Berlin, in the Empire of Germany, have invented a new and useful Telephone-Exchange, of which the following is a specification.

My invention relates to an improvement in telephone-exchanges with separate distribution-switchboards and with separate connection-switchboards; and the object of my improvement is to automatically show to every distributing operator not only by means of a single signal, as usual, that the respective connecting operator is engaged, but also by means of two signals in case the same connecting operator is engaged by two or more other distributing operators.

For the operator at each of the several distribution-switchboards a plurality of pairs of signaling devices is disposed, of which a pair corresponds to the operator at either of the several connection-switchboards, and all the pairs of signaling devices at the several distribution-switchboards which correspond to either connecting operator are connected by lines with a double relay near the said connecting operator, which double relay is arranged for actuating only the one signaling device at every distribution-switchboard in case a current of ordinary strength is passing through the same and for actuating both signaling devices at every distribution-switchboard in case a current of a greater strength is passing through the same.

I will now proceed to describe my invention with reference to the accompanying drawing, which shows diagrammatically a part of the system at a telephone-exchange.

For the sake of simplicity I have shown only two pairs of signaling devices  $r\ n$  and  $r'\ n'$  for two distributing operators (marked with "A" and "B," respectively,) and the double relay  $d\ e$  for a connecting operator, (marked with "C.") The signaling devices are here assumed to be incandescent lamps.

$u$  and  $v$  denote two main conductors, between which a battery  $b$  is inserted. The keys  $a$  and  $a'$  for the two distributing operators A and B are connected with the one main conductor  $u$  by lines  $g$  and  $g'$ , respectively. In a similar manner the keys of the other distributing operators (not shown) are connected with the main conductor  $u$  by corresponding lines. For a connecting operator C the double relay  $d\ e$  and a single signaling device  $m$  are disposed. The coils

of the two electromagnets  $d$  and  $e$  are connected in multiple, on the one hand, with the other main conductor  $v$  by a line  $c$  and, on the other hand, with a line  $c'$ , which in turn is connected with the contact-pieces of the several keys  $a\ a'$  by lines  $f\ f'\ f^2$ . The movable armature  $h$  of the one electromagnet  $d$  is itself a conductor, is electrically connected with the line  $c$  and the coil of the electromagnet  $d$ , and is arranged for connecting two contact-pieces  $k$  and  $l$  on being attracted. The one contact-piece  $k$  is connected with the main conductor  $u$  by means of a line  $y$ , in which the signaling device  $m$  is inserted. The other contact-piece  $l$  is connected with a line  $x$ , which in turn is connected with the several signaling devices  $n\ n'$  by lines  $z\ z'\ z^2$ . The movable armature  $i$  of the other electromagnet  $e$  is also itself a conductor and is electrically connected with the line  $c$  and the coil of the electromagnet  $e$  and is arranged for coming in contact with the contact-piece  $q$  on being attracted. The contact-piece  $q$  is connected with a line  $w$ , which in turn is connected with the several signaling devices  $r\ r'$  by lines  $p\ p'\ p^2$ . The other terminals of the signaling devices  $r\ r'$  are shunted by lines to the lines  $z\ z'\ z^2$ , as is clearly shown. The two electromagnets  $d$  and  $e$  are so arranged that on the current of ordinary strength passing through their coils only the one electromagnet  $d$  will attract its armature  $h$ , while the armature  $i$  of the other electromagnet  $e$  remains idle, but that on a current of a greater strength passing through the two coils both electromagnets  $d$  and  $e$  will attract their armatures  $h$  and  $i$ .

As already mentioned in the introductory part of this specification, a plurality of separate keys  $a$  is disposed for every distributing operator, the total number of these keys being equal to the number of the connecting operators at the office. Of course two signaling devices  $r$  and  $n$  are connected with every key  $a$ . The manner in which these several keys  $a$  and the several pairs of signaling devices  $r\ n$  are to be connected with the double relays  $d\ e$  and the signaling devices  $m$  of the several connecting operators is obvious after the above explanations. It is also clear that every connecting operator has at his disposal as many signaling devices  $m$  and double relays  $d\ e$  as there are distributing operators. I do not further describe the remaining parts of the telephone-exchange, as they are known and form no part of this invention.



The telephone-exchange operates as follows: Supposing the distributing operator A to be desirous of engaging a connecting operator C, he depresses his respective key *a* to close the circuit, when the current will pass from the battery *b*, through the main conductor *v*, the line *c*, the coils of the two electromagnets *d* and *e*, the lines *c'* and *f*, the key *a*, the line *g*, and the other main conductor *u*, back to the battery *b*. Only the one armature *h* will be attracted for closing two circuits, when a current will pass from the line *c* through the armature *h* and will be divided between the two contact-pieces *k* and *l*. A part of this current passes from the contact-piece *k* through the line *y* with the signaling device *m* and through the main conductor *u* back to the battery *b*. The incandescent lamp *m* will then burn and give the signal to the connecting operator C. The other part of the current passes from the contact-piece *l* through the line *x* and all the several lines *z z' z''* and through the main conductor *u* back to the battery *b*, so that all the incandescent lamps *n n'* will burn and show to all the distributing operators that the connecting operator C is engaged. Should at the same time another distributing operator B depress his key *a'* for calling on the connecting operator C, of course a current will circulate through the main conductor *v*, the line *c*, the coils of the two electromagnets *d* and *e*, the line *c'*, the line *f'*, the key *a'*, the line *g'*, the main conductor *u*, and back to the battery *b*. The simultaneous currents in the two circuits *f g* and *f' g'* will produce a current of double the strength in the line *c*, the coils of the two electromagnets *d* and *e*, and the line *c'*, so that now also the other armature *i* will be attracted for closing a third circuit, when a current will pass from the key *i*, through the contact-piece *q*, the line *w*, all the lines *p p' p''*, the signaling devices *r r'*, the several lines *z z' z''*, and the main conductor *u*, back to the battery *b*. All the incandescent lamps *r r'* will therefore now burn in addition to those *n n'*, so that the first distributing operator A will know that another distributing operator wants to engage the connecting operator C, and all the other distributing operators B will know that the connecting operator is engaged by at least two parties.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a telephone-exchange, the combination with a plurality of keys, signaling devices and additional signaling devices, each key, each signaling device and each additional signaling device for a distributing-switch operator, of two relays and a signaling device for a connecting-switch operator, primary circuits

controlled by said plurality of keys and including said two relays which are connected in multiple, the first of said two relays being arranged for alone attracting its armature under the action of a current of ordinary strength and both relays being arranged for simultaneously attracting their armatures under the action of a current of a greater strength, secondary circuits controlled by the armature of the first of said two relays and including said plurality of signaling devices, a circuit shunted to said secondary circuits and including said signaling device, and circuits shunted to said secondary circuits and including said plurality of additional signaling devices and controlled by the second of said two relays.

2. In a telephone-exchange, the combination with two main conductors, of a source of electricity connected with said two main conductors, a plurality of keys each for a distributing-switch operator, a plurality of contact-pieces for said plurality of keys, two electromagnets for a connecting operator, lines connecting in multiple the coils of said two electromagnets on the one hand with the one of said two main conductors and on the other hand with said plurality of contact-pieces, a plurality of lines connecting said plurality of keys with the other of said two main conductors, a plurality of signaling devices each for a distributing-switch operator, the first of said two electromagnets being arranged for alone attracting its armature under the action of a current of ordinary strength and both electromagnets being arranged for simultaneously attracting their armatures under the action of a current of a greater strength, secondary circuits controlled by the armature of the first of said two electromagnets and including said plurality of signaling devices and the other of said two main conductors, a line shunted to said secondary circuits and to the other of said two main conductors and including a signaling device for said connecting-switch operator, a plurality of additional signaling devices each for a distributing-switch operator, and lines shunted to said secondary circuits and including said plurality of additional signaling devices and forming circuits which are controlled by the armature of the second of said two electromagnets.

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

BENNO SALZMANN.

Witnesses:

ABORER SITTENMANN,  
RICHARD ROSENSTICHT.