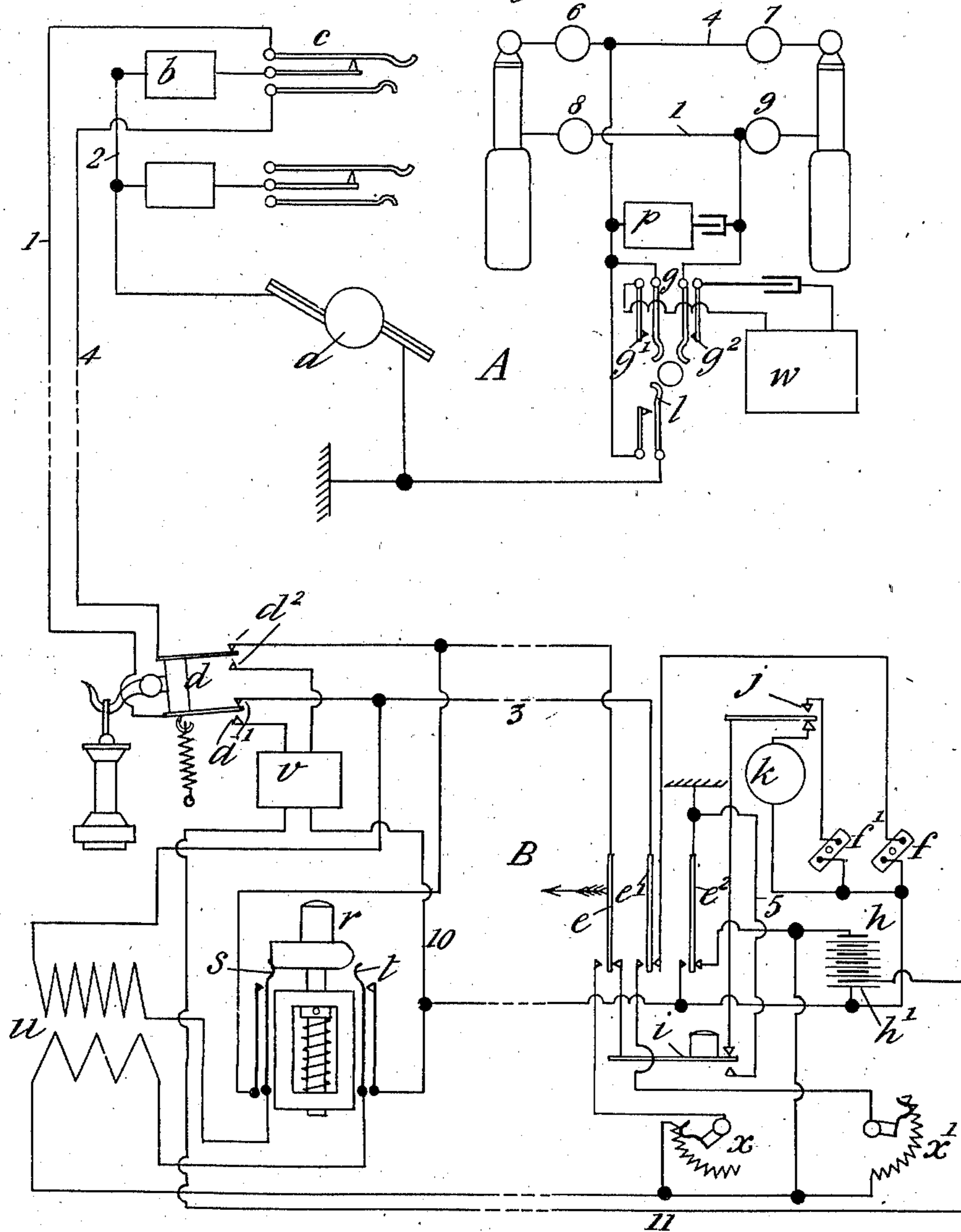


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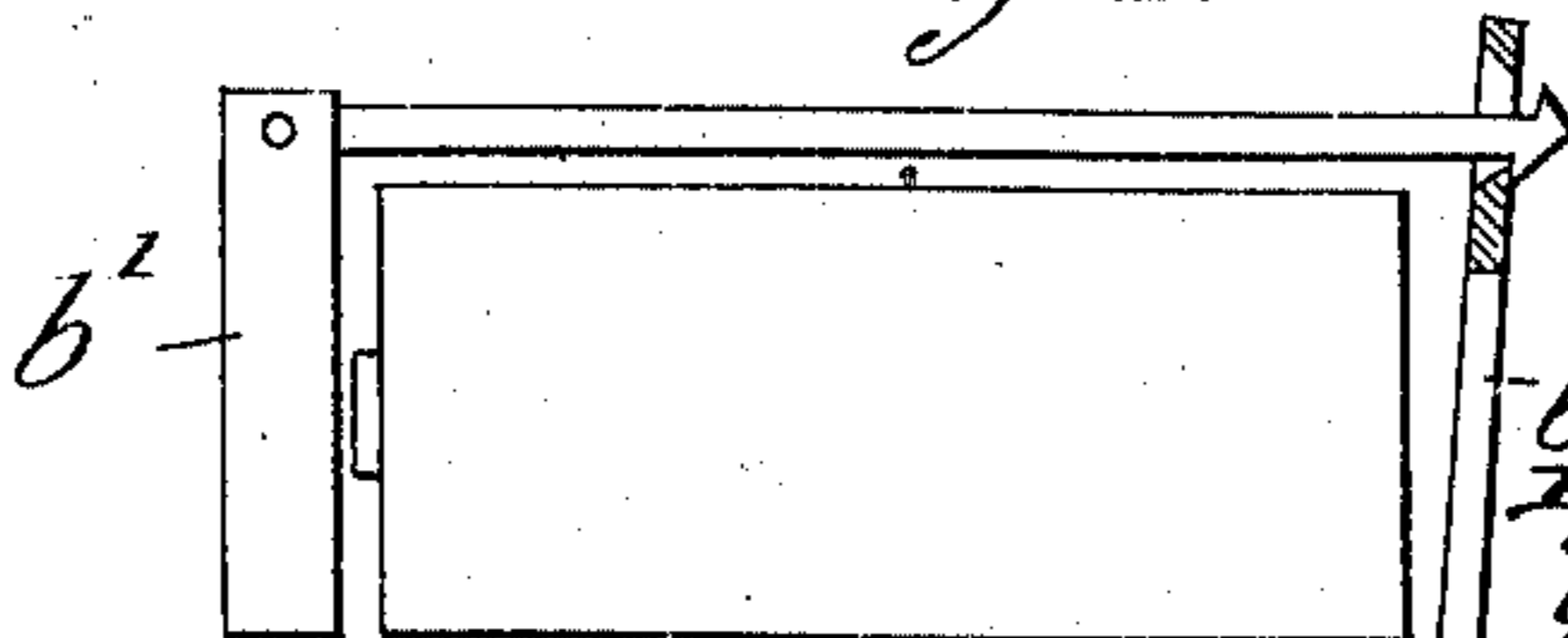
*Fig. 1.*



*Fig. 2.*

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By James E. Norris.

City

# UNITED STATES PATENT OFFICE.

FOSTER RITCHIE, OF ACTON, ENGLAND.

COMBINED TELEPHONE AND TELAUTOGRAPH EXCHANGE SYSTEM.

965,748.

Specification of Letters Patent.

Patented July 26, 1910.

Application filed October 12, 1908. Serial No. 457,411.

*To all whom it may concern:*

Be it known that I, FOSTER RITCHIE, a subject of the King of Great Britain, residing at 36 King Edwards Gardens, Acton, in the county of Middlesex, England, electrical engineer, have invented certain new and useful Improvements in a Combined Telephone and Telautograph Exchange System, of which the following is a specification.

The object of this invention is to provide means for subscribers on an exchange system in which both telephones and telautographs are installed being put into communication with each other through the exchange so that they may speak, write or give calls or signals without interfering with the exchange apparatus.

In the system proposed according to the present invention, each subscriber has a storage battery which when the subscriber's line is not in use is being charged from the exchange, the breaking of this circuit by the subscriber causing the calling signal at the exchange to be actuated. Subsequent communication with the exchange is by telephone and means are provided whereby the exchange may ring up any subscriber.

These and other novel features of the system are hereinafter more particularly described with reference to the accompanying diagrammatic drawings in which—

Figure 1 shows the various circuits required for signaling, and Fig. 2 a calling indicator at the exchange switch board which is shown as a special form of shutter indicator but may be of any other suitable form, as for example, small electric lamps controlled by suitable relays.

In Fig. 1 the exchange apparatus generally is denoted by A and the subscriber's by B. At the exchange is a dynamo *a* or other suitable source of current, the negative terminal of which is earthed while the positive terminal is connected with line 1 through wire 2, indicator *b* and jack *c*. The current from the dynamo passes along line 1 to a subscriber's station through upper contact *d'* of switch *d*, wire 3, master switch spring *e'*, part of the telautograph receiving apparatus *f*, battery *h*, and master switch spring *e''* to earth, thus charging the battery *h*. This current holds up the indicator shutter *b* but removal of the telephone receiver from the hook of switch *d* breaks

this circuit at contact *d'* and the shutter falls, thereby giving a calling signal. The exchange operator then inserts a plug in jack *c* and by means of switch *g* connects the exchange telephone *w* through contacts *g'*, *g''*, to lines 1, 4 and through them and the lower contacts *d'*, *d''* of switch *d* to subscriber's telephone apparatus *v*. Having ascertained the subscriber required the operator plugs in the proper jack and informs the calling subscriber that he is through. Under this condition the charging circuit is broken at the jacks and either the two subscribers' telephone apparatus are connected over lines 1, 4 in which case the working current is supplied by a part *h'* of each battery connected by wires 10, 11 with the telephone apparatus, or if both subscribers' telephones are replaced, the line 4 has in circuit at each end the master switch spring *e*, push *i*, contacts *j*, bell *k*, battery *h*, and master switch spring *e''*. As the two batteries are connected in opposition no current passes along the line, but on the calling subscriber depressing the push *i* current from the called subscriber's battery passes through his bell *k* along line 4 and thence through master switch spring *e* and lower contact of calling subscriber's push *i* and wire 5 to earth. The two subscribers are thus enabled to correspond either by telephone or telautograph. The ringing circuit is completed by closing the contacts of switch *l* at the exchange and thereby connecting the line 4 to earth.

The clearing or ring-off indicator *p* is connected in series with a condenser across the lines 1, 4 and is operated by induced impulses sent from the subscriber's station by operatively connecting a transformer *u* with line on the one hand and the subscriber's battery on the other. This is effected by means of a spring returned push *r*, by depressing which momentarily the secondary of the transformer is connected through contact *s* with line wires 1, 4 and subsequently the primary of the transformer is connected through contact *t* with subscriber's battery *h*. This causes an impulse to be sent over the lines which is generally sufficient to operate the indicator *p* but in any case a second impulse is sent over the lines by the contacts *t* being again closed momentarily on the release of the push *r*.

When sending a written message the mas-

ter switch springs  $e$ ,  $e'$ ,  $e^2$  are moved to the left as indicated by the arrow in Fig. 1 so cutting the receiving apparatus indicated at  $f$ ,  $f'$  out of circuit and connecting the transmitting apparatus indicated at  $x$ ,  $x'$  with the lines. This movement of the master switch also reverses the polarity of the calling subscriber's battery  $h$  with respect to its earth connection, thus putting it in series with the called subscriber's battery and thereby provides the potential required for transmitting the writing currents.

The switch  $j$  is a part of the telautograph receiving apparatus which is moved against its upper stop when the receiving mechanism is brought into operation, thereby cutting out the bell  $k$  and inserting the receiving apparatus  $f$  in line.

In telautographs depending upon varying currents for the movements of the pen it is necessary that the resistance of the line circuits should be fairly constant and for this purpose the resistance coils 6, 7, 8, 9 are interposed in the cord circuit when a junction wire to another exchange is not required, the combined resistance of 6 and 7 being arranged to be equal to one junction wire, and that of 8 and 9 to the other. The resistance of subscribers' lines to their respective exchanges are all brought up to a standard value, so that under normal conditions the line circuits between any pair of subscribers have a definite and constant value.

In the calling indicator  $b$  shown in Fig. 2 the shutter is provided with a double catch in order that the exchange operator may be able to restore the indicator when the call has been attended to, before the charging current is again passing through it. As shown in the drawing the shutter is held up with the armature in the released position as it would be when the charging current is broken at the jack. When the plug is withdrawn and the charging current is again established, the armature  $b'$  is attracted and the shutter after dropping forward very slightly is arrested by the upper catch. On the subscriber making a call and thus again breaking the charging circuit

the shutter is released by the upper catch and falls to the calling position.

Having thus described the nature of my said invention and the best means I know of carrying the same into practical effect, I claim:—

1. A combined telautograph and telephone exchange system comprising a local battery at each subscriber's station, circuit connections placing these local batteries normally in opposition, and means operative when sending a written message whereby the polarity of the battery of the sender is reversed, substantially as described.

2. A combined telautograph and telephone exchange system comprising a local battery and a call bell at each subscriber's station and means at the calling subscriber's station whereby the battery of the called up subscriber is grounded and a circuit established through his bell, substantially as described.

3. In a combined telautograph and telephone exchange system comprising a local battery at each subscriber's station and a ring-off indicator at the exchange, means for operating the ring-off indicator by induced currents, said means comprising a transformer and means for successively connecting the secondary of the transformer with line and its primary with the subscriber's battery, substantially as described.

4. A combined telautograph and telephone exchange system comprising transmitting and receiving apparatus and a local battery at each subscriber's station, circuits connecting said apparatus and a switch in the transmitting apparatus of each subscriber adapted to ground the batteries of the other subscribers and complete the calling circuit, substantially as described.

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

FOSTER RITCHIE.

Witnesses:

JOSEPH MILLARD,  
WALTER J. SKERTEN.