F. GHIO

TYPE WRITING TELEGRAPH SYSTEM.

APPLICATION FILED MAR. 9, 1918.

1,283,147.

Patented Oct. 29, 1918.

2 SHEETS—SHEET 1.

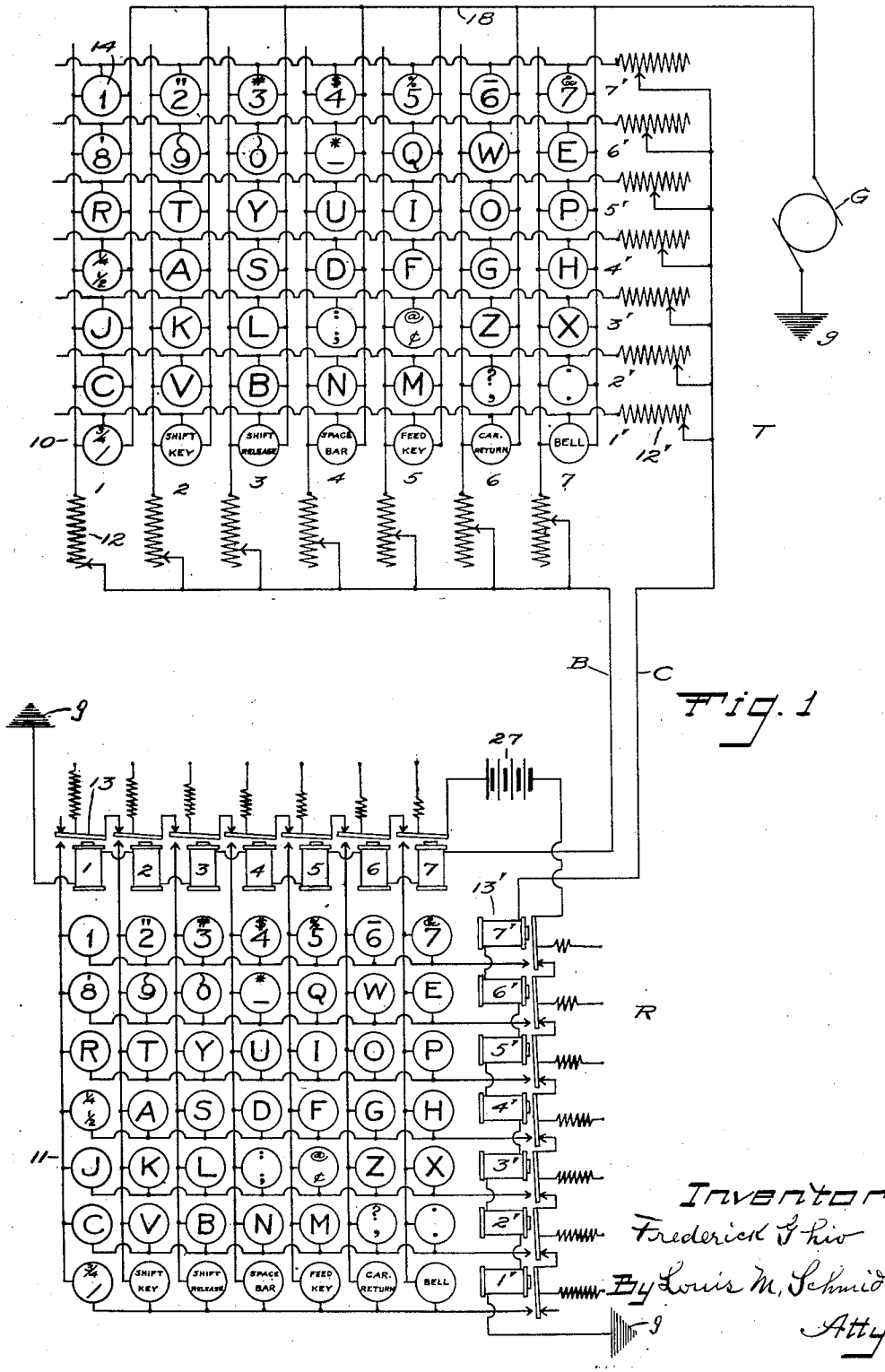

Fig. 1

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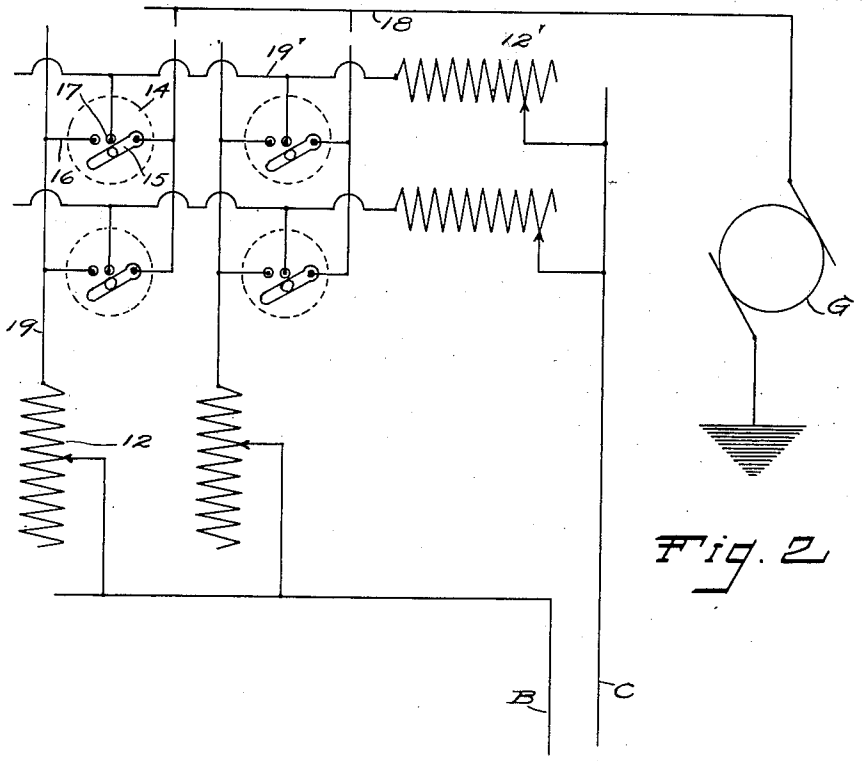

Fig. 2

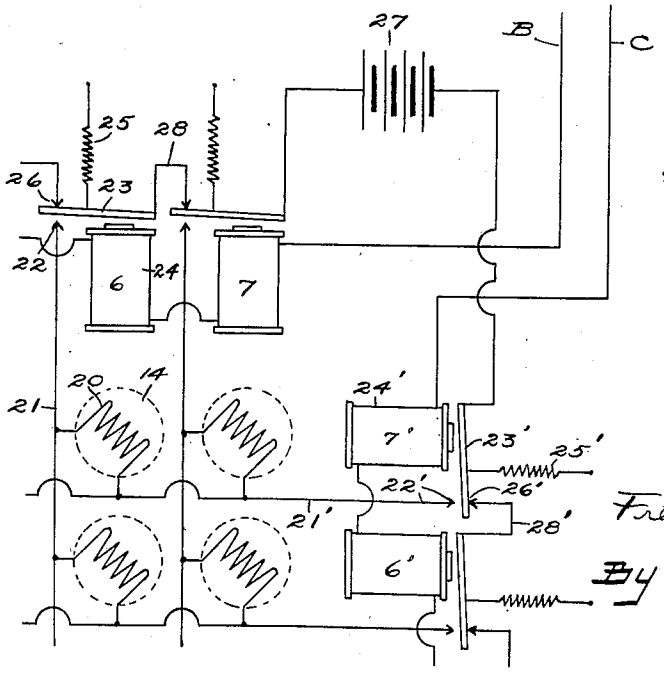

Fig. 3

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UNITED STATES PATENT OFFICE.

FREDERICK GHIO, OF BRISTOL, CONNECTICUT, ASSIGNOR OF ONE-TENTH TO JEROME VACCARIO, OF NEW BRITAIN, CONNECTICUT.

TYPE-WRITING-TELEGRAPH SYSTEM.

1,283,147. Specification of Letters Patent. Patented Oct. 29, 1918.

Application filed March 9, 1918. Serial No. 221,400.

To all whom it may concern:

Be it known that I, FREDERICK GHIO, a citizen of Italy, residing at Bristol, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Type-Writing-Telegraph Systems, of which the following is a specification.

My invention relates to improvements in type-writing telegraph systems wherein a type-writer of special construction for closing certain electrical circuits is used for the transmitting device and serves to operate a type-writing device at the receiving station for writing the message, and the object of my improvement is to produce a system that operates in a simple and reliable manner and by the use of two line wires only for connecting the sending and receiving stations.

In the accompanying drawing:—

Figure 1 is a diagrammatic plan view of my improved type-writing telegraph system.

Fig. 2 is a plan view, on an enlarged scale, of part of the transmitting apparatus shown in Fig. 1.

Fig. 3 is a plan view of part of the receiving apparatus shown in Fig. 1.

In the representation of my improved type-writing telegraph system shown in the drawing, which is diagrammatic throughout, the apparatus at the transmitting station is designated by the character T, and which includes the electric generator G, and the apparatus at the receiving station is designated by the character R, and the two stations are connected by two line wires designated respectively by the characters B and C and through the ground by means of ground connections *g* provided at the transmitting station for one side of the generator G and at the receiving station for the ends of the two line wires B and C.

Key-boards 10 and 11 are provided, one at each station, having similar arrangements for the keys and similar markings therefor, the markings corresponding to the letter or character to be transmitted and conforming in general to the markings used in type-writers, including double marking for the keys with suitable "shift" and "shift release," and the keys at both the sending or transmitting and the receiving stations operate type-writing devices simultaneously while coöperating in the sending of a message. That is to say, at the sending station there are paper operating devices that are operated after the manner of operation in type-writers generally or in any proper or suitable manner so that a type-written record of the message as transmitted is obtained, the keys functioning as type-writer keys simultaneously while functioning as transmitting devices. The function as a transmitting device in the present instance comprises the selective closing of certain electric circuits. At the receiving station the keys function to selectively operate to the operation of the corresponding keys of the transmitting station and in so doing they serve to produce a type-written record of the message.

The present invention pertains to the feature of the selective operation of the keys.

As a detail in the arrangement of the key-boards I arrange the keys in parallel rows both longitudinally and transversely and with the same number of keys in each row and in both directions, the number of keys as shown being seven in each row. Thus the keys are arranged in the form of a square that is formed by a total of 49 keys.

Coöperating with the keys of each row, both in the longitudinal and the transverse direction, is a resistance 12 or 12′, at the transmitting station and at the receiving station there is a relay 13 or 13′ for each row.

The rows of keys at both stations are numbered for convenience consecutively from 1 to 7 inclusive from left to right for the longitudinal rows and from 1′ to 7′ inclusive for the transverse rows and any individual key may be designated by the intersection of particular rows. Thus the marking for the key at the intersection of rows 3 and 4′ or briefly, 3, 4′, as shown, is "S."

Considering the details of the individual keys at the transmitting station T, each of these comprises the tip 14 at the upper end with the proper marking, as shown in full lines in Fig. 1 and in broken lines in Fig. 2, and below the said tip 14 there is a circuit closing device or switch for producing a double circuit closing effect composed of a contact arm 15 and two contacts 16 and 17.

The contact arm or switch arm 15 is in each case connected to the ungrounded main 18 from the generator G. That is to say, all of the contact arms 15 are connected to the generator.

The different contacts 16 and 17 are connected in rows through the individual resistances for the different rows to one or the other of the line wires B and C.

Thus the contacts 16 for each longitudinal row, such as 1 or 7, are connected to a common short main 19 which is connnected to the resistance 12 adapted to the particular row and all of the resistances 12 are connected to the main B.

Similarly in the case of the transverse rows the contacts 17 of each transverse row, such as 1′ or 7′, are all connected to a common short main 19′, which in turn is connected to the individual resistance 12′ adapted to the particular row, and all of the resistances 12′, which may be designated as transverse row resistances, are connected to the main C.

Considering the details of the individual keys at the receiving station, these comprise the tip 14 at the upper end and below the said tip is a magnet which is designated in Fig. 3 diagrammatically by the coil 20.

The coils 20 have their two terminals connected by short mains arranged to correspond to the lay-out of the keys in rows, there being one such short main for each longitudinal row and one for each transverse row, one terminal being connected to a longitudinal short main and the other to a transverse short main.

Thus, as shown in Fig. 3, one terminal of the coil 20 is in each case connected to longitudinal short main 21 that is common to all of the coils 20 in the same longitudinal row, and the other terminal is connected to a transverse short main 21′ that is common to all of the coils 20 in the same transverse row.

Each short main 21, 21′ terminates in a contact point 22, 22′ that is part of the relay structure of the relay 13, 13′ of the particular row.

The contact points 22, 22′ are normally out of contact with the moving arm or moving part 23, 23′ of the relays 13, 13′ and they make contact therewith when the magnet portion 24, 24′ thereof is energized.

Considering the relays 13, 13′, these are similar and comprise in each case the magnet 24, 24′, the armature operated thereby and incorporated in the structure of the swinging arm 23, 23′, the spring 25, 25′ that tends to draw the swinging arm 23, 23′ away from the magnet 24, 24′, the contact points 22, 22′ already mentioned as normally out of contact with the swinging arm 23, 23′, and the contact point 26, 26′ on the opposite side of the swinging arm from the contact point 22, 22′ and normally held in contact with the said swinging arm by the action of the spring 25, 25′.

Considering the positioning of the relays, there is a relay in each longitudinal row and one in each transverse row, the selective feature of each relay being the contact point 22, 22′ at the end of the short main 21, 21′. The relays 13 are arranged in a transverse row above the keys in the receiving station, as shown in Fig. 1 and when individually energized they connect the short main 21 of the row corresponding to the particular relay to the particular relay arm 23 and thereby connect one terminal of all of the magnet coils 20 of the particular row to the said relay arm 23.

The relays 13′ are arranged in a longitudinal row at the right of the keys and they serve in a manner similar to that described above when individually energized to connect the other terminal of all of the magnets 20 in the particular transverse row to the corresponding relay arms 23′.

The magnet coils of all of the relays in one row are connected in series and are in the circuit of one of the main lines.

Thus, as shown, the coils of the magnets 24 of the relays 13 are connected in series and are in circuit with the main line B and the magnets 24′ of the relays 13′ are connected in series and are in circuit with line wire C.

The return circuits for the line wires B and C to the generator in each case is through the ground by means of the ground connections *g*.

The individual magnets 20, as will be noted, are each a member of a longitudinal row of magnets and also a member of a transverse row, being positioned at an intersection of two such rows, and they have one terminal connected to the corresponding longitudinal short main and the other to the corresponding transverse short main, and these mains are normally each open circuited at the corresponding relay, and to complete the circuit through each magnet coil 20 the relay 13 at the end of the particular longitudinal row must be operated and also the relay 13′ at the end of the particular transverse row must be operated.

All of the relays 13, which may be designated as the longitudinal relays, receive the same current, but have their springs 25 adjusted so that they respond to different current strengths, the relay 13 at the end of the row 1, the first at the left, being adjusted to respond to the weakest current, the relay 13 at the end of row 7, the one at the extreme right, being adjusted to respond only to the strongest current of all, and the intermediate relays 13 being graduated in their adjustments in order between the limits of row 1 and row 7.

In a similar way the relays 13′ receive the same current and they are adjusted so that the relay in the bottom row 1′ responds to the weakest current of all and the relays above this are graduated in their adjust-

ments in order so as to respond to higher current strengths only with the relay 13′ in the top row 7′ adjusted to respond only to the maximum quantity of current of any and all in the row.

The relays 13 and 13′ by the movements of their contact arms 23 and 23′ between the normally open contacts 22 and 22′ on the inner or magnet sides of the said arms and the normally closed contacts 26 and 26′ on the outer or spring sides of the said arms control the selected admission of current to the key magnets 20 in a local circuit that is supplied with current from a suitable source of current, such as the battery 27, one set of relays serving to make connection to one lead from the said battery and the other set making connection to the other lead. The battery lead is connected to the contact arm of the end relay and the current is conducted further successively through the outer contacts to the next contact arm in the series up to and through the particular arm whose relay coil happens to be energized so that contact is made between the said particular arm and the corresponding inner contact instead of the outer contact. Thus the remaining contact arms in the row are cut out of the circuit and in lieu thereof connection is made to an entire row of key magnets through the corresponding short main.

Thus, as shown, the positive lead of the battery 27 is connected to the contact arm 23 of the relay 13 at the right hand end of the row of relays, being the one in the longitudinal row 7, and the outer contact 26 that coöperates with the said arm is connected by a short lead 28 with the contact arm 23 in the next row, which is longitudinal row 6, and the successive outer contacts 26 and arms 23 are interconnected in a similar manner.

In a similar manner the negative lead from the battery 27 is connected to the contact arm 23′ at the top of the row of relays 13′ that are positioned individually at the ends of the transverse rows of keys and key magnets 20, or row 7′, and short leads 28′ connect the outer contacts 26′ successively with the following arms 23′ of the series. Also the current is led through successive arms 23′ and contact points 26′ up to and through the particular contact arm that happens to be shunted from its normal position by reason of the energizing of its relay magnet. Thence the current is shunted along the corresponding transverse short main 21′ and may pass along the coil of any one of the key magnet coils 20 of the row to the corresponding longitudinal short main 21.

Thus the energizing of a particular key magnet 20 and the operation of the particular key connected therewith are effected by energizing two relays, one being in the corresponding longitudinal row and the other in the corresponding transverse row, the magnet 20 that is operated being at the intersection of the two particular rows.

The selective operation of the relays is controlled by means of differences in the resistances 12 and 12′ that are positioned in series with the different short mains 19 and 19′ of the transmission apparatus.

These resistances are adjusted so that in the case of the longitudinal short mains 19 the one at the left, in row 1 is the maximum of the set and the other resistances 12 to the right in order are successively of less resistance, the resistance 12 in row 7 at the right being the minimum. All the resistances 12 are connected to main B, as mentioned, which connects with relays 7 to 1 inclusive. Thus impulses of seven different degrees of strength may be sent through these particular relay coils along main line B, depending in each case upon the particular longitudinal row of the particular transmitting key that is depressed.

The gradation of the relay springs 25 has already been explained. By such gradation, while the same current passes through all of the relay coils in the row, the relay 13 in row 1 at the left responds to the weak current that corresponds to the maximum resistance 12 of row 1 of the transmitting station, the intermediate relays in order being responsive to the intermediate current values, and the relay 13 in the last row 7 to the right being responsive only to the maximum current value of the set.

In a similar way the resistances 12′ for the different transverse rows of the transmitting station are adjusted to coöperate with the spring adjustments of the relays 13′ for the different transverse rows of the receiving station, the resistance 13′ in the bottom row 1′ being a maximum for the series, that at the top row 7′ being the minimum, and those for the intermediate rows being graduated in order. Also, in a particular case of operating a key at the transmitting station the corresponding resistance 12′ is connected through line main C in the circuit with all of the relays 7′ through 1′ inclusive.

As described, in sending a message by the arrangement described, two line wires are used and there is a choice of seven different intensities of current to be sent over each wire, thus providing as a possible number of combinations available of these intensities or impulse combinations a total of forty-nine, which corresponds to the number of keys provided at each station.

Each transmitting key when depressed serves to send a chosen impulse, being one of the seven available, along main line wire B and simultaneously to send a chosen impulse, being also one of a group of seven available but a different group from the

other seven mentioned, along main line wire C.

At the receiving station the responsive action due to the operation of the particular transmitting key as mentioned comprises the operation of one particular relay in main line B and also the operation of one particular relay in main line C. The operation of these two relays serves to connect one terminal of all of the key magnets 20 in one longitudinal row to one lead from the battery and one terminal of all of the key magnets in one transverse row to the other lead from the battery, and the battery circuit being closed through one key magnet only so that only one key magnet will be energized by the local battery, and this one corresponds in position to the key that is operated at the transmitting station.

Therefore, in the manner described, by manipulating any of the forty-nine keys at the transmitting station the corresponding key at the receiving station will be operated by a local electric current. Also, the current will continue to flow through the key magnet of the receiving station all the time that the particular transmitting key is held in the circuit closing position.

I claim as my invention:—

1. A type-writing telegraph system comprising in combination, transmitting keys and receiving keys similarly arranged in longitudinal rows and in transverse rows, a generator having one main grounded, a pair of line wires, a short longitudinal main for each longitudinal row of keys and a short transverse main for each transverse row of keys, the short longitudinal mains for the transmitting keys being each connected to one of the said line wires through a resistance, the short transverse mains for the transmitting keys being each connected to the other line wire through a resistance, a relay positioned in line with each of the rows of keys at the receiving station, the relays in line with the longitudinal rows of keys being connected in series with one line wire, the relays in line with the transverse rows of keys being connected in series with the other line wire, a magnet for each receiving key having the terminals connected one to the corresponding short longitudinal main and the other to the corresponding short transverse main, the relays being double contact devices, comprising a contact arm coöperating with one contact when the relay is energized and normally held in contact with another contact by a spring, the said one contact being connected to the corresponding short main, the other contact being connected to the adjacent contact arm of the next row so as to connect the contact arms for each of the sets of rows in series, a battery having one lead connected to the contact arm of the relay at the end of one set and the other lead connected to the contact arm of the relay at the end of the other set.

2. A type-writing telegraph system comprising transmitting means consisting of a set of keys arranged in longitudinal and transverse rows, each key comprising a switch consisting of a moving contact arm and two contact points coöperating therewith, the contact arms being connected to a source of current, one resistance for each longitudinal row being connected to one of the contacts for all of the keys in the corresponding longitudinal row, another resistance for each transverse row being connected to the other contacts for all of the keys in the corresponding transverse row, all of the first mentioned resistances being connected to one main line wire and all of the other resistances being connected to another line wire.

3. A type-writing telegraph system comprising receiving means consisting of a set of keys having individual operating magnets, the said keys being arranged in longitudinal and transverse rows, a longitudinal relay for each longitudinal row, a transverse relay for each transverse row, the longitudinal relays being connected in series to one main line, the transverse relays being connected in series to another main line, a local battery, the magnets in each longitudinal row having one terminal connected to a common short longitudinal main, the magnets in each transverse row having the other terminal connected to a common short transverse main, the relays being double contact devices, and each relay being operative to alternatively connect the adjacent relay to one of the leads from the battery and to the short main corresponding to the particular relay.

FREDERICK GHIO.