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F. J. SINGER ET AL

2,015,323

PRINTING TELEGRAPH SYSTEM

Filed July 3, 1934

2 Sheets-Sheet 1

FIG. 1

CALLING SUBSCRIBER

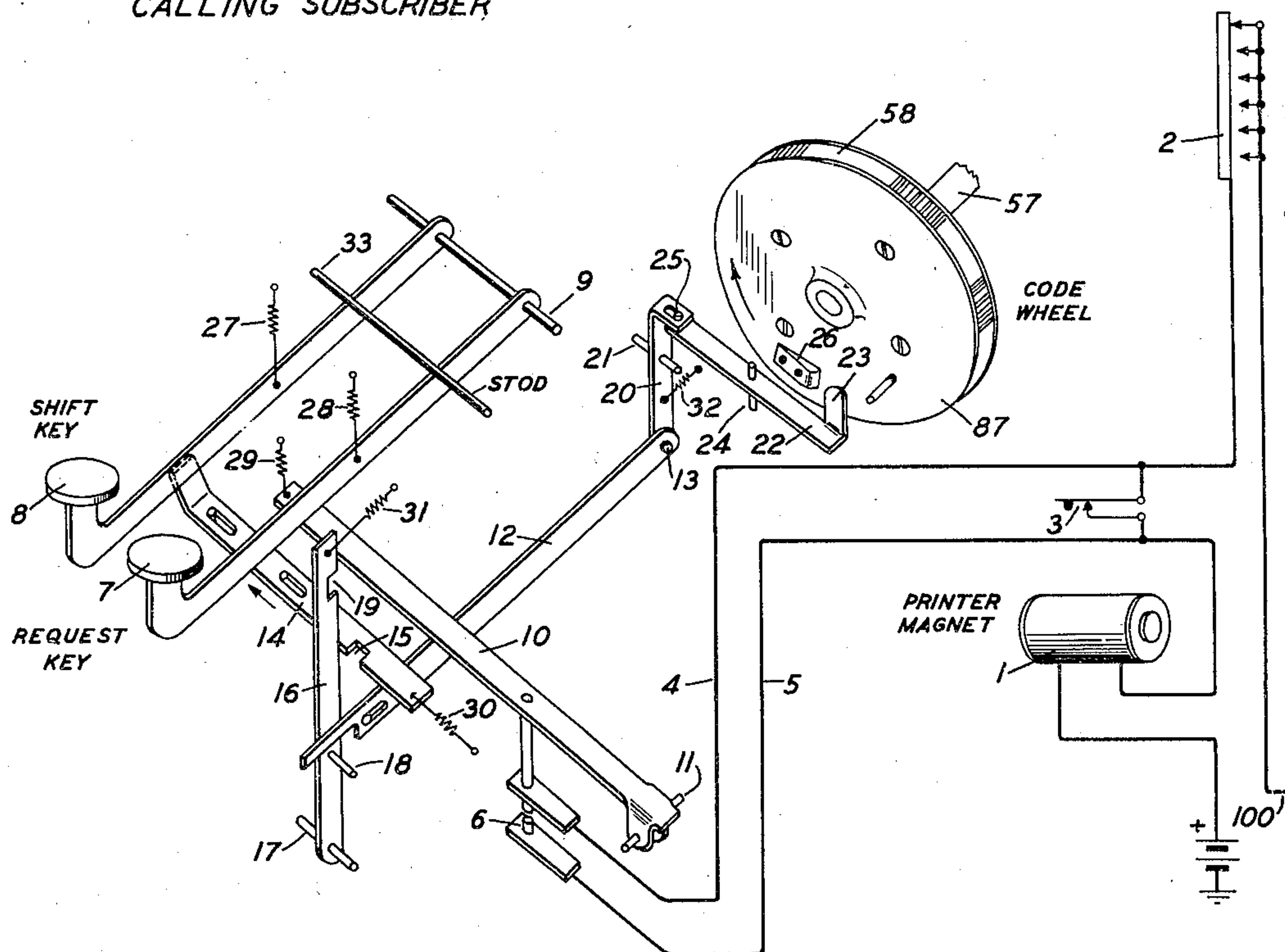
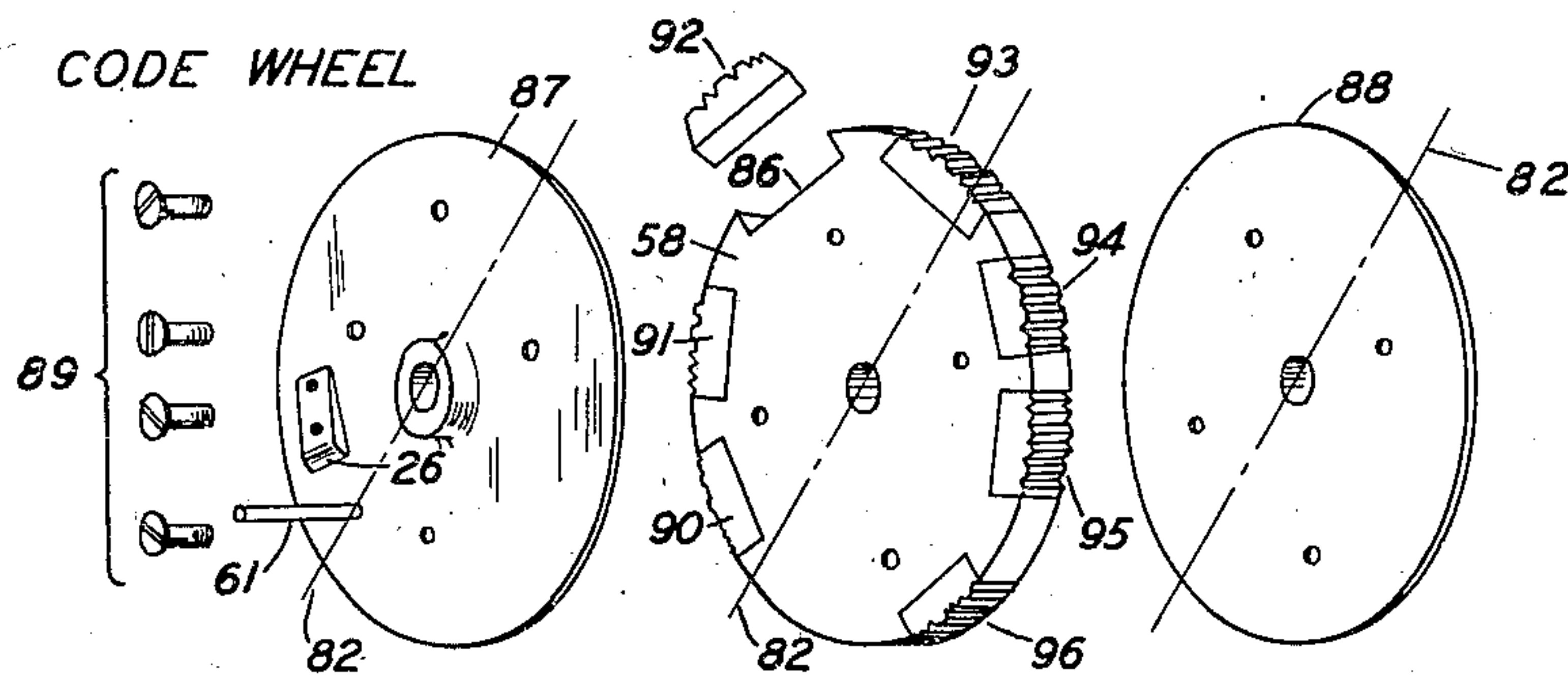


FIG. 3



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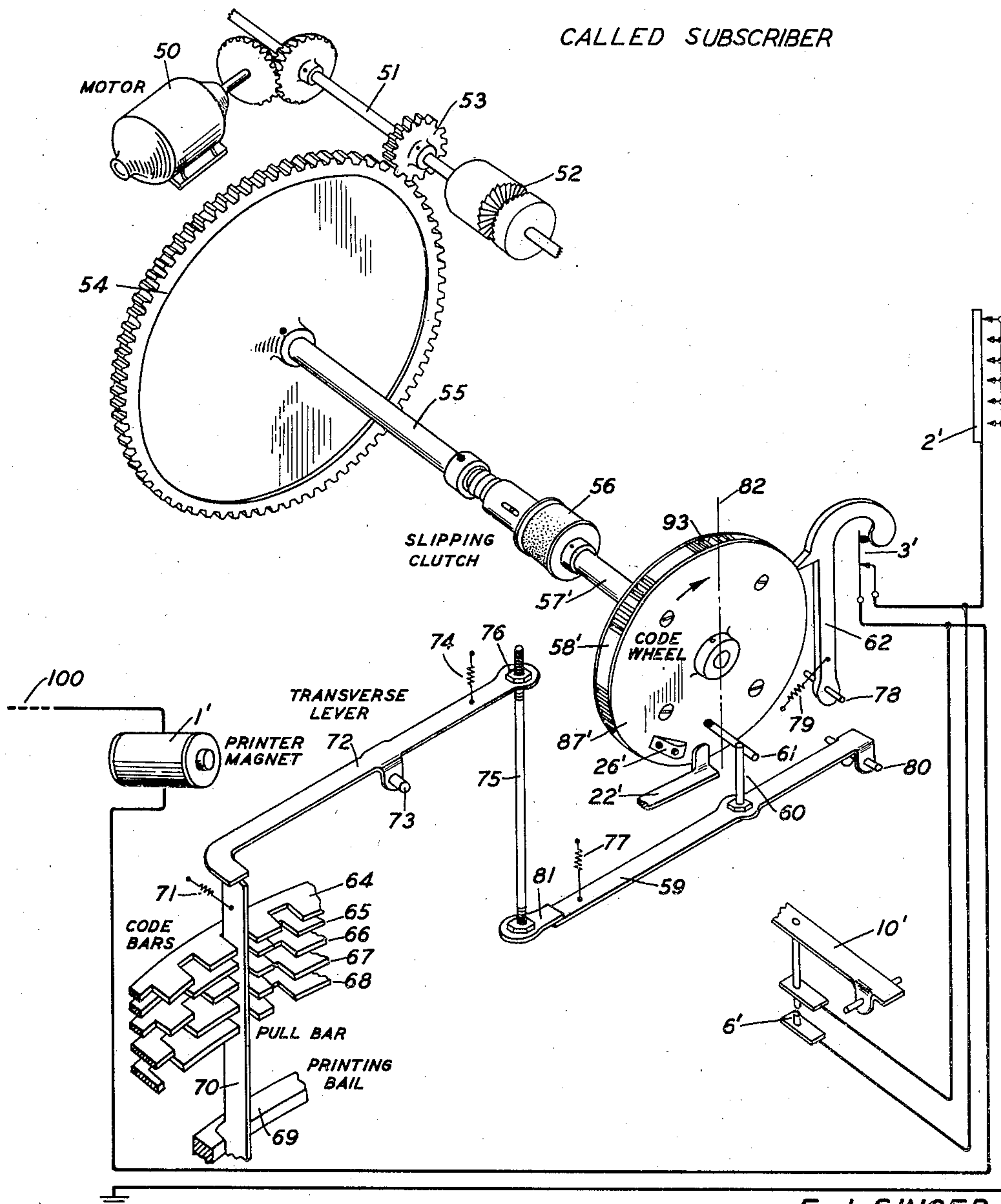
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2 Sheets-Sheet 2

FIG. 2



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2,015,323

PRINTING TELEGRAPH SYSTEM

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Application July 3, 1934, Serial No. 733,638

5 Claims. (Cl. 178—4)

This invention relates to printing telegraph systems and more particularly to an answer-back signaling device adapted for use therein.

An object of this invention is to automatically transmit a predetermined signal from a remotely controlled unattended printer.

Another object is to automatically inform a calling subscriber in a printing telegraph or other signaling system of the identity of a called station whereby an established connection to the correct called station is insured.

Another object is to automatically inform a calling subscriber that the receiving printer remotely controlled by the calling subscriber is in a position for the reception of signals.

A printing telegraph exchange system usually comprises a group of subscribers' printer stations and one or more switchboards or central offices for interconnecting the subscribers for communication purposes. Means may be provided at the switchboard for starting the motors at a called subscriber's station for conditioning the printer set thereat to receive a message whenever the called station is unattended. Locke-Kinhead application, Serial No. 459,684, filed June 7, 1930, discloses a system of this type. The exchange system may be equipped, in lieu of the switchboard, with automatic switching mechanisms for interconnecting the subscribers' stations and for starting of the motors at a called subscriber's station. F. J. Singer Patent 1,958,930, issued May 15, 1934, discloses a system wherein automatic switching mechanisms are used at the central office. It is often desirable in such systems to bring to the attention of the calling subscriber the code number of the unattended station to which he is connected before starting to transmit the message. Such an arrangement will prove a check on the central office operator and will acquaint the calling party with the fact that he is communicating with the correct party.

Broadly, this invention comprises means to transmit an answer-back signal to the calling subscriber. In accordance with this invention a request key at the calling subscriber's printer causes, when operated, to be transmitted over the line a particular code signal which in turn operates a combination of selector bars at the called subscriber's printer. The selector bars, in response to the particular code signal, permit a certain operable member, or pull bar, to fall into an alignment of slots therein. The pull bar is lifted by a printing ball to a position where it effectively operates a chain of levers to thereby release a code disk frictionally engaged to a con-

tinuously rotating shaft of the printer. The code disk has detachably mounted around its periphery a series of corrugated pieces arranged during the rotation of the disk to engage a pair of contacts in the loop circuit for sending to the line a series of signals representing the called printer station number, each corrugated piece being so cut as to open and close, when the disk is rotated, the contacts in the loop circuit for sending to the line impulses of current corresponding to a particular signal. The operation of the request key short-circuits the answer-back contacts at the calling subscriber's printer in order to prevent sending the code number of the calling subscriber's printer over the line during the time the code number of the called subscriber's printer is being received.

The manner in which these results are attained may best be explained by reference to the specific embodiment of the invention illustrated in the accompanying drawings in which for sake of clearness some of the apparatus has been shown at the calling subscriber's station Fig. 1 and some at the called station Fig. 2 although in actual practice it will readily be understood that every subscriber station would be provided with the complete equipment of Figs. 1 and 2. It should be further understood that the apparatus shown represents additional equipment that may be used with any well known teletypewriter equipment such, for example, as that shown in Patent 1,904,164 to Krum and Kleinschmidt on April 18, 1933 covering an improved form of printing telegraph typewriter.

Fig. 1 shows the code request key and that portion of the invention at a calling subscriber's station which has to do with the apparatus necessary to prevent the sending of the calling subscriber's code number during the time said subscriber is receiving the code number of the called subscriber.

Fig. 2 shows diagrammatically that part of the teletypewriter equipment at a called subscriber's station which has to do with registering a code request signal and sending back impulses to the calling subscriber.

Fig. 3 shows a more detailed construction of the code wheel used in sending back impulses to the calling subscriber and means for readily changing the code wheel to fit the identity of the station.

Where the same apparatus appears in different figures, like designations are used for descriptive purposes. The apparatus at each station comprises in Fig. 1 an upper case shift key 2, a printer

magnet 1, transmitting contacts 2, and in Fig. 2 a motor 50, drive shaft 51, printing bail 69, pull bar 70, and code bars 64 to 68 of the usual well known teletypewriter machine of a printing telegraph system. In the preferred form of this invention the apparatus at each station may also comprise as in Fig. 1 a code request key 7, a lever 10 for actuating contact 6, a latch disabler lever 14 for preventing latch bar 16 from locking lever 10 unless lever 14 is operated prior to the operation of key 7 for the sending out of a code request, a lever system for unlatching latch bar 16 comprised of cleat 26 on code wheel 58, projection 23 on lever 22, link 20 and unlatching member 12. The apparatus at each station may also comprise as in Fig. 2 a transverse member 72, a link 75 and adjustable stub 81, and a lower lever 59 which when it is pressed downward releases code disc wheel 58'. It may also comprise gears 53 and 54, friction clutch 56, code disc wheel 58' and a lever 62 which controls the make and break of contact 3' to send back the code of the called subscriber station. For a more detailed description of the operation and release of pull bar 70 as permitted by the code bars 64 to 68 under control of printer magnet 1' reference should be had to Krum et al Patent 1,904,164, supra.

Referring now to Fig. 1, Sheet 1 for the purpose of illustration it will be assumed that the calling subscriber desires to communicate with the called subscriber of Fig. 2. In these drawings the stations are shown connected by line 100 for simplicity but it will be obvious that under normal conditions this line would be connected through one or more switching and repeater offices which makes it desirable to first check to see whether the right station is connected. Therefore, after the connection is established as represented by line 100 the calling subscriber of Fig. 1 Sheet 1 will cause his teletype machine to send out a request code signal to the called party. Since this code signal is usually in the upper case bracket the calling party operates the shift key 8 followed by the code request key 7. Depressing key 7 acts on lever 10, hinged at 11, to close contact 6 which completes a secondary path over conductors 4 and 5 around answer back contact 3. The purpose of this is to maintain the continuity of the line circuit even when contact 3 opens and closes in response to the local request signal as will later be explained. The line circuit is traced from positive battery through printer magnet 1 of Fig. 1, answer back contact 3 or its shunt contacts 6 and conductors 4 and 5, and transmitting contacts 2 of the calling subscriber thence over line 100 and printer magnet 1' of Fig. 2, answer back contact 3', transmitting contacts 2' of the called subscriber to ground. The operation of request key 7 also causes transmitting contacts 2 to interrupt the line circuit just traced in a manner not shown since the mechanical linkage of this key is the same as for other keys of any well known teletypewriter. Sending of a code request signal in this manner is recorded by the printer magnets 1 and 1' at the calling station of Fig. 1 and the called station of Fig. 2, respectively, in the same manner as for other character signals. As indicated in Fig. 2 the recording function consists of moving one or more of the code bars 64 to 68, inclusive into selected or non-selected positions whereby an alignment of slots is formed immediately in front of some one of the pull bars. In the case wherein the code bars are actuated in response to the request signal transmitted from the calling station shown in Fig. 1 the alignment

of slots occurs immediately in front of pull bar 70 which is then permitted to be pulled into the slots by spring 71. The printing bail 69 then lifts pull bar 70 thereby rocking transverse lever 72 pivoted at 73 so that the end 76 carries the link 75 downward. An adjustable stub 81 is provided so that the lower lever 59, pivoted at 80, is moved downward sufficiently to disengage pin 60 from the stop pin 61 and thereby permit code disc 58' mounted on shaft 57' to immediately begin to rotate in the direction indicated under the urge of friction clutch 56. Code disc 58' makes one revolution causing contact lever 62 to open and close contacts 3' in the line circuit in accordance with the cuttings of the code disc pieces 90 to 96, inclusive. A code signal, individual for each station, is thus transmitted back to the calling subscriber of Fig. 1, who requested the identification.

According to the above description it will be evident that the code request signal which originated at the calling subscriber's station of Fig. 1, resulting at the called subscriber's station of Fig. 2 in operating answer-back contacts 3', likewise causes the calling subscriber code disc 58 of Fig. 1 to tend to send out the code for the calling station by the intermittent opening and closing of answer-back contact 3 of Fig. 1. Since, however, contact 6 at the calling station bridges the sender contact 3 as previously described contact 3 does not interfere with the code signals sent out by the called station. Contact 6, however, must remain closed during the entire period during which the code is being received. To accomplish this it is necessary to lock the lever 10 in its downward position so that the request key need not be held down until the code wheel has completed its revolution, otherwise it might release too soon. The interlocking levers shown in Fig. 1 are therefore provided for holding contact 6 closed until code wheel 58 at the calling station has made one complete revolution when lever 10 is again restored to normal. A description of one method of locking contact 6 in a closed position will now be described.

The shift key 8, which is operated prior to the code request key 7 when the request selection is in upper case, acts to pull the latch disabler lever 14 against the action of spring 30 so that slot 15 comes opposite latch bar 16. The latter, however, is prevented from entering the slot under tension of spring 31 until the lever 10 is depressed by key 7 so that it falls opposite slot 19 in latch bar 16. The bar 16 entering slot 15 and the slot 19 passing over lever 10 lock the two levers 10 and 14 in an operated position and this maintains contact 6 closed until unlatched by unlatching member 12, thus eliminating the effect of contact 3 while the code disc 58 is revolving. The code disc 58 in Fig. 1 is set into motion by the code signal in the same way and at the same time as the code disc 58' of Fig. 2 described above. In this manner, the code signals for the calling station do not interfere with recording the code signal sent out by the called station of Fig. 2.

After the called subscriber code signal is recorded by the printer magnet 1 and its associated apparatus, not shown, it is necessary to release the latch bar 16 for restoring the apparatus in Fig. 1 to normal. This is accomplished by projection 26 on code disc plate 87 which, when the disc 58 nears the end of its revolution, engages spur 23 causing it to push lever 22 outward about axis 24. Lever 22 engages link 20 at 25 whereby the motion of lever 22 is transmitted to link 20 which moves about axis 21. Link 20 engages unlatching member 12 at 13. The motion of link 20

acts on member 12 the end of which engages pin 18 in latch bar 16 working on axis 17. In this manner the latch bar is moved outward against spring 31 allowing levers 10 and 14 to restore to normal.

The locking arrangement just described does not function when the subscriber is using the shift key 8 for upper case characters during transmission of a message because lever 10, not being depressed, does not rest opposite slot 19 in latch bar 16 thus preventing the latter from entering slot 15 in lever 14 which has been pulled over by key 8.

Referring to Fig. 3 there is shown further details of construction of code disc 58 in which the dot and dash line 82 represents the normal position when at rest. It is made by cutting slots, such as 86, at various points around the disc in such a manner that different code pieces 90 to 96 may be inserted sidewise into the disc and held in place by means of two side plates 87 and 88. With such construction, one code disc and a number of code pieces for the various code letters can be used for indicating any desired station code, making it possible to easily change the code designation from one designation to some other in the field by merely removing one of the side plates 87 and inserting new code pieces. The side plates are fastened to disc 58 by screws 89.

The disc assembly is shown complete in Fig. 2 in which the dot and dash line 82 represents its normal home position. It is to be observed further that the ratio between gears 53 and 54 may be such as to provide any reasonable number of characters for station designation. The code disc pieces as 92 would then be cut so that the line frequency of the code disc signals would be the same as the line frequency of the regular keyboard signals. The code disc may also be designed so that a long closed pulse will be sent out at the beginning of its rotation in order to insure that the printer mechanism which has been actuated by the identification request combination assumes its stop position before the code disc begins to send.

While the improved arrangement as herein described is of a specific type, it will be understood that the same results may be obtained by numerous other mechanical arrangements.

What is claimed is:

1. A printing telegraph system comprising a calling station, a called station, a line circuit interconnecting said stations, a printer and a driving motor therefor at each of said stations, said printer comprising a plurality of type bars respectively responsive to combinations of signal impulses incoming over said line circuit; a mechanically started answer-back device attached to each of said printers and responsive to the operation of a certain one of said type bars, said device comprising a mechanical linking arrangement connected to said printer and arranged to operate in response to the operation of said certain one type bar, a single pair of contacts connected in series in said line circuit, a rotatable shaft arranged to be driven by said motor, a single normally locked disc frictionally engaged to said shaft, directly controlled by said linking arrangement and arranged, when released to rotate continuously through one revolution and then stop, a plurality of elements mounted on the

periphery of said disc, and arranged when said disc is rotated to alternately open and close said contact pair for transmitting over said line circuit to the calling station in a predetermined order a series of signal impulse groups respectively corresponding in code to the digits of the called number of the printer to which the device is attached, and means controlled from the calling station for effecting the operation of the printer and motor at the called station and for releasing said disc.

2. A printing telegraph system comprising a calling station, a called station, a line circuit interconnecting said station, a printer and a driving motor therefor at each of said stations, said printer comprising a plurality of combination code bars responsive to signal impulses incoming over said line circuit from said calling station, and a plurality of operable members each of which is arranged to be actuated in conjunction with said code bars to an operated position in response to an incoming signal, and an answer-back device attached to each of said printers, a chain of rigid members connecting each of said operable members to said device and responsive to the operation of a certain one of said members for starting said device operating, said device comprising a single pair of contacts connected in series with said line circuit, a rotatable shaft arranged to be driven by said motor, a single normally locked disc frictionally engaged to said shaft, and arranged to be released in response to the operation of a certain one of said operable members, for continuous rotation through one revolution only and then stopped, whereby said disc causes the alternate opening and closing of said contact pair to transmit over the line circuit a series of impulses in a predetermined sequence, said signal being indicative of the identity of the station at which the operated answer-back device is located.

3. A printing telegraph system, in accordance with claim 1, wherein said line circuit comprises at each of said stations another single pair of normally opened contacts arranged to automatically shunt said single pair of contacts at said calling station during the interval in which said series of impulse groups are being transmitted.

4. A printing telegraph system in accordance with claim 1, wherein each of said printers has associated therewith a keyboard comprising a shift and a request key, members responsive to the joint operation of said keys, means for automatically locking and maintaining said members in operated position for the duration of one revolution only of said disc, and release means for restoring said locking means and said members to normal position when said disc completes one revolution.

5. A printing telegraph system according to claim 2, wherein each of said answer-back devices comprises a series of mechanically operated links interconnecting said certain one operable member and said disc, said series of links being arranged to release, in response to the operation of said certain one operable member, said disc for rotation through one revolution only.

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