

July 16, 1935.

W. G. H. FINCH

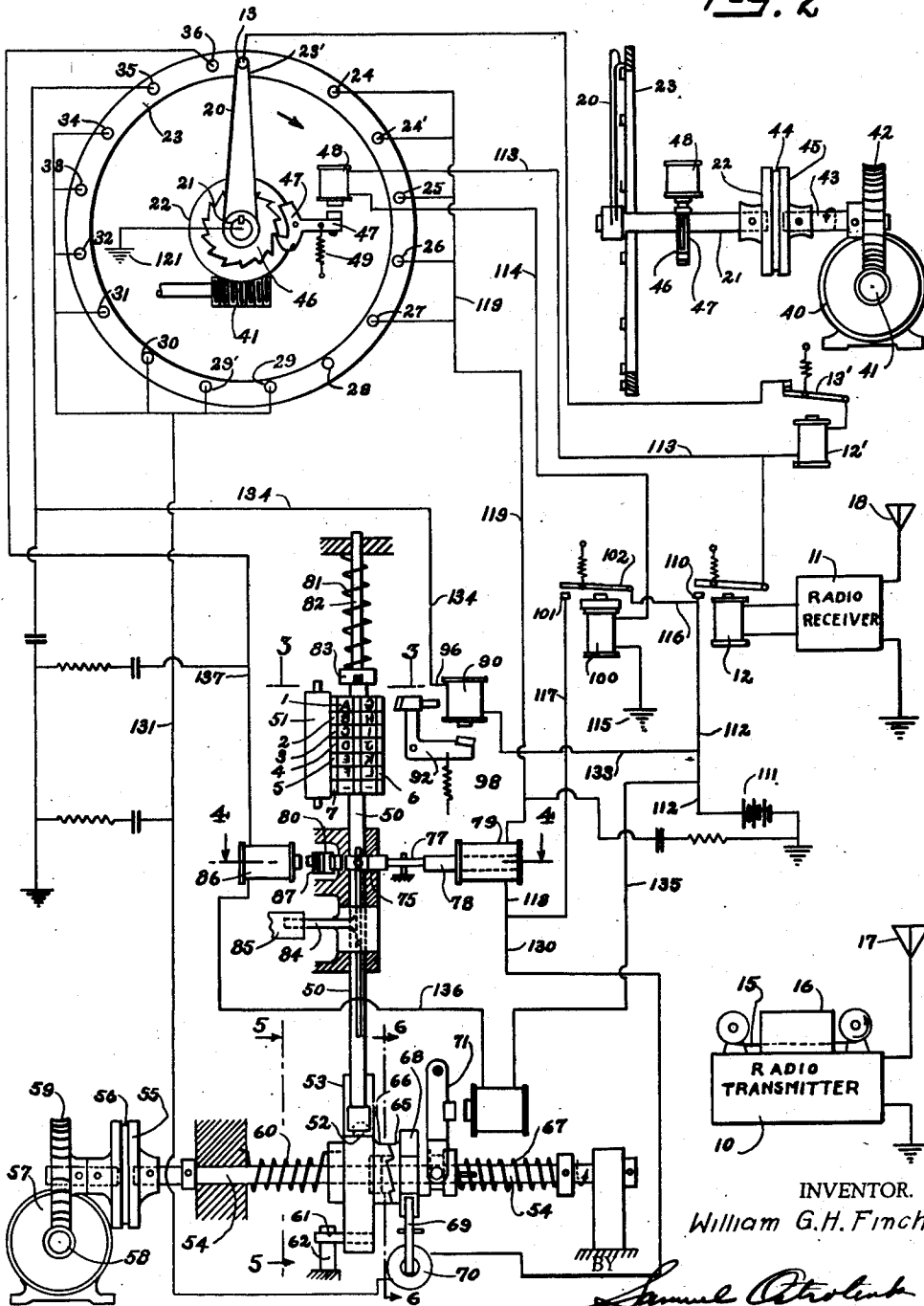
2,008,389

TELEGRAPH PRINTER SYSTEM

Original Filed April 28, 1933 3 Sheets-Sheet 1

Fig. 1

Fig. 2



INVENTOR.
William G.H. Finch

ATTORNEY.

July 16, 1935.

W. G. H. FINCH

2,008,389

TELEGRAPH PRINTER SYSTEM

Original Filed April 28, 1933 3 Sheets-Sheet 2

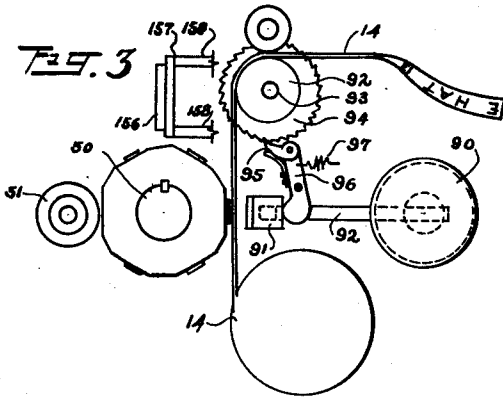


Fig. 7

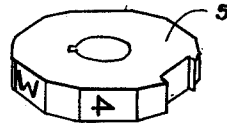


Fig. 8

	a	b	c	d	e	f
1	A	G	M	S	Y	6
2	B	H	N	T	I	7
3	C	I	O	U	2	8
4	D	J	F	V	3	9
5	E	K	Q	W	4	
6	F	L	R	X	5	
7	.	-	?	@	\$	&

Fig. 4

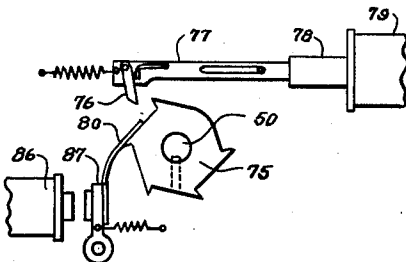


Fig. 9

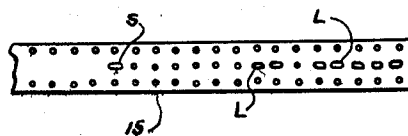


Fig. 5

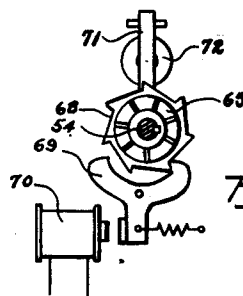
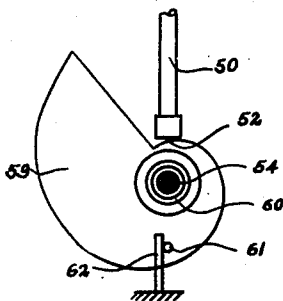


Fig. 6

INVENTOR.

William G.H. Finch

BY

Samuel O. O'Brien

ATTORNEY.

July 16, 1935.

W. G. H. FINCH

2,008,389

TELEGRAPH PRINTER SYSTEM

Original Filed April 28, 1933 3 Sheets-Sheet 3

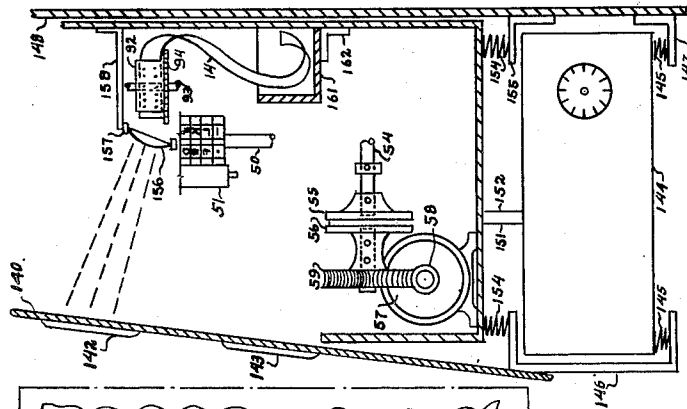


Fig. 10

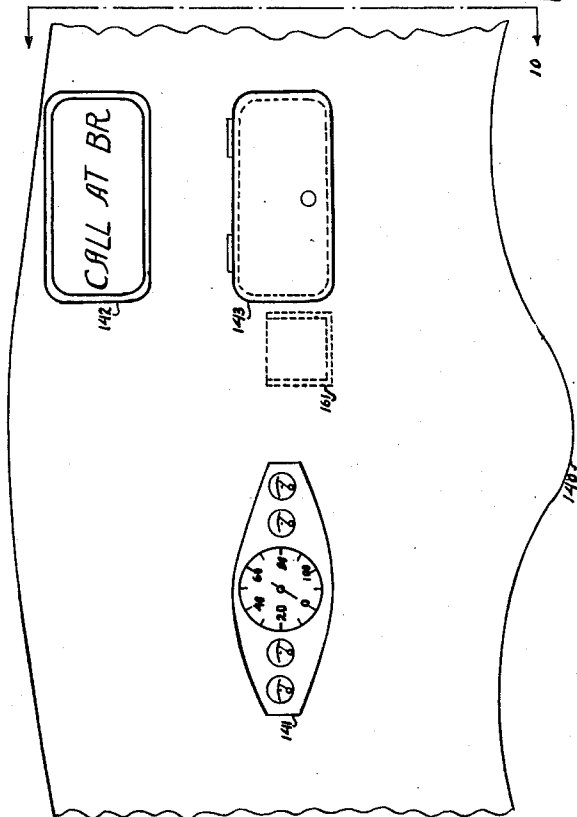


Fig. 11

INVENTOR.

William G.H. Finch

BY

Samuel C. Crotwell
ATTORNEY.

UNITED STATES PATENT OFFICE

2,008,389

TELEGRAPH PRINTER SYSTEM

William G. H. Finch, New York, N. Y.

Original application April 28, 1933, Serial No. 668,390, now Patent No. 1,932,579, dated October 31, 1933. Divided and this application October 30, 1933, Serial No. 695,740

17 Claims. (Cl. 250—8)

My invention relates to novel apparatus for and methods of automatic printing telegraphy and more particularly relates to novel methods of and apparatus for selecting, synchronizing and operating portable and mobile automatic printing telegraph apparatus by radio.

Heretofore, due mainly to the complications of telegraph printers, they have been considered practical only for fixed station work.

A great need, however, has arisen for the operation of mobile telegraph printers; that is, printers which are mounted on movable carriers, such as automobiles, buses, trucks, police cars, aeroplanes, ships and the like.

Owners of these mobile printers are then supplied with a radio service for sending out recorded instructions. For example, the owner of a truck desiring to transmit instructions to the driver submits the message to the central station. The central broadcasting station operating on an assigned wave length then broadcasts the instructions which automatically are recorded on the printer mounted on a particular moving carrier.

The printer used must not only be rugged to withstand the unusual usage, but must be of simple construction having as few parts to get out of order as possible, operating on as simple a code as possible to avoid errors.

Accordingly, I have as the main object of my invention the provision of a printing telegraph system operating a mobile printer by radio.

The standard five-unit code in which impulse intervals of uniform duration are used to make the necessary selection of the high speed printer have not been as successful as desired. They require complicated synchronizing selecting mechanism and overlap devices. This has rendered these printers prohibitively costly and impractical for mobile use.

Accordingly an object of my invention is to provide a novel mobile, radio operated telegraph printer and novel methods for operating the same.

A further object of my invention is to provide a novel code for automatic telegraph printers.

Still a further object of my invention is to provide a two-unit code for directly operating a telegraph printer and substantially without the use of intermediary selecting apparatus.

Still a further object of my invention is to provide a telegraph printer, operated by a code comprising long and short impulses.

In the operation of printers, in a vehicle which is not only crowded for space but subjected to

much jarring, special mountings and arrangement of the printer is necessary.

Accordingly, a further object of my invention is to use novel mountings and supports for mobile printers.

Another object of my invention is to render the printer characters quickly and readily visible.

In operating telegraph printers by a radio it is of considerable importance, especially in the case of police signalling, that the code be kept secret so that unauthorized "listeners-in" will not be able to make any intelligence out of the message being sent.

To this end, complicated coding apparatus has been developed which is so involved that it is costly and difficult to keep in practical operation.

Accordingly, a further object of my invention is to provide novel apparatus for and methods of maintaining the telegraph code secret.

A further object is to provide a telegraph printer in which the characters can be readily interchanged to respond to different codes.

Still a further object is to provide type wheel printers in which the characters are responsive to different codes.

Still a further object of my invention is to provide telegraph printers with removable and interchangeable type characters.

There are other objects of my invention which together with the foregoing will appear in connection with the detailed description to be given hereinafter.

In general, my invention disclosed in the present application which is a division of Patent 1,932,579, granted October 31, 1933, contemplates a central station selling radio service to subscribers of mobile telegraph printers mounted on buses, trucks, passenger cars and police cars. In the latter case particularly, the permanent record of the received message avoids any misunderstanding or loss of message by temporary absence from the car. It also insures a greater secrecy.

In accordance with my invention land communications may also be conducted with ship and aeroplanes between ships, between aeroplanes, and from ships and aeroplanes to land.

The telegraph printer of my invention comprises a plurality of disc-shaped type wheels secured together on a type wheel shaft. Each disc in turn carries a number of individual embossed characters to be printed.

This type wheel construction is directly, selectively operated by what I prefer to call a two-unit code, each unit consisting of a combination of

long and short impulses. The long impulses of one unit selectively shift the type wheel shaft to select a type wheel disc and the long impulse of the second unit selectively rotates the type wheel shaft to select a character of the selected type wheel disc.

A distributor directly controlled by each unit counts the impulses for synchronizing and at the proper impulse, switches the oncoming signals in synchronism therewith to select the type wheel disc and then the character on the disc.

To insure secrecy of the code, I provide means to interchange the position of the characters.

The printer is mounted on the vehicle in a manner to prevent serious vibrations, to prevent electrical interaction and therefore injury thereof.

Referring to the drawings:

Figure 1 is a diagrammatic view of the circuits and apparatus employed in one form of my invention.

Figure 2 is a side elevation of the distributor mechanism employed in Figure 1.

Figures 3 to 6, inclusive, are sections taken respectively on line 3-3, 4-4, 5-5 and 6-6 of Figure 1.

Figure 7 is a perspective view of a form of type wheel disc showing particularly the arrangement of obtaining space between words.

Figure 8 is a developed diagram of a perforated form of type wheel construction.

Figure 9 is a fragmentary portion of one form of message transmitting tape which may be used in my invention.

Figure 10 is a sectional view of the printer mounted in an automobile.

Figure 11 is a front plan view of the dash board of the automobile.

Referring now more particularly to Figure 1, the system of communication diagrammatically illustrated therein consists generally of a code transmitting device 10, a receiving device 11, a receiver controlled relay 12 for repeating the received code, combinations of impulses to the selecting and recording system, a controlling device 13 responsive to the short and long impulses of the received code and a printing mechanism which is selectively actuated to progressively print upon a movable tape 14 a letter or character corresponding to the transmitted code combination of short and long electrical impulses assigned to represent that character.

More specifically, the transmitting device 10, preferably a radio transmitter adapted to broadcast short and long electrical impulses may be operated in any desired manner such as manually, photoelectrically or mechanically. As illustrated in the drawings, a perforated tape 15, having therein groups of perforations comprising short slots or holes S and long slots L (see Figure 9), is fed through a scanning mechanism 16 associated with the transmitter 10. The scanning mechanism 16 responds to and translates the groups of perforations into radio electrical impulses which are broadcast through the antenna 17 in any well known manner. The impulses may then be picked up by the antenna 18 of the tuned receiver 11 of any well known construction and caused to energize the relay 12.

The code transmitted comprises a starting impulse followed by a two-unit code combination.

In response to the starting impulse, relay 12 which is a slow acting relay is energized.

Normally relay 12' whose winding is of a lower resistance than the series windings of magnet 48

and relay 100, provides a by-pass circuit for the current from battery 111 over contact 23' and brush 20 to ground at 121. Relay 12', however, upon being energized over this circuit, opens the circuit at its armature 13' which disengages its back contact.

Thereafter upon receipt of the first signal impulse, the circuit completed extends over conductor 113 as will be explained hereinafter, since relay 12' being slow to release is not deenergized during the no-impulse period.

If, therefore, the synchronizing impulse is received while brush 20 is on contact 23', normal operations proceed as will be described.

If, on the other hand, no impulse is received when brush 20 is on contact 23', no operation can occur. For reasons that will appear hereinafter, brush 20 will remain on contact 23' until the synchronizing impulse showing that the transmitter and receiver are in synchronism is received.

The resetting impulse is much longer than even the long impulse of the code to be described in order to energize extra slow relay 12'. As soon as relay 12' is energized, stepping magnet 48 is energized over a circuit to be described in connection with the code signals. Brush 20 is moved from contact 23'. At the end of the synchronizing impulse, magnet 48 is deenergized, stepping the brush a further distance and the apparatus is ready for the first signalling impulse.

In response to the first signal impulse energizing relay 12, an energization circuit is completed from the battery 111 front contact and armature 110 and conductor 113 through the magnet 48, conductor 114 and relay 100 to ground at 115.

Magnet 48 is a stepping magnet controlling the operation of the distributor device 13 which controls the switching of the oncoming impulse to mechanisms, to be described, responsive to the two-unit code and controlling the final printing and restoration of the printer.

This switching is effected by the brush or contact arm 20 which is mounted on, and locked by a key to one end of a rotatable shaft 21, the other end of which carries a friction plate 22. Shaft 21, is driven by a motor 40 (Figure 2) through worm 41 mounted on a shaft of the motor and meshing with a worm wheel 42 secured to and driving shaft 43. Secured to for rotation with shaft 43 is the friction disc 44 including plates 22 and 45.

As motor 40 rotates, shaft 21 carrying distributor arm 20, tends to rotate with it, but is normally prevented from rotating by the pawl 47 in engagement with one tooth of the ratchet 46, secured to the shaft 21. One end of the pawl 47 consists of an armature controlled by a magnet 48 to which the armature is attracted when that magnet is energized. Normally, however, the pawl 47 is held against its backstop as shown in Figure 1 by a spring 49, one end of which is secured to the pawl 47 and the other to the frame work.

When magnet 48 is energized in the manner described above, it attracts pawl 47 which rocks about its pivot withdrawing the lower tooth of pawl 47 from the ratchet wheel 46 and moving its upper tooth in the path of the ratchet wheel permitting a rotation of the shaft 21 with arm 20 through an angle equal to one-half the pitch of the teeth of ratchet wheel 46.

The distributor arm 20 is moved successively into engagement with a series of contacts 24 to 36 consisting of contacting points mounted on an insulating ring 13. Each of the contacts 24 to

28 is common to a character on each disc wheel, five contacts being shown here for purposes of illustration of a printer in which there are five characters on each disc wheel to be described. Each of the contacts 29 to 34 is individual to a type wheel disc of a printer consisting of a plurality of such discs. Contact 35 controls a printing operation and contact 36 a restoring operation all of which will be described in more detail hereinafter. The pitch of the teeth of ratchet 46 is equal to the angular displacement between successive contacts, so that when magnet 48 is energized to permit the escapement mechanism 46 and 47 to operate, the distributor arm 20 is rotated either from a contact to a point intermediate the contact and a successive contact or from an intermediate point to a succeeding contact. With brush 20 therefore in the normal position shown, the receipt of the first code impulse energizing relay 12 which in turn energizes the escapement magnet 48 will permit rotation of brush 20 in the direction of the arrow shown to the first contact 24. It will be recalled that the escapement magnet 48 was energized in a series circuit with relay 100.

Relay 100 is a slow-to-energize relay constructed so that it will not respond to the short impulse of the code but is only responsive to the long impulse. If, however, the first impulse received is a long impulse, relay 100 will energize after an interval of time and an energizing circuit will thereupon be completed from ground at 121 over distributor brush 20, contact 24, conductors 120 and 119, through the selector relay 79, conductors 118 and 117, front contact 101 and armature 102, conductors 116 and 112 and through battery 111 to ground. The effect of the energization of relay 79 will be described hereinafter.

Upon the completion of the first code impulse, relay 12 is deenergized, opening the energizing series circuit for the magnet 48 and relay 100. Upon the deenergization of relay 48, pawl 47 is restored to the position shown permitting rotation of shaft 21 for a distance equal to half the pitch of the ratchet 46. Brush 20 rotates from contact 24 to a point intermediate contacts 24 and 25. Selecting relay 79 is deenergized and the apparatus is back in normal condition in preparation for the next impulse.

The same cycle of operations is now repeated, brush 20 moving into engagement with contacts 25 and 28 successively in response to each impulse received and in turn controlling the selective energization of relay 79 in accordance with whether the received impulse is long or short.

The first unit selection is completed when the brush 20 leaves contact 28 and the second unit selection begins when the brush engages contact 29. If a long impulse is received at this time, relay 100 is energized and a circuit is completed from ground at 121, brush 20, contact 29, conductor 132 and 131 through the magnet 70, conductor 130 and thereafter over conductor 117 to battery 111 and ground as described hereinbefore.

Relay 70 is a second selection relay which is energized in response to long impulses in the second unit of the code for selecting the particular type wheel disc. Relay 79 having previously selected a particular column of characters, a final selection is thus completed as will be described in more detail hereinafter. The selection having been completed, the printer is now in position for operation and on receipt of the next impulse which is the printing impulse, brush

20 engages contact 35 to extend the energizing circuit from ground at 121 over conductor 134 to the printing magnet 90 and conductor 133 to battery 111 and ground. Upon the energization of the printing magnet, the printing operation of the selected character is completed. Brush 20 is now moved to contact 36 to complete an energizing circuit over conductor 137 for the restoring magnets 86 and 72 in series over conductors 135 and 137. Magnets 86 and 72 upon energization restore the apparatus to normal. Following the restoration of the apparatus, brush 20 moves to its normal position shown in synchronizing contact 23'.

It will be noted that contact 23' is spaced one-half a tooth pitch from contact 36 and one and one-half a tooth pitch from contact 24. At the end of the last signal, relay 12 is deenergized to move brush 20 to contact 23'.

Upon receipt of the synchronizing impulse, relay 12 is energized to energize relay 12' if the impulse is long enough. Magnet 48 is energized as soon as relay 12' is energized to move brush 20 off of contact 23'. Thereupon magnet 48 is deenergized at the end of the synchronizing impulse and brush 20 moves to one-half a pitch distance from contact 24 in preparation for the first signalling impulse.

If during the signalling period an impulse is lost and distributor brush 20 so falls out of synchronism with the transmitter, brush 20 will continue to be stepped until it reaches synchronizing contact 23'. It will then be held at this position because of the deenergized condition of relay 12' providing a bypass around magnet 48 until a synchronizing impulse energizes the relay 12'. This insures distributor brush 20 always starting out in synchronism.

The printer will now be described in more detail. The printing mechanism consists of a vertical shaft 50 mounted in a frame so as to allow for both rotary and axial reciprocation. Upon the upper end of the shaft are removably keyed a series of seven type discs 1 to 7 inclusive. These type discs have six faces each upon each of which characters such as the letters of the alphabet, marks of punctuation, numerals, etc., are embossed. An inking roller 51 is in frictional engagement with the discs so that during the setting of the discs the characters will pick up the proper amount of ink to bring the characters upon the tape 14. It is understood that other methods of inking or printing may be employed, such as an inked ribbon placed between the type and the tape as in the typewriter.

The lower end of the shaft 50 is supplied with an antifriction ball 52 which rests upon the periphery of a disc selector cam 53 (Figure 5). The cam 53 is loosely mounted but held against longitudinal movement, midway upon a horizontally disposed shaft 54. One end of this shaft 54 (left in Figure 1) is journaled in a frame member and beyond which it carries a plate 55 which is in frictional engagement with a continuously running friction disc 56.

The disc 56 is continuously driven by a motor 57 through the worm 58 and worm wheel 59. A torsion spring 60 encircling the shaft 54 and having one end secured in the hub of the cam 53 and the other end in the frame serves to urge the cam to its normal position of rest where the vertical shaft 50 is in its lowest position, as shown in Figure 5. This position of rest is determined by a stop pin 61 carried by the cam

coming in contact with a stop lug 62 carried by a frame member.

Slidably keyed upon the shaft 54 adjacent the cam 53 is a clutch member 65 cooperating through said teeth with a clutch member 66 formed on the side of the cam facing member 65. The number of teeth in the clutch members corresponds to the number of type discs on the vertical shaft 50. This is seven in the form of mechanism illustrated. The clutch member 65 is normally held in engagement with the member 66 on the cam by a compression spring 67.

The rotation of cam 53 is accomplished in a similar manner to the rotation of the arm 20 of the control mechanism. Shaft 54 is allowed to rotate with friction discs 56 only when the proper impulses operate an escapement mechanism. To effect this movement, there is formed upon the periphery of the clutch member 65, a seven tooth ratchet wheel 68 (Figure 6). In functional association therewith is an escapement mechanism consisting of a pawl 69 and electromagnet 70. Upon the actuation of the magnet 70, the pawl 69 allows the shaft 54 to rotate a distance of one ratchet tooth and thus, through clutch 65, 66 rotate the cam 53 a sufficient amount to elevate the type discs a distance equal to one of their thicknesses.

After the printing operation has taken place (to be described hereinafter) the resetting of the cam 53 is accomplished by disengaging the clutch 65, 66, whereby the spring 60, which was being wound up during the setting of the vertical shaft 50, serves to immediately return the cam to its original position. The means for disengaging the clutch 65, 66 consist of a forked lever 71, pivoted upon the frame and co-acting with the grooved hub of clutch member 65, and electromagnet 72 for actuating lever 71.

In addition to elevating the group of type discs the proper amount, as described above, the discs 6 are rotated so that the proper character on the disc opposite the printing mechanism is brought into position to be printed. Of course if the character to be printed is on the face already in position, no rotation is necessary. The mechanism whereby the disc shaft 50 is rotated comprises a ratchet wheel 75, which is slidably keyed upon the shaft 50 but held in longitudinal position by surrounding frame members, and a pull finger 76 (Figure 4) adapted to rotate the ratchet 75 a sixth of a revolution at each pull. Finger 76 is carried upon an extension 77 of the movable core 78 forming a part of the solenoid 79. Thus, upon the solenoid being energized by a message impulse, the core extension 77 and finger 76 serve to rotate the shaft 50 one sixth of a revolution.

In order to maintain the shaft 50 and type discs 1 to 7 in accurate angular position after each movement, a pivoted spring detent 80 is normally held in engagement with the back face of a tooth on the ratchet 75 in such a manner as to prevent backward movement of the ratchet but allowing forward movement of same.

As soon as the printing has taken place, it is necessary that the type discs be returned to both their original or normal angular and vertical positions in readiness for the next cycle. To perform this operation there is provided a combined torsion and compression spring 81 which encircles an upwardly extending portion 82 of the shaft 50 and has one end secured in a frame member and the other end in a thrust collar 83 fixed on said shaft. Thus it will be seen that,

as the type disc shaft is elevated and rotated, the spring 82 is both wound up and compressed. Resetting of the shaft 50 vertically downward by means of spring 81 takes place as the clutch 65, 66 is disengaged and cam 53, under influence of spring 60, returns to its low position.

The rotational resetting of the shaft 50 is accomplished by withdrawing the spring detent 80 from contact with ratchet 75 whereby the spring 82 unwinds and returns shaft 50 to its original position as determined by a stop finger 84, which is slidably keyed on shaft 50, striking a lug 85 carried on a frame member. Spring detent 80 is withdrawn from its contact with ratchet 75 by means of electromagnet 86 acting upon an armature 87 formed as the rear portion of the detent.

It is sometimes desirable in communication and particularly radio communication, to have a message in code form. Heretofore this has been accomplished in the mechanism by sending the original message in code form so that the printed representation is a copy of the transmitted message which was in code. According to my invention, I send the message in its decoded form but receive and print it from type discs which have been displaced from their original positions. In the mechanism as illustrated, the rearranging of the type discs is accomplished merely by disconnecting shaft extension 82 from shaft 50, to which it is removably attached by a squared socket formed in collar 83, and slipping the type discs off the shaft and replacing them in any desired order. Thus in the printing of the message, instead of printing the character represented by the transmitted impulses, another character is printed which, in the code form, represents the original character.

After a code combination of message impulses representing a particular character have been translated into a corresponding set-up of the type discs, it is necessary to record this set-up on a tape and move the tape so that the next recording may take place. This is accomplished by a hammer and tape feed mechanism placed adjacent the type discs and operated by an electromagnet 90. The energizing of magnet 90 thus forces hammer 91 to strike tape 14 thus printing the set-up character thereupon. Associated with the hammer 91 and operated by the movement of same is a tape feed mechanism comprising a tape feed wheel 92' (Figure 3) mounted upon a shaft 93, a ratchet wheel 94 for rotating shaft 93, and a feed pawl 95 mounted upon the end of a pivoted feed lever 96 the opposite end of which is in contact with the rear face of the hammer 91. A spring 97 serves to cause feed lever 96 to follow the movements of the hammer 91. It will thus be seen that as the hammer moves forward to perform the printing operation the lever 96 rocks upon its pivot and draws the pawl 95 over a predetermined number of teeth of ratchet 94 to feed the tape. When the hammer 91 is returned to its original position by means of a spring 98 attached to the bell-crank 92, the feed lever 96 is rocked in the opposite direction and causes the tape 14 to be fed forward a distance sufficient to permit printing of the next character.

Referring now to Figure 8, there is shown a diagram of one system of type disc markings and disc arrangement wherein the horizontal rows 1 to 7 inclusive represent the several type discs and the vertical rows a to f inclusive rep-

represent the aligned faces of the type discs. As shown in Figure 1, the normal setting of the mechanism has disc 1 and the character M in the printing position. This character M thus may be printed without further setting of the machine, but any other character requires the various settings previously described. A space between words is produced in the same manner as a printed character but no printing takes place because the disc face corresponding to the space impulses is cut away (see Figure 7).

The operation of the system of short and long electrical impulses required to run the mechanism through a cycle consisting of radial type disc set-up, vertical set-up, printing, tape feed and return of parts to original positions should now be apparent. Fourteen impulses are required to rotate the control arm 20 through one revolution. The first five impulses serve to align radially the proper disc face with the printing mechanism. This is accomplished by successive contacts of arm 20 with contact points 24 to 28 inclusive and the action of the slow-to-energize relay 100. The latter is connected in series with the arm escapement magnet 48 and operates only in response to the long impulses. The next six impulses control the vertical alignment of the type discs through the action of arm 20, contact points 29 to 34 inclusive, cam escapement magnet 70 and slow-to-energize relay 100. The twelfth impulse operates the printing magnet 90 to print the set-up character and then move the tape to the next position. The thirteenth and fourteenth impulses are utilized for connecting the arm 20 with contact plate 36 to energize type disc restoring the magnets 72 and 86. Two impulses are used for the last operation to insure an elapse of time sufficient for the restoring operation although if desired only one impulse may obviously be used.

The short and long impulses are used, in conjunction with the slow-to-energize relay 100, to properly align the type discs in the following manner: The short impulses do not operate the slow-to-energize relay 100 and hence cause no movement of the shaft 50; the long impulses energize the slow-to-energize relay 100 sufficient to close its contact 101 and armature 102 and thus in turn energize either solenoid 79 or cam release magnet 70. Thus, in the series of fourteen impulses representing, for example, the character "C", the first five would consist of four long and one short impulses, which would operate solenoid 79 four times and rotate type-discs from column c, Figure 8, to columns d, e, f and a successively and thereby align the face of disc 3 carrying the character C, with the printing mechanism. Of the next six impulses, the first two would be long and the following four, short. This would cause magnet 70 to allow cam 53 to move twice and elevate shaft 50 to bring the type disc 3 and character C thereon opposite the printing mechanism. The succeeding three impulses serve to print the character C and return the parts to original position as previously described.

Referring to Figure 9, there is shown one form of tape 15 for transmitting messages to be received on the herein-disclosed mechanism, wherein the long synchronism and fourteen short and long perforations representing the character C are distributed as follows (reading from right to left): a long synchronizing slot, four long slots, one short, two long, four short, three short. These slots may be arranged consecutively on the tape in any desired manner. When the tape is fed

through the scanning device 16 of the transmitter 10 there is broadcast a similar group of electrical impulses which may be picked up in the manner already described.

Figures 10 and 11 show one preferred manner or mounting the printer on the radio set in a vehicle for mobile use.

As shown, the radio receiving circuit is mounted in a metal container 144 for protecting it from outside disturbances, particularly such as are found in a moving vehicle.

Container 144 is mounted through a spring cushioning device 145 on the brackets 146 secured to the lower edge of the dash board 140.

Mounted just above the radio set is a frame 153 construction 153 having spring cushioning supports 154. Electrical conductors 151 and 152 extend from the radio set to the relay 12, mounted in frame 153 which also carries the remaining parts of the printing mechanism which is shown with portions cut away.

As the characters are printed on the tape 14, the tape is fed inwardly in the arrangement shown in Figure 10 so that the characters sweep from right to left along the lens 156 mounted by means of the supports 157 on the bracket 158. The simple amplifying arrangement is provided by lens 156 for projecting the characters through a slot at 142 caught in the dash board and through which the characters are made visible to the driver sitting in the car opposite the dash board. The arrangement is such that the character is projected and made visible instantaneously so that the driver is apprised of the message as soon as it has been received.

After the tape has been fed past the tape 142, it falls into the basket 161 mounted on basket 162. The driver may at any time read portions of the message which have dropped into the basket by swinging the closure 143 on its pivots to a horizontal position and reaching into the basket. The basket as shown is located on one side of the printer where it is easily accessible.

In order to prevent interaction between the telegraph printer and the radio receiver amplifier, the radio receiver is, as has already been described hereinbefore, suitably shielded by being enclosed in a metallic casing. Similarly the printer is also mounted in a metallic casing so as to prevent any radiation due to speaking at the contacts and both the telegraph distributor and the motor drive from affecting the radio receiver. As shown, condensers 171, 172, 173, 174 and 175 are connected across the distributor contacts to provide a bypass for any arcing that may take place at the distribution contacts.

It will be understood that I have disclosed only one form of printing and that any other supporting means may be used for my mobile printer. Furthermore, although I have shown the printer mounted in an automobile, it will be obvious that it may be mounted in any other movable object such as aeroplanes, ships and so forth.

It will be obvious to those skilled in the art, that my printer may take other forms than that herein shown, which is merely described here in detail for purposes of illustrating the principle of my invention, and I do not intend to be limited thereby except as set forth in the appended claims.

I claim:

1. In a radio telegraph printer; a transmitter; a receiver; a single transmitting channel connecting said transmitter and receiver; means at said transmitter for transmitting by radiant en-

ergy over said single channel code combinations of radio frequency impulse conditions; means at said receiver for translating said radio frequency impulse conditions into direct current impulse conditions; a printer comprising a plurality of type wheels, each type wheel consisting of a plurality of individually removable type characters, said type characters being interchangeable on said type wheels for rendering said printer responsive to secret codes; selector mechanism responsive to said direct current impulse conditions for selectively operating said printer in accordance with the received codes and means for transmitting a synchronizing signal over said channel for maintaining said receiver in synchronism with the received signals.

2. In a signalling system, a radio transmitter; a radio receiver; a single radio signalling channel connecting said transmitter and receiver, said receiver including a telegraph type wheel printer comprising a plurality of type wheel discs responsive to received code combinations of impulse conditions transmitted by said transmitter and received by said receiver over said single channel; a pair of electrode magnets responsive to the received code combinations of impulse conditions over said single signalling channel for selecting type characters for printing; switching means for switching predetermined ones of said impulses to one of said magnets and other predetermined impulses to other of said magnets; and means for transmitting synchronizing impulses over said single channel for controlling said switching mechanism operation in timed relation with said received signals.

3. In a signalling system, a radio transmitter; a radio receiver; a single radio signalling channel connecting said transmitter and receiver, said receiver including a telegraph printer comprising a type wheel shaft; a plurality of type discs secured thereto; means responsive to received code combinations of impulse conditions transmitted over said single channel for selectively controlling the rotation of said type wheel shaft; and moving it along its axis to select a type wheel and character on the selected type wheel for printing; and means responsive to synchronizing signals received over said single channel for operating said first means in timed relation with said received signals.

4. In a signalling system, a radio transmitter; a radio receiver; a single radio signalling channel connecting said transmitter and said receiver, said receiver including a telegraph printer comprising a type wheel shaft; a plurality of discs secured thereto; means comprising solely a pair of magnets responsive to received code combinations of impulse conditions over said single channel for selectively controlling the rotation of said type wheel shaft; and moving it along its axis to select a type wheel and a character on the selected type wheel for printing; switching means for driving predetermined ones of said impulses to one of said pair of magnets and the other of said impulses to the other of said magnets; and means for synchronizing said switching means and received impulses by impulses received over said single channel.

5. The method of operating a radio telegraph system over a single radio channel including a transmitter and a printer which comprises radiating code combinations of a uniform number of long and short impulse conditions over the single channel, selectively operating a printer in accordance therewith, and timing the operations

by counting the number of impulses in each code combination.

6. In a signalling system, a radio transmitter; a radio receiver; a single radio signalling channel connecting said transmitter and said receiver, said receiver including a telegraph printer comprising a type wheel shaft; a plurality of type discs secured thereto; means comprising a pair of magnets for controlling the rotation of said type wheel shaft and moving it along its axis and selector mechanism responsive to received code combinations of impulse conditions received over said single channel for selectively controlling said rotating means to select a type wheel and a character on the selected type wheel for printing; a switch for switching predetermined impulses of the received code combination from one to the other of a second pair of magnets; and means for transmitting synchronizing impulses over said single channel.

7. In combination, a movable carrier; a mobile radio printer mounted thereon; a motor drive therefor; cushioning means to render said printer and motor substantially free from vibrations of said carrier; a radio receiver for controlling said printer in accordance with received code combinations of a plurality of groups of impulse conditions over a single carrier channel; means whereby the received signals maintain the receiver in synchronism with the received code signals; and means for interchanging type characters on the printer to insure secrecy.

8. In combination, an automobile having a dashboard; a mobile printer mounted on said dashboard; a motor drive therefor; cushioning means to render said printer and motor substantially free from vibrations of said automobile; a radio receiver screened from and controlling said printer in accordance with received code combinations of a plurality of groups of impulse conditions over a single carrier channel; means whereby the received signals maintain the receiver in synchronism with the received code signals; and means for interchanging type characters on the printer to insure secrecy.

9. In combination with a signalling channel, a movable vehicle, having a dashboard; a mobile printer, comprising a plurality of typewheels responsive to received code combinations of groups of impulse conditions, all of the same polarity and received over said signalling channel; means for directly operating said printer first to select a typewheel in accordance with one group of code combinations and then a character on the typewheel in accordance with another group of code combinations; means for interchanging the typewheels for maintaining secrecy; spring mounting for securing said printer to the dashboard; a radio receiver screened from and controlling said printer in accordance with received signals; and means for transmitting synchronizing signals for maintaining said receiver in synchronism with said received signals.

10. In combination, a movable vehicle having a dashboard; a mobile printer mounted on said dashboard; cushioning means to render said printer substantially free from vibrations of said vehicle; a radio receiver screened from and controlling said printer in accordance with received code combinations of a plurality of groups of impulse conditions over a single carrier channel; means whereby the received signals maintain the receiver in synchronism with the received code

signals; means for interchanging type characters on the printer to insure secrecy; and a visual magnifier for magnifying and rendering visible the printed characters to render them readily visible in said vehicle.

11. In combination, a movable vehicle having a dashboard; cushioning means to render said printer substantially free from vibrations of said automobile; a mobile printer mounted on said dashboard; a radio receiver screened from and controlling said printer in accordance with received code combinations of a plurality of groups of impulse conditions over a single carrier channel; means whereby the received signals maintain the receiver in synchronism with the received code signals; means for interchanging type characters on the printer to insure secrecy; and a slot in said dashboard and a visual magnifier for amplifying the printed characters to display them through said slot.

12. In combination, a movable carrier; a mobile radio printer mounted thereon operable by direct current impulse conditions; a motor drive therefor; cushioning means to render said printer and motor substantially free from vibrations of said carrier; a radio receiver generating direct current impulse conditions for controlling said printer in accordance with received code combinations of a plurality of groups of impulse conditions over a single carrier channel; means whereby the received signals maintain the receiver in synchronism with the received code signals; means for interchanging type characters on the printer to insure secrecy; and high frequency bypass means for preventing high frequency signals from operating said printer.

13. In combination, an automobile having a printer support; a mobile printer having a plurality of typewheels mounted on said support; a motor drive therefor; cushioning means to render said printer and motor substantially free from vibrations of said automobile; a radio receiver screened from and controlling said printer in accordance with received code combinations of a plurality of groups of impulse conditions over a single carrier channel; means whereby the received signals maintain the receiver in synchronism with the received code signals; and means for interchanging type wheels on the printer to insure secrecy.

14. In combination with a signalling channel, a movable vehicle having a printer support; a mobile printer comprising a plurality of typewheels responsive to received code combinations of groups of direct current impulse conditions, all of the same polarity and received over said signalling channel; means for directly operating said printer first to select a typewheel in accordance with one group of code combinations and then a character on the typewheel in accordance with another group of code combinations; means for interchanging the typewheels for maintaining secrecy; spring mounting for securing said printer to the vehicle; a radio receiver screened from and controlling said printer in accordance with received signals translated into direct current impulse conditions; means for transmitting

synchronizing signals for maintaining said receiver in synchronism with said received signals; and means for preventing high frequency signals from affecting any operation of said printer.

15. In combination, a movable vehicle having a printer support; a mobile printer mounted on said printer support; cushioning means to render said printer substantially free from vibrations of said vehicle; a radio receiver screened from and controlling said printer in accordance with received code combinations of a plurality of groups of impulse conditions over a single carrier channel; means whereby the received signals maintain the receiver in synchronism with the received code signals; means for interchanging type characters on the printer to insure secrecy; and a visual magnifier for magnifying and rendering visible the printer characters to render them readily visible in said vehicle.

16. In a signalling system, a radio transmitter; a radio receiver; a single radio signalling channel connecting said transmitter and receiver; a printer connected to the output of said receiver, said radio receiver being screened from said printer; said printer including a telegraph typewheel printer comprising a plurality of typewheel discs responsive to received code combinations of impulse conditions transmitted by said transmitter and received over said single signalling channel; said receiver including a pair of electro-magnets responsive to the received code combinations of impulse conditions over said single signalling channel for selecting type characters for printing; switching means for switching predetermined ones of said impulses to one of said magnets and other predetermined impulses to the other of said magnets; and means for transmitting synchronizing impulses over said single signalling channel for controlling said switching mechanism operation in timed relation with said received signals.

17. In a signalling system, a radio transmitter; a radio receiver; a single radio signalling channel connecting said transmitter and receiver; a printer connected to the output of said receiver, said radio receiver being screened from said printer; said printer including a telegraph typewheel printer comprising a plurality of typewheel discs responsive to received code combinations of impulse conditions transmitted by said transmitter and received over said single signalling channel; said receiver including a pair of electro-magnets responsive to the received code combinations of impulse conditions over said single signalling channel for selecting type characters for printing; switching means for switching predetermined ones of said impulses to one of said magnets and other predetermined impulses to the other of said magnets; means for transmitting synchronizing impulses over said single signalling channel for controlling said switching mechanism operation in timed relation with said received signals; and means for preventing high frequency signals from affecting said printer magnets.

WILLIAM G. H. FINCH.