March 10, 1936. C. S. BATDORF 2,033,507

AUTOMATIC TELEPHONE SIGNAL TRANSMITTING METHOD AND DEVICE

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Fig. 1.

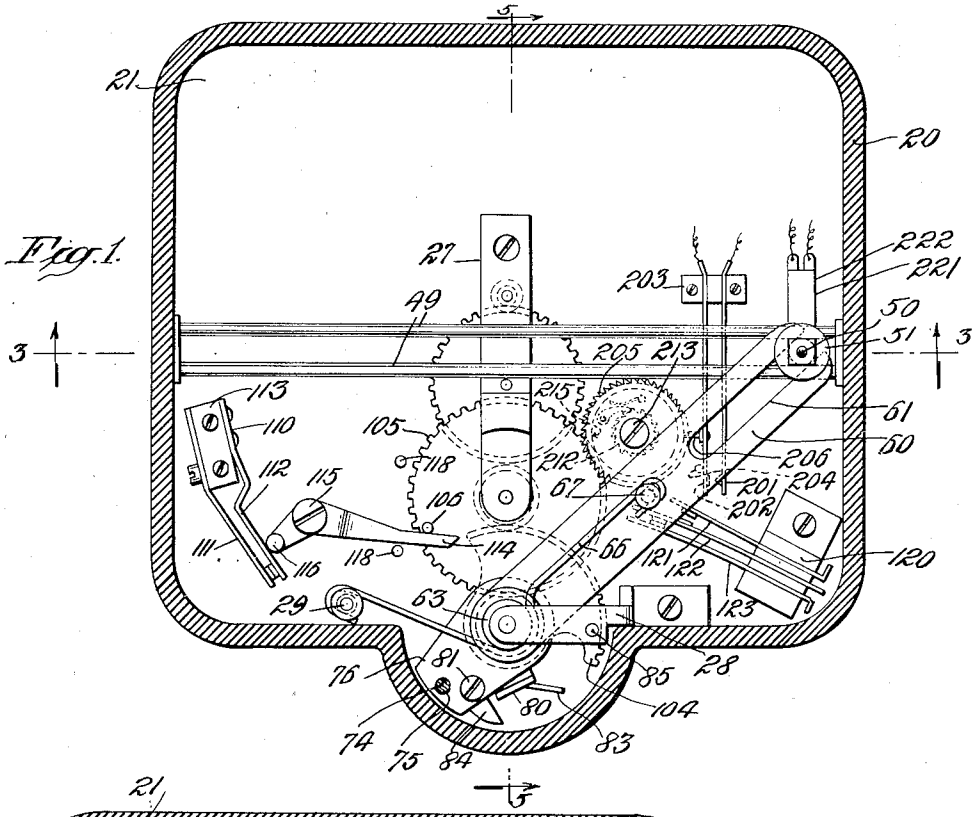
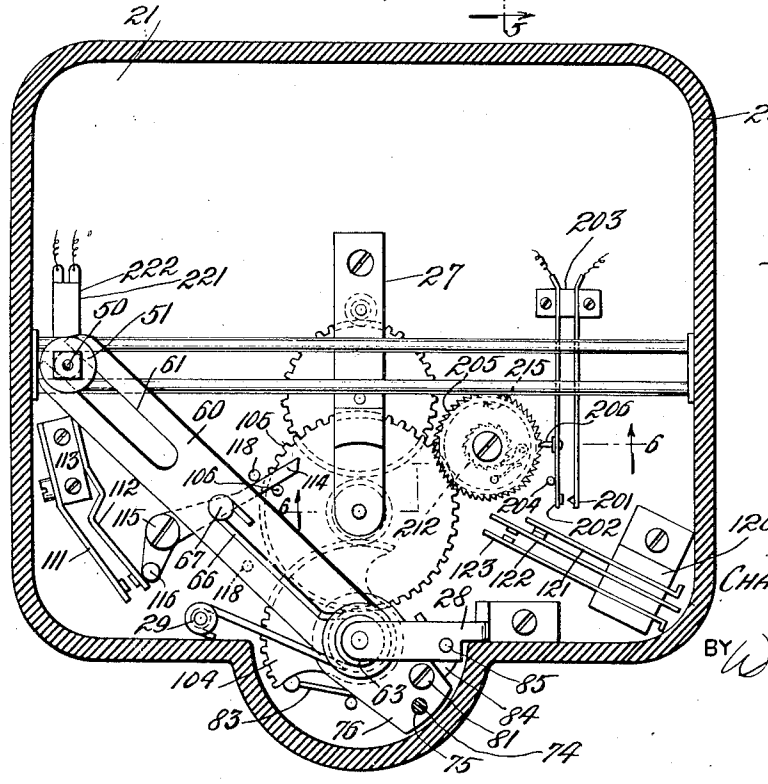


Fig. 2.



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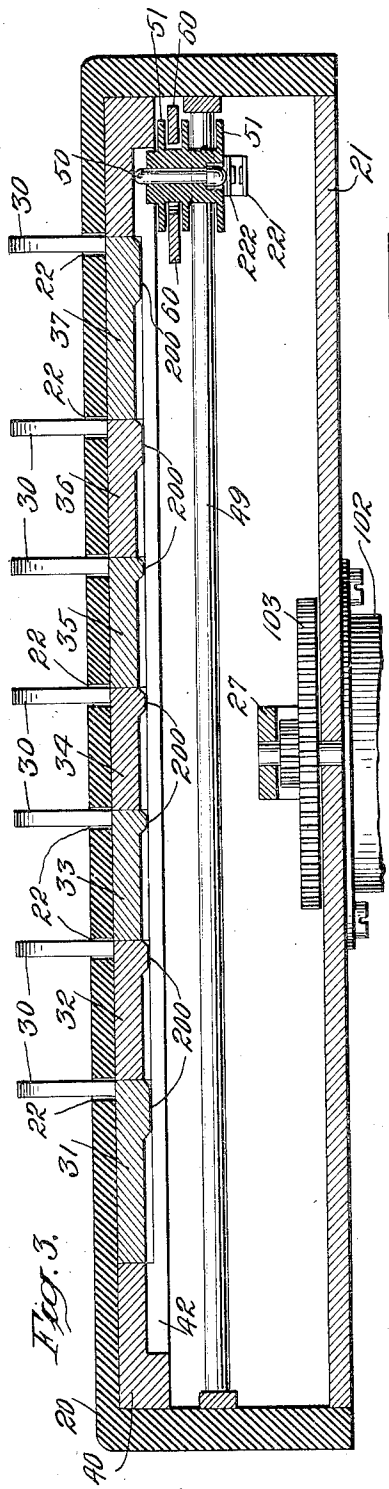


Fig. 3.

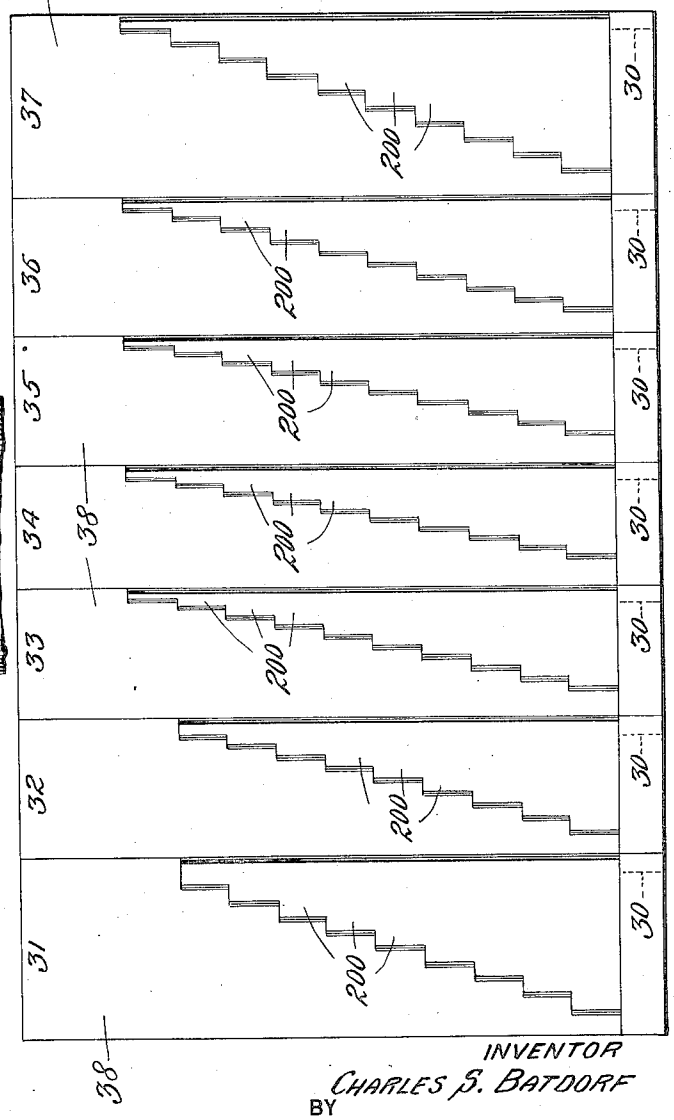


Fig. 4.

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AUTOMATIC TELEPHONE SIGNAL TRANSMITTING METHOD AND DEVICE

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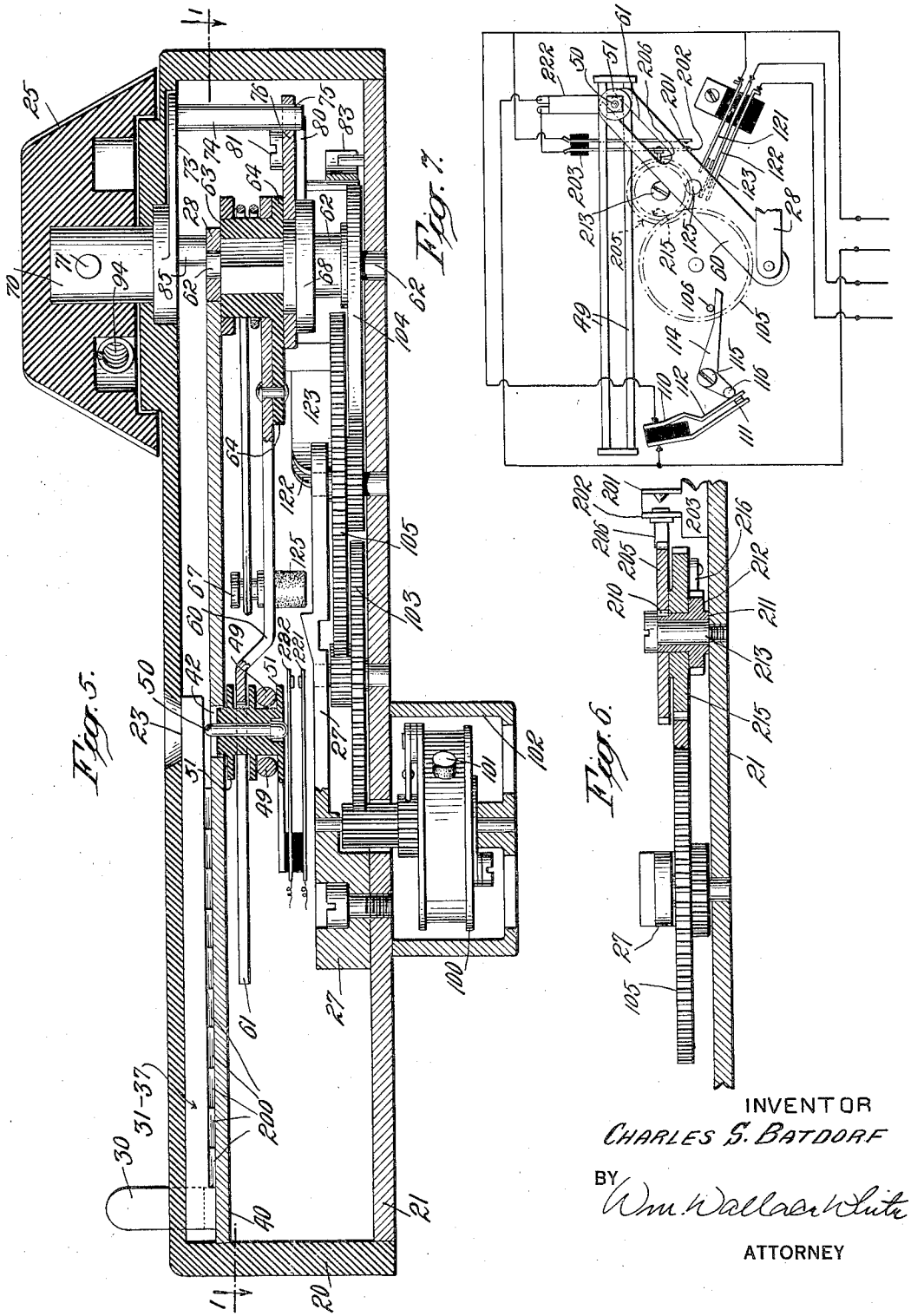


Fig. 5.

Fig. 7.

Fig. 6.

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2,033,507

AUTOMATIC TELEPHONE SIGNAL TRANSMITTING METHOD AND DEVICE

Charles S. Batdorf, Brooklyn, N. Y.

Application May 10, 1933, Serial No. 670,280

10 Claims. (Cl. 179—90)

This invention relates to signal-transmitting methods and devices for use in connection with automatic telephone systems, and particularly to methods of transmitting signals, and transmitters, of the character used in automatic telephone systems wherein the selective switches for establishing connections are operated in response to current impulses induced by such transmitters.

This invention has for its object improvements upon the automatic telephone signal-transmitting method and device set forth in U. S. Patent No. 1,891,633, issued to me on December 20, 1932.

A particular object of this invention is to provide a positive or direct current make-and-break device in conjunction with the general method and apparatus disclosed in said patent, in order to overcome the disadvantages inherent in the sliding or commutator type of circuit breaking device shown in said patent, wherein a contact pin traverses a series of plates having grooves therein, making and breaking the circuit each time the pin strikes a ridge and passes over a groove.

With this principal object in view, and such other objects as will appear from the specification, my invention consists in the method, construction, combination and arrangement of parts herein described and claimed and shown in the accompanying drawings. In these drawings the same reference characters have been used to designate the various parts as in the drawings of the said patent, in so far as the same parts are utilized in carrying out the present invention, and in this specification only so much of the apparatus is described as is necessary for an understanding of this invention, it being understood that reference may be made to the said patent for more detailed description if desired.

The general external appearance of the device is the same as shown in Figs. 1 and 2 of my said Patent No. 1,891,633. Furthermore, the operation of the device by the person using the telephone is exactly the same as set forth in said patent. Referring to the accompanying drawings,

Figure 1 is a sectional view taken approximately on the line 1—1 of Fig. 5, looking in the direction of the arrows, showing the parts in normal position, and corresponding in general with Fig. 9 of said patent;

Fig. 2 is a corresponding sectional view showing the operating parts in position to commence the automatic transmission of a signal, this figure corresponding in general with Fig. 10 of said patent;

Fig. 3 is a transverse vertical section taken approximately on the line 3—3 of Fig. 1, looking in the direction of the arrows, and corresponds with Fig. 4 of said patent;

Fig. 4 is a view looking from beneath upward at the cam plates shown in Fig. 3, and corresponds with Fig. 5 of said patent;

Fig. 5 is a longitudinal vertical section taken approximately on the longitudinal centre line of the device, and corresponds in general with Fig. 6 of said patent;

Fig. 6 is a detail of the make-and-break impulse producing mechanism; and

Fig. 7 is a diagrammatic view showing the electrical connections, which differ somewhat from those shown in Fig. 13 of said patent.

As a matter of convenience, the reference characters applied to the parts in the said Patent No. 1,891,633 are applied to the same parts in the drawings accompanying this specification, as mentioned above, and numbers commencing with 200 are applied to the new parts herein.

The type of signal transmitting device to which this invention particularly refers as shown in the drawings herein, and as more fully described in my said patent, is one in which the person desiring to make a telephone call first sets a series of plates 31–37 each in position corresponding to the elements of the signal to be transmitted, and then turns the knob 25 to the left as far as it will go, about half a turn, thus swinging a forked arm 60 to the left, and causing a pin 50 actuated by the fork to travel to the left to the initial position for the transmitting of the signal, whereupon the fork is released from the knob and the transmission of the signal is effected automatically. The automatic transmission of the signal is accomplished by the sending out of signal impulses upon the line as the pin 50 traverses the plates 31–37, the number of impulses sent out as the pin passes over each plate, being determined by the positions in which the plates were set. The pin 50 is caused to traverse the plates by the spring 66 acting on the fork 60, and the speed of travel is controlled by a governor 100 driven from the shaft 62 upon which the forked arm 60 is mounted through a gear train including the gear wheel 105, to which further reference will be made.

As shown in the drawings there is provided a casing 20 mounted upon a suitable base plate 21 which casing and base plate together enclose all of the operative parts of the mechanism except those to which access is necessary for the selecting or setting up of the signal to be transmitted,

and for the setting of the apparatus to effect the automatic transmission of the signal. The base plate **21** is capable of being connected with a telephone instrument in substantially the same manner as the dial transmitters now in use. Immediately under the top face of the casing **20** are located a plurality of cam plates **31**, **32**, **33**, **34**, **35**, **36**, **37**, one for each element of the signal to be transmitted, as shown in Figs. 3 and 4. These cam plates are slidably mounted upon a plate **40**, in the same manner as the corresponding contact plates of said patent, and are operated in the same manner. However, these cam plates do not themselves have anything to do with the production or electrical transmission of the signal impulse as did the contact plates of said patent, but they serve the purpose of determining the number of impulses to be sent out on the line corresponding with each element of the signal to be transmitted, as will hereinafter be set forth more fully.

The production of the signaling impulses is effected by the make-and-break device **201**, **202** shown particularly in Figs. 1 and 2, in which there is a stationary contact member **201** and a movable contact member **202** suitably carried by an insulated mounting **203** attached to the casing base plate **21**. The normal position of the member **202** is against the stop **204**, in which position the circuit is open. The contact member **202** is provided with a stud **206**, and the circuit is closed by means of the toothed or notched wheel **205** acting upon the stud **206** to force the member **202** against the member **201**, each time a tooth of the wheel **205** passes under the stud **206**.

The wheel **205** is preferably driven by the gear wheel **105** through the mechanism shown more clearly in the detail view Fig. 6. The wheel **205** is keyed at **210** to a sleeve **211** having as an integral part thereof a ratchet wheel **212**, said sleeve being mounted upon a pin **213** fixed to the casing base plate **21**. Rotatably mounted upon the sleeve **211** is a gear wheel **215** which meshes with the gear wheel **105**. The gear wheel **215** carries a pawl **216** which engages the ratchet wheel **212**, so that when the wheel **105** during the transmission of a signal revolves in one direction, rotating the gear **215**, the ratchet wheel **212** and sleeve **211** are rotated through the pawl **216**, and thus the wheel **205** is driven to operate the make-and-break device **201**, **202**; but when the gear wheel **105** turns in the opposite direction, during the setting of the device preliminary to the automatic transmission of a signal, the pawl **216** rides over the teeth of the ratchet wheel **212**, so that the sleeve **211** and the wheel **205** remain motionless.

The gear wheel **105** is part of the train which drives the governor **100**, and it makes a definite number of revolutions from the beginning to the end of the transmission of a complete telephone signal or number. Thus the gears **215** and **105**, and the number of teeth on the wheel **205**, may be so related that the circuit will be made and broken a definite number of times by the circuit breaker **201**, **202** during the transmission of each complete telephone signal. Inasmuch as the complete telephone signal consists usually of seven elements having a maximum of ten impulses each, the gear ratios may be set so that the circuit breaker **201**, **202** will make and break the circuit 70 times during the transmission of a complete telephone signal.

This device operates in exactly the same manner and produces the full seventy impulses, each time a signal is transmitted, irrespective of the elements comprising the telephone signal being transmitted; and the control device including the cam plates **31** to **37** then determines the number of those impulses to be sent out on the line, and also the grouping of them with respect to the telephone signal elements.

As in the case of my said Patent No. 1,891,633, the transmission of the signal is controlled by the pin **50** traversing the plates **31** to **37**; but instead of the pin **50** and the plates forming part of the electrical circuit, as in said patent, the plates **31** to **37** are now merely cam plates having raised portions **200** which depress the pin **50** as it passes over them, thus closing at such time a switch **221**, **222** carried by the roller **51** in which the pin **50** is mounted, causing the movable contact member **222** to make contact with the other member **221** closing a circuit.

The cam plates **31**–**37** correspond with the contact plates of my said patent save that the grooves of each plate are replaced by a raised cam surface **208** extending over the same stepped shaped portions of the plates as were occupied by the grooves. The pin **50** passes across the raised cam portions **200**, and is held depressed a period of time dependent upon the particular step set in its line of travel, which thus determines how long the switch **221**, **222** remains closed, and how many impulses produced by the circuit breaker **201**, **202** are sent out on the line.

As will be seen from the wiring diagram Fig. 7, when the circuit is closed by the depression of the pin **50**, the signal impulses produced by the make-and-break device **201**, **202** are permitted to go out over the line, but when the pin **50** is traveling over a portion of the plates **31** to **37** where it is not depressed by the cam portion **200** thereof, the switch **221**, **222** being open, the signal impulses being continuously produced by the make-and-break device **201**, **202**, do not get to the line and are not transmitted as a part of the telephone signal.

For example, during the time that the pin **50** passes over each of the plates **31** to **37**, ten impulses are produced by the circuit breaker **201**, **202**; but if the signal being transmitted is, for instance, MI3—3541, the letter M comprising the first element of the signal being in the sixth row, at this point the stepped cam **200** is of a width sufficient to hold the pin **50** depressed only during the period that six of the ten impulses are produced; thus but six impulses will be transmitted as a signal upon the line. The letter I being in the fourth row, the stepped cam is set in a position such that but four of the ten impulses being transmitted while the pin **50** passes across the second plate **32** will be transmitted on the line; and so on.

Apart from these variations, the electrical wiring and the construction and operation of the device is the same as described in my Patent No. 1,891,633 aforesaid.

Having described my invention, I claim:

1. In an automatic telephone signalling apparatus for transmitting electric impulses produced by a single contacting member to form the predetermined signal characters desired, the combination comprising an electric telephone circuit, means for repeatedly opening and closing said circuit by positive contact at uniform time intervals and in a predetermined exact time to produce an invariable number of signal impulses, and a switch carried by said single contacting member for selecting the number and grouping

of such impulses to be transmitted to form the signal characters predetermined.

2. In an automatic telephone signalling device, the combination comprising an electric telephone circuit, a time governed circuit breaker for producing signal impulses at uniform time intervals, direct contact means for closing said circuit to permit only certain of such impulses to be transmitted over said circuit, a movable arm carrying the circuit closing means and a series of adjustable cams arranged to actuate said circuit closing means at predetermined intervals to effect the transmission of the predetermined characters of the signal required.

3. In a telephone signal transmitting apparatus the combination with the telephone circuit of means for producing a number of signal impulses corresponding with the maximum number required for the transmission of a complete signal, a series of flat selective cams, one for each signal element to be transmitted, means for sliding the cams into position for the transmission of a predetermined signal, a direct contact switch for closing the circuit to permit the transmission of signal impulses, and a cam traversing member actuated in accurately timed relation to the speed of production of said signal impulses and arranged to open and close said switch as determined by the setting of said cams, the said switch being carried by the traversing member and being caused to traverse all said cams successively.

4. The method of transmitting telephone signals which consists in producing at uniform intervals a fixed number of signal impulses corresponding to the maximum number required for the transmission of a complete signal, traversing a control switch successively over a plurality of variable signal elements and thereby selecting groups of such signal impulses according to the elements of a signal to be transmitted and transmitting only the impulses so selected.

5. The method of transmitting signals over a telephone circuit which consists in producing an invariable number of signal impulses at uniform intervals throughout and corresponding in number to the maximum number required for any complete signal, and traversing a control switch successively over a plurality of variable signal elements and thereby selectively opening and closing the circuit to permit of the transmission of only those signal impulses selected.

6. A method of transmitting telephone signals which comprises producing an invariable number of signal impulses at uniform time intervals and corresponding to the maximum number required for the transmission of a signal, separating the impulses into groups, and traversing a control switch over variable signal elements and thus selecting and transmitting to the line only the impulses so selected for each group.

7. A method of transmitting telephone signals which comprises producing an invariable number of signal impulses at uniform time intervals and corresponding to the maximum number required for any complete signal, separating the impulses into groups and selectively opening and closing a switch in the line by traversing said switch over independently variable control elements to permit the transmission of only those signal impulses selected to give the desired signal.

8. In a telephone signal transmitting apparatus the combination comprising, relatively movable selective members for setting the apparatus to transmit a predetermined signal, an invariable circuit make-and-break device, means for actuating said device uniformly for the transmission of all signals, a traversing member, a contact switch carried by said member and actuated by said selective members, and means for causing the said switch to traverse all said selective members in accurately timed relation to the operation of the make-and-break device to transmit the signal by selecting and controlling the transmission of impulses by the said make-and-break device.

9. In a telephone signal transmitting apparatus a group of smooth selective members each of varying width for setting the apparatus to transmit a predetermined signal, a uniformly actuated make-and-break device, a traversing member, a direct contact switch carried thereby, and means for causing the traversing member to traverse the width of all said selective members successively to actuate the said switch and so control the transmission of grouped and selected impulses by said make-and-break device.

10. In a telephone signal transmitting apparatus, the combination comprising means for producing an invariable number of signal impulses at uniform time intervals and corresponding with the maximum number required for the transmission of a complete signal, a series of relatively movable selective elements, one for each signal element to be transmitted, means for setting the said selective elements individually in position for the transmission of a predetermined signal, a direct contact switch between the signal producing means and the line, and a traversing member carrying said switch and adapted to traverse all said selective elements successively and to close said switch as determined by said selective elements and thus separate said impulses into groups corresponding to the elements of the signal to be transmitted.

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