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SIGNATURE KEYER AND OPERATOR'S INDICATOR

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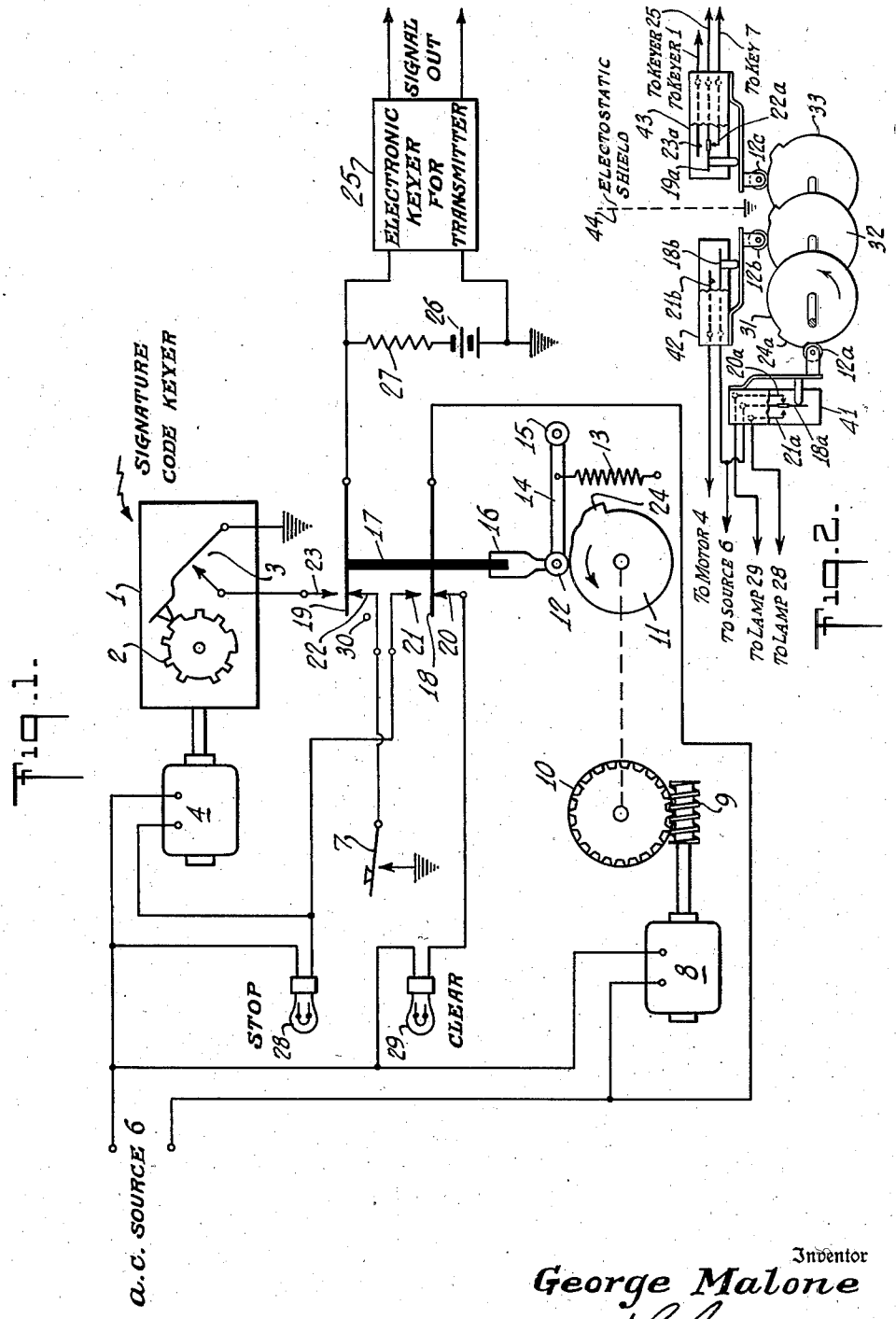


Fig. 1.

Fig. 2.

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SIGNATURE KEYER AND OPERATOR'S INDICATOR

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7 Claims. (Cl. 177—380)

This invention relates to signature keying. In communications work on radio channels, it is one of the requirements of the Federal Communications Commission that a signature code be sent out at periodic intervals for the purpose of showing the source of the intelligence which is radiated over a given channel. The signatures are customarily announced either orally or by means of Morse code signals. In United States Patent No. 2,134,562 which was granted October 25, 1938, to W. Kimmich, a signature keying device was shown and described. Such a keying device has been found particularly useful for keying the signatures of different relay stations in a multichannel carrier wave system. In a simplified form, the device of Kimmich may, of course, be used for announcing the signature of a single transmitting station.

In connection with the operation of signature keyers generally, I have found that it is desirable to provide intermittent operation of the motor which drives the code keying cam. Such a motor needs to be run for only the brief time, say for about 15 seconds, in order to announce the signature, and then may be stopped for a period of, say 14¾ minutes, more or less. During the time that the signature motor is not running, the channel is, of course, available for the transmission of traffic signals.

The sending operator needs to be warned when his channel is to be occupied for signature keying. In order to utilize the channel at maximum efficiency, the operator needs to be again warned at the instant that his channel becomes available for the further transmission of messages.

Accordingly, it is an object of my invention to provide a system for automatic keying of transmitter station identification signals at periodic intervals.

It is another object of my invention to provide indications at the sending station as to the times when signature keying takes place and the time when the communications channel is available for the transmission of messages.

Other objects and advantages of my invention will be made apparent in the description to follow. The description is accompanied by a drawing, in which:

Fig. 1 represents in diagrammatical form a preferred arrangement for carrying out the invention; and

Fig. 2 shows a modification.

Referring to Fig. 1, I show diagrammatically a signature code keyer unit 1 which includes a motor driven cam 2 and a contact assembly 3, one contact of which is preferably grounded. The other contact leads to a switching arrangement which alternately selects each of two signal sources for controlling an electronic keyer in a conventional radio transmitter. The signature code keyer 1 is driven by motor 4. This motor derives its power from any suitable current source connected to terminals 6.

A telegraph key is indicated at 7. This key, however, should be considered as merely symbolic of any conventional telegraph transmitting device whether automatic or manual in its operation. In other words, the traffic signal keyer 7 may, if desired, be a tape-controlled Morse signal, or printer signal, sender, or it may be a facsimile transmitter suitable for sending picture signals, or a device for the sending of other types of intelligence signals.

My invention also includes a switch control device which may be continuously operated by a motor 8 connected to the source 6. This motor preferably has a worm 9 on its shaft. The worm meshes with a worm wheel 10. A cam 11 is mounted on the same shaft with the worm wheel 10 and is continuously rotated. The periphery of the cam 11 is such as to operate a cam follower member 12 in opposition to a holding spring 13. The cam follower is mounted on a lever arm 14 pivoted at 15.

The lever arm 14 carries a suitable connecting element 16 which supports an insulation member 17 for actuating two contact springs 18 and 19. The contact spring 18 has complementary contacts 20 and 21. Likewise, the contact spring 19 has complementary contacts 22 and 23.

For the greater part of its circumference, cam 11 has a circular periphery. The hump 24, however, is arranged to lift the cam follower 12 so as to shift the contacts 18 and 19 from engagement with their lower stationary contacts to their upper stationary contacts. In making this shift, the following circuit conditions are established:

Current from the source 6 is supplied through contacts 18 and 21 to the motor 4 for driving the unit 1. Current is also supplied to a lamp 28, which may be of a suitable color, such as red, to indicate that the telegraph operator is to stop sending traffic signals.

The signature code keyer unit 1 during operation becomes connected to the input bias control circuit for an electronic keyer 25 whereby the signature code signals may be sent out over the radio channel which is in use. A biasing circuit for the keyer unit 25 is indicated as including a biasing source 26 and a resistor 27. During

moments when the contacts 3 in unit 1 are engaged, that is, when one of these contacts is lowered into a notch on the cam 2, the input circuit for electronic keyer 25 will be grounded. In accordance with conventional practice, the grounding of a grid in a discharge tube (not shown) in that keyer 25 will be such as to render the tube conductive, as is well understood by those skilled in the art. When the contacts 3 are broken, it is apparent that the ground potential will be removed from the grid of the electronic keyer tube and this tube will be biased to cut off by a potential from the source 26.

When the cam follower 12 has ridden completely over the hump 24, conditions will be restored for normal transmission of traffic signals. During the interval of 14 to 15 ensuing minutes, key 7, or its equivalent, is connected to the biasing circuit of the electronic keyer 25 and simultaneously a lamp circuit is closed through contacts 18 and 20 for lighting the lamp 29 to indicate to the operator that he has a clear channel. This lamp may be either green or white in color if desired.

In order to give the operator a few seconds of warning prior to the breaking of his keying circuit, I have provided a hump 24 on the cam 11, the configuration of which has two principal levels, or radii, above the principal peripheral radius. The cam follower 12 is lifted part way by the lower of the two upraised portions of the hump 24. In this first step contacts 18 and 20 are broken in order to extinguish the "clear" lamp 29. Contacts 19 and 22 still remain closed however. Contact 22 is of sufficiently yielding structure so that it will follow contact 19 for only half of its total movement. An arresting pin 30 may be provided for restraining the contact 22 from further movement after the spring 19 is lifted into engagement with its companion contact 23. Such engagement is, of course, effective when the cam follower 12 rides over the highest portion of the hump 24.

By arranging the hump 24 to povide two stages of switch control, the lamp 29 may be extinguished at a moment appreciably prior to the lighting of lamp 28 and also before breaking the circuit of the traffic signal keyer 7.

In accordance with the modification shown in Fig. 2, the operator may be warned of the breaking of his keying circuit before this circuit is actually broken, the warning signal being given by switching off the lamp 29 and almost simultaneously lighting the lamp 28 at an instant, say two or three seconds prior to the transfer of the control of the electronic keyer 25 from the key 7 to the signature code keyer 1.

In Fig. 2, I show three cams 31, 32, and 33 mounted for rotation on a single shaft which may be continuously motor driven through any suitable reducing gear. The hump 24*a* on cam 31 is of longer arc than the humps on cams 32 and 33. The cam follower rollers 12*a*, 12*b*, and 12*c* may all of them be simultaneously lowered to the minimum radius of the respective cams 31, 32, and 33. The cam follower 12*a* which is associated with cam 31, however, should be actuated prior to the other two cam followers 12*b* and 12*c*, in order that the switching function of the double-throw switch unit 41 may be anticipatory to the switching functions of the switch units 42 and 43.

The switch units 41, 42, and 43 are preferably of a type which is in more or less general commercial use for a variety of switching requirements. It is a unit, the contacts of which are conveniently housed so as to be protected from dust and dirt. A snap action is incorporated into the design of the contact arrangement. A very slight movement on the part of the cam follower roller is sufficient to actuate the switch, either for single-throw or double-throw operation.

The arrangement of parts as shown in Fig. 2 will be readily understood in view of the complete circuit diagram of Fig. 1. The modification of Fig. 2, however, consists in providing independent switch units 41 and 42 in place of the contact assembly, the contacts of which are labelled 18, 20, and 21 in Fig. 1. Thus the unit 41 contains contacts 18*a*, 20*a*, and 21*a* which are used exclusively for the control of the lamps 28 and 29. This control provides for extinguishing the lamp 29 substantially at the moment of lighting the lamp 28. Due to the greater arc of the hump 24*a* on cam 31 in relation to the arcs subtended by the humps on cams 32 and 33, the lamp 28 will become lighted for a brief moment, say about two or three seconds, prior to the time interval which is occupied for signature keying.

When the switch units 42 and 43 are actuated, however, the motor 4 is caused to drive the signature code keyer 1. This function is obtained by the closing of contacts 18*b* and 21*b* in the switch unit 42 in response to the engagement of the hump on cam 32 with its cam follower roller 12*b*.

During the interval of signature code keying by the unit 1, the input circuit for the electronic keyer 25 must be switched into connection with the contacts 3 of the signature code keyer 1. Simultaneously, the connection between the traffic keyer 7 and the electronic keyer 25 must be broken. As will readily be seen from the details of the double-throw switch unit 43, these conditions are established when contacts 19*a* and 22*a* break and contacts 19*a* and 23*a* make.

Since the input circuit for the electronic keyer 25 is intimately associated with high frequency apparatus, it may be desirable to electrostatically shield this circuit from the circuits which are fed from the power source 6. Accordingly, an electrostatic shield 44 may be interposed between switch unit 43 and other switch units and electrical circuit arrangements of the complete combination.

Since corresponding parts in Figs. 1 and 2 bear the same reference numerals and such numerals have subscript letters applied in Fig. 2 for distinguishing their separate functions, it is believed that no further description of Fig. 2 is necessary; particularly, where the complete circuit arrangement as shown in Fig. 1 may be readily understood as applicable to the modification shown in Fig. 2.

In view of the foregoing description, it will be understood that considerable utility is to be found for my invention, due to the economy of channel time as by indicating to the operator just when he can use his key 7, and just when he should cease using it because such use would fail in its purposes during the disconnection of the traffic signal keyer from the outgoing channel.

Various applications of my invention may be well understood by those skilled in the art without specifically mentioning the different conditions under which the invention itself may be found useful. It will be understood, therefore, that the scope of the claims is not limited to the

particular combination of elements or arrangement of parts herein shown and described.

I claim:

1. In a telegraph system, a signature keyer arranged to transmit a predetermined train of marking and spacing signals, a motor for intermittently driving said signature keyer, a traffic signal keyer, a communications circuit connectable alternately to one and to the other of the two said keyers, a pair of indicator devices each individually operable to denote predetermined and mutually exclusive times for signature keying and for traffic signaling respectively, and continuously motor-driven switching means for supplying power during a predetermined time interval to said signature keyer motor and to that one of said indicator devices which is associated therewith, said switching means being further operable to supply power to the other said indicator device and to connect said communications circuit to said traffic signal keyer for a subsequent predetermined period.

2. The combination according to claim 1 and including at least one cam and a cam follower through which said switching means is motor driven.

3. Apparatus for signature keying and for indicating the periodic use of a signature code keyer, comprising said keyer, an intermittently operable signature keyer motor, a communications channel, a traffic signal keyer, switching means including a continuously motor-driven cam-and-cam-follower system for differentiating between the use of said channel by said motor-driven signature keyer and by said traffic signal keyer respectively, indicating means operable by said switching means to give an anticipatory warning that said channel is about to be switched to said signature keyer, and further indicating means operable by said switching means at least during the period of operation of said signature keyer motor for indicating the lapse of said period.

4. In combination, a signature code keyer, a motor for actuating said keyer intermittently, a traffic signal keying device, a keying circuit, a cam-actuated switch for connecting said circuit alternately to said keyer and to said keying device, a second cam-actuated switch for controlling the running and idle periods of said motor, an indicator lamp connectable by said switch to a given power source at least during the running periods of said motor, and a second indicator lamp connectable by said switch to said power source during a major portion of the idle period of said motor.

5. The combination according to claim 4 and including a plurality of cams mounted on a common shaft, said cams constituting means for maintaining a predetermined cyclic phase relation between the operation of said switches.

6. In combination, a signature code keyer; a motor for actuating said keyer intermittently; a traffic signal keying device; a keying circuit; a switching arrangement comprising three units, A, B, and C, each individually controlled by a separate cam-follower riding over the periphery of an appropriate continuously motor-driven cam, each of said cams being rotatable on a common shaft; and two indicating lamps; the configuration of said cams being such that switch unit A is first operated to extinguish one lamp and to light the other, switch unit B is subsequently operated to close a power supply circuit to said motor, switch unit C is operated substantially simultaneously with switch unit B to transfer the connection of said keying circuit from said traffic signal keying device to said signature code keyer, and the three said switch units are operated in the reverse direction substantially simultaneously.

7. Apparatus for periodically actuating a signature keyer and for indicating intervening periods available for traffic signaling over a given radio channel, comprising continuously motor-driven cam-actuated switching means for producing circuit closures which connect said keyer to said radio channel during recurring signature keying periods, a traffic signal keyer connectable by said switching means to said channel during intervening periods, a pair of indicator lamps having individual lighting circuits said switching means being operable to connect said lighting circuits alternately to a given power source, the switching cycle for said lamps being such that the lighting of one indicates substantially a signature keying period and the lighting of the other indicates substantially a traffic keying period, and means including a motor for intermittently driving said signature keyer; said switching means being also operable to feed power to said motor for driving said signature keyer during said recurring signature keying periods.

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