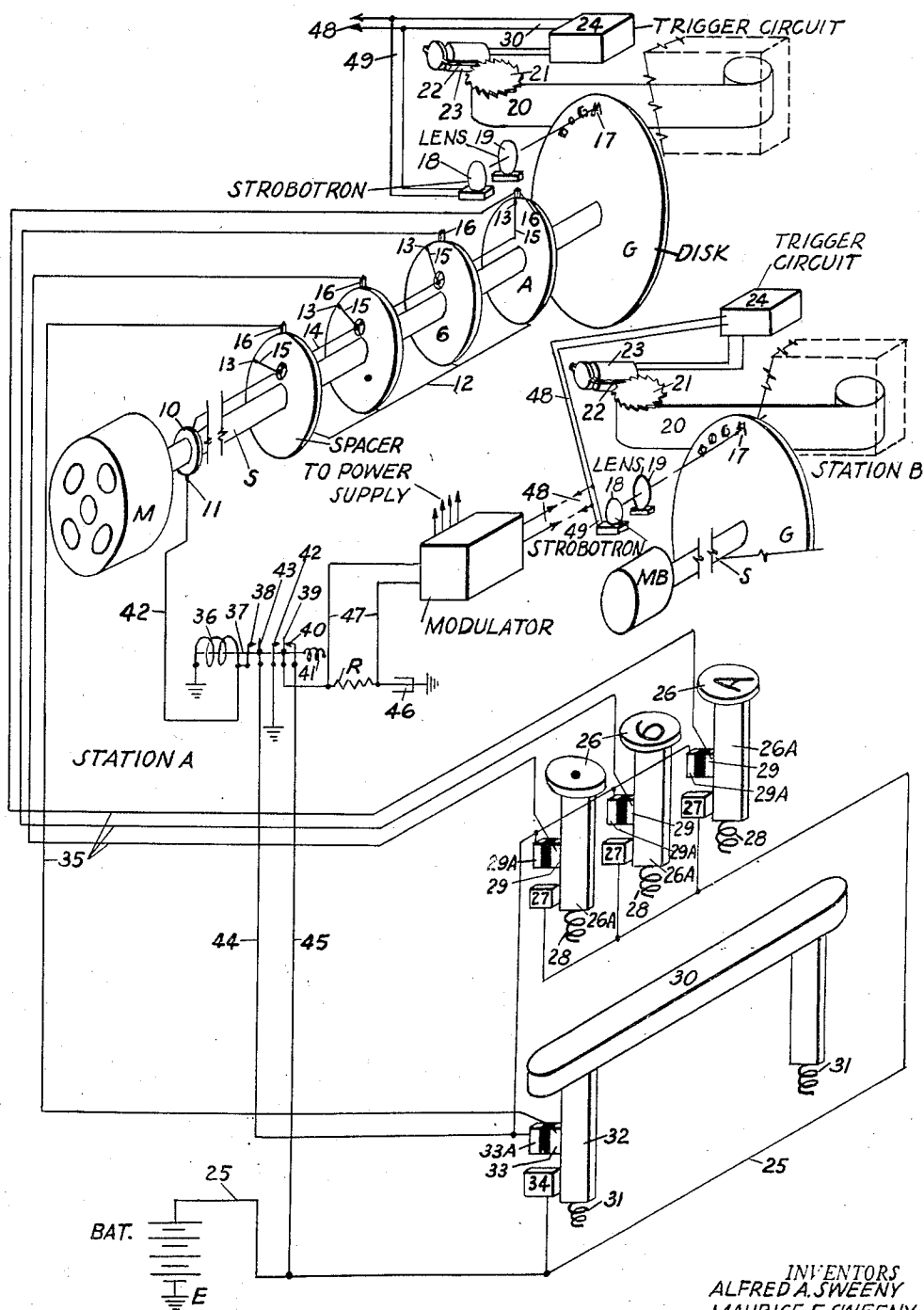


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PRINTING TELEGRAPH SYSTEM

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PRINTING TELEGRAPH SYSTEM

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1 Claim. (Cl. 178—15)

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This invention relates to improvements in teletypewriter devices and has reference more particularly to a photo teletypewriter mechanism.

Teletype machines of various kinds are now in use for sending and distributing information such as news, stock reports and/or messages of various kinds. Such machines, being mechanical and operated by electromagnetic devices, including relays, magnets and escapements of various kinds, are highly complicated, very costly and subject to breakdowns.

It is the object of this invention to produce a mechanism that will transmit messages from one place to another either over metallic circuits or by means of a modulated radio carrier wave, and which shall have a minimum of parts.

Another object is to produce a mechanism of such construction that the message can be sent by operating keys corresponding to the ordinary typewriter keys and which will receive the message at a distant station and print it on a tape in easily readable form.

The above and any other objects that may become apparent as the description proceeds are attained by means of a construction and an arrangement of parts that will now be described, for which purpose reference will be had to the accompanying drawing in which the invention has been illustrated and in which the single view is a diagrammatic representation showing the several elements in their operative relation.

In the drawing reference character M designates a synchronous motor, preferably a two pole motor, and S designates a shaft directly connected with the motor. Secured to the shaft is a slip ring 10 with which brush 11 cooperates. The shaft carries a number of disks 12 of insulating material; there is a separate disk for each letter, number and/or other characters to be transmitted, which preferably correspond to the characters on a standard typewriter. Each disk has a short metal segment in its periphery and these are all connected with a common conductor 14 by means of radial conductors 15. A brush 16 is positioned to contact with the periphery of each disk. Brushes 16 are all positioned in a radial plane passing through the shaft axis, as shown. A disk G, somewhat larger in diameter than disks 12, is attached to the end of the shaft opposite from the motor. If disk G is made from opaque material, it has all of the letters, numbers and other characters cut therein as stencils and arranged in a circle as indicated at 17. Disk G may, however, be made from transparent plastic or other suitable trans-

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parent material and covered with an opaque paint or other opaque outer film which may have parts removed to form the letters. A "strobotron" lamp 18 is positioned, preferably in the radial plane that contains brushes 16, and is provided on one side with a transparent window through which a beam of light emerges whenever the lamp functions, which beam is adjusted to travel in the radial plane above referred to and to strike disk G in a position to project light through the stencils or through the transparent areas outlining the letters and/or other symbols. A lens 19 may be interposed between the lamp and disk G to collimate the rays from the lamp. Positioned on the far side of disk G is a sensitized tape 20 that is moved from right to left by means of a step by step mechanism comprising a ratchet wheel 21 and a pawl 22 operated by solenoid 23 when it is energized by a current from the multivibrator 24.

Messages are initiated by means of an apparatus that will now be described.

A source of direction current, for example, a storage battery BAT, of the desired voltage and capacity is provided and has one pole grounded at E. A conductor 25 is connected with the other pole and extends to the keyboard where it forms the common lead for all of the sending key switches which will now be described. The sending apparatus has a keyboard similar to that of a typewriter, having one key for each letter, number, punctuation mark and any special character that may be desired; there is only one key for each letter, as capital letters only are used. In the drawing only three keys are shown, one representing the letters, one representing the numbers and the other the punctuation marks and special characters, if any. Associated with each key is a stationary switch contact 27. For the purpose of this explanation, the stems 28a of the keys will be considered as made from insulating material. Springs 28 are associated with the keys and normally hold them in the elevated position shown in the drawing. Attached to each key stem are switch contacts 29 and 29a that are moved into engagement with the corresponding stationary contacts 27 whenever the keys are depressed. Numeral 30 designates spacer bars that are held in elevated position by springs 31 and which have insulating stems 32 that carry switch contacts 33 and 33a into engagement with contacts 34 when the bars are depressed.

Conductors 35 connect the movable contacts 29 with the corresponding brushes 16. The one

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that is connected with the movable contact 29 of the A key extends to brush 16 at the disk nearest disk G and the others follow in regular order.

Station A is provided with a relay comprising a solenoid coil 36 having one end connected with brush 11 and the other grounded. A magnetic core 37 is operatively associated with the solenoid and is connected with two spaced movable relay contacts 43 and 39. Contacts 39 and 40 are normally in engagement, being biased to this position by spring 41. When the solenoid is energized, core 37 will be moved towards the left, thereby opening circuit at 39 and 40 and closing contacts at 39, 42 and 38, 43.

Let us now assume that key A is depressed. Contacts 29 and 29a will then be moved into engagement with contact 27 and conductor 35 will be energized, and when contact 13 on the first disk 15 engages brush 16, current will flow through conductor 14 to slip ring 10, thence through wire 42 through solenoid 36 to ground. When solenoid 36 is energized, core 37 will be attracted, moving switch members 43 and 39 towards the left, whereupon circuit 38, 43 and 39, 42 will close and 39, 40 open. When key A was moved downwardly, contact 29a also became energized by engagement with contact 27, thereby energizing conductors 44, whereupon current will flow from 44 to 38, thence through the solenoid and to ground, locking the relay.

Before the solenoid was energized, conductor 45, which is in electrical contact with the ungrounded pole of the battery, was connected to condenser 46 through resistance R. The other terminal of the condenser being grounded, the condenser was therefore charged when contact 39 separated from contact 40, and therefore, when contact 39 engaged contact 42, the condenser discharged through ground. The discharge of the condenser set up a voltage across resistance R which was conveyed to or impressed on the modulator through conductors 47. When key A is released, wires 25 and 44 are de-energized and the solenoid relay is thereby unlocked, and the parts return to the position shown on the drawing. When another key is depressed, the operation just described is repeated.

When words are to be spaced, bar 30 is moved downwardly, whereupon contacts 33 and 33a engage the live contact 34 in the same manner as explained in connection with contacts 29 and 29a.

The apparatus just described has been designated as "station A." Identical apparatus is located at "station B," and at all other stations if more than two are used.

On the drawing a few of the elements of station B have been indicated. It will be observed that a pair of conductors project from the trigger circuit 24, and this pair has been designated by numeral 48.

Whenever the condenser is discharged through resistance R, which occurs each time a sending key is pressed down, an impulse is transmitted to the modulator, which may be connected with the multivibrator at station B by means of a wired circuit 48. Instead of a metallic circuit, a radio carrier wave may be sent out from the modulator and modulated by the means described, all as is common in the art of radio.

It must be understood and remembered that the equipment at each station is identical. In station B the motor has been designated by MB to distinguish it from motor M at station A. The two synchronous motors M and MB are connected for synchronous operation by any one of the sev-

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eral methods commonly employed for this purpose, and the shafts S at the two stations therefore rotate in exact synchronism.

Whenever a sending key is depressed at either station, the impulse due to the discharge of the condenser modulates the current or the carrier wave sent out from the modulator, and currents or waves modulated by such impulse flow through conductors 49 to the strobotron and causes the same to light. Since such impulses are controlled as to time by the closing of the circuit from any one of brushes 16 to the corresponding contact 13, and since the brushes are all in a plane which also contains the strobotron, such impulses will take place and the strobotron glow at the instant that the corresponding letter, figure or other symbol on disk G is in line with the light beam from the strobotron; light will therefore pass through the stencil openings of the corresponding letter or figure, etc., and strike the sensitized paper 20 which is positioned in a light-proof compartment. At the time the strobotron is lighted, solenoid 23 is energized and moves the sensitized tape one space. The tape moves in the same direction as the upper part of disk G, and therefore any distortion due to relative movement is prevented. Since the times here dealt with are exceedingly small, practically no distortion results, even when the tape is stationary at the time the light strikes. The exposed tape is developed by contact with gas in a well known manner, and the characters become visible and readable. A separate symbol, as for example, an open square or oblong figure, may be used to indicate a space between words, and it is possible to leave such spaces blank as on an ordinary Teletype tape.

Operation

When a message is to be transmitted from station A to station B, it is spelled out by striking the keys in the same manner as on a typewriter or Teletype machine. The two motors M and MB are operating in synchronism as above explained. If key A, for example, is struck, conductor 35 will be connected with the ungrounded pole of the battery, and when contact 13 engages the brush 16 on the A disk 12, relay coil 36 is energized and condenser 46 allowed to discharge, setting up an instantaneous voltage drop between the ends of resistance R, producing an impulse that is transmitted to the modulator, from which it is transmitted to wires 48 of the other station, activates the trigger circuit and lights strobotron 13. Since the source of light, brushes 16 and the stenciled character corresponding to any disk 12 are in the same diametrical plane, the image of the character will be projected onto the tape at the same point relative to the two axes of the tape rolls. After each exposure, solenoid 23 functions to step the tape ahead one space. Any lag due to the small time constant of solenoid 36 and associated parts can be compensated for by a corresponding angular adjustment of disk G relative to disks 12. Disk G and tape 20 are preferably enclosed in a light-tight compartment, indicated by broken lines, or all equipment at each station with the exception of the keyboard may be enclosed in a light-tight compartment. The tape may be of the type that is developed by contact with a gas, sometimes referred to as "Ozaprints." There are several methods being practiced which may be employed for developing the tape, and this has therefore not been shown.

Attention is called to the fact that the circuit

illustrated on the drawing is of the block type in which the strobotron, the modulator and the trigger circuit have been identified by name. These elements are well known to and understood by persons versed in this art. In the book entitled *Basic Radio* by Hoag Van Nostrand Co., Inc., tenth printing, in chapter 19 on page 127 the circuit contemplated for the trigger circuit is shown. Either the Simple counting circuit (Figure 19A) or the Self stopping circuit (Figure 19B) may be used, the latter being preferred. In chapter 18 beginning on page 120 the circuit and elements indicated on the drawing by the word "strobotron" are shown and explained (Figure 18D), and in chapter 16 the various embodiments of modulators are shown. The trigger circuit may be a "one shot multivibrator" as is defined in *Principles of Radar* M. I. T. School Staff Second Edition, McGraw Hill, chapter 13, pages 2-44. The circuit shown in *Basic Radio* and above identified is the preferred one.

From the above it will be evident that the mechanism is very simple compared to the ordinary "teletype" machine now in use. The two stations may be connected by a radio carrier wave instead of by wires 48. The equipments at both or all stations are exactly alike and of comparatively small size. As above mentioned, the motors may be synchronized in any of the several ways now employed for this purpose.

On the drawing and in the specification a strobotron and a sensitized tape have been shown and described as the means for recording the message, as this may be effected by simple mechanical means.

The device may, however, be so made that it will print the message directly onto the tape. Such a modification merely involves the application of type to the large end disk and the substitution of an ink ribbon and an electrically operated hammer for the strobotron and the lens. The hammer can be operated by a magnet that is actuated by the same current impulse that operates the strobotron, and may be arranged so as to have a slight movement that will allow it to follow the moving type for the very short time it is in contact therewith.

Having described the invention, what we claim as new is:

A device for transmitting intelligence from and to either of two spaced stations comprising; in combination, a set of keys, one for each character to be transmitted, a source of electric current having one pole grounded, a stationary switch contact associated with each key, all of said contacts being electrically connected with the ungrounded pole of the electric current supply, two electrically insulated contacts associated with each key for movement towards and away from the stationary contact, a shaft mounted for rotation, means comprising electric motors for turning the shafts in the two stations in exact synchronism, a disk at the end of the shaft, said disk having the characters to be transmitted ar-

ranged in angularly spaced relation in a circular zone, the characters having transparent outlines, the shaft having a plurality of electrical contacts supported thereby for conjoint rotation therewith, each contact moving in a separate circular path, there being one contact for each character, a brush positioned in the path of each contact, the brushes and contacts being so arranged angularly about the shaft that electrical connection between the contacts and brushes will take place successively at angular intervals equal to 360° divided by the number of characters, a strobotron positioned to throw a beam of light onto that zone of the disk containing the characters, a slip ring on the shaft, conductors electrically connecting all of the electrical contacts with the slip ring, one of the two contacts associated with each key being electrically connected with one of said rotatable contacts, the brushes, the strobotron and the characters on the disk being so arranged that when key is depressed and the brush corresponding to said key comes into engagement with the corresponding rotating contact the character on the disk corresponding to the key connected with the contact will be positioned to be illuminated by light from the strobotron, a relay coil having one end connected with the slip ring and the other end grounded, a condenser having one side grounded, a resistance connected with the other side, the other end of said resistance being normally connected with the ungrounded pole of the electric current source, means comprising said relay coil for breaking connection between the resistance and the electric source and connecting the resistance to ground whereby the condenser will discharge through the resistance, the relay simultaneously connecting the ungrounded end of the coil directly to the ungrounded pole of the electric source thereby locking the relay during the time the key is depressed, the relay unlocking and returning to its normal position when the key is released, whereby the condenser is connected across the current source, a modulator connected in parallel with the resistance, the modulator serving to transmit a modulated electric wave to the other station for activating the strobotron, a sensitized tape mounted for movement adjacent the rotating character containing disk, to receive light passing through the corresponding character, and means for shifting the tape when the key is returned to normal position.

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