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TELETYPEWRITER

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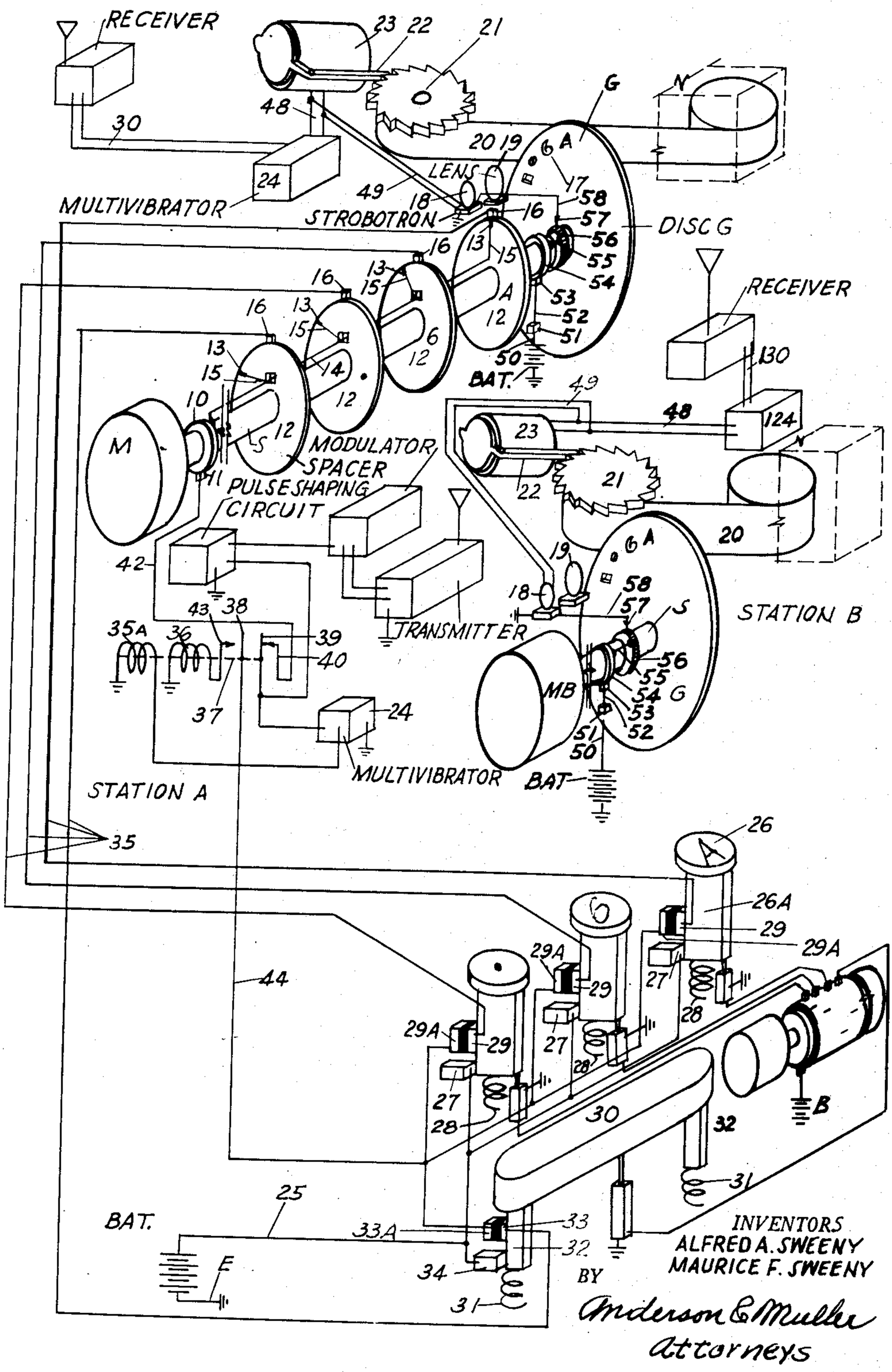

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TELETYPEWRITER

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1 Claim. (Cl. 178—68)

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This invention relates to improvements in teletypewriters and has reference more particularly to a wireless teletypewriter mechanism.

Teletypewriter 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 modulated radio carrier waves, 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 manually operated or perforated paper tape operated 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 drawings in which the invention has been illustrated and in which the single figure is a diagram showing the several elements in their operative relation showing a manual keyboard control.

In the drawings, 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 character to be transmitted, which preferably corresponds to the characters on a standard typewriter. Each disk has a short metal segment 13, 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 the same 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 transparent 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, but not necessarily, 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 trigger circuit 24.

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

A source of direct 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 a 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 26A 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 a spacer bar that is held in elevated position by springs 31 and which has 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 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 solenoid coils **35A** and **36**. A magnetic core **37** is operatively associated with the solenoids and is connected with two spaced movable spring type relay contacts **43** and **39**. Contacts **39** and **40** are normally in engagement. When the solenoid is energized, core **37** will be moved towards the left, thereby opening circuit at **39**, **40** and closing contacts at **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 the corresponding conductor **35** will be energized. 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** and through contact **40** and **39** to multivibrator **24** and to the pulse shaping circuit. Multivibrator **24** operates solenoid **35A** which attracts core **37**, moving switch members **38** and **39** to the left whereupon circuit **38**, **43** will close and **39**, **40** open. When key A is moved downwardly, contact **29A** also becomes energized by engagement with contact **27**, thereby energizing conductors **44**, whereupon current flows from **44** to **38**, thence through the solenoid **36** to ground, locking the relay.

Attention is called to the fact that the current in wire **42** has a complete conductive path to the pulse shaping circuit after it passes relay contacts **39**, **40** and is not delayed by reason of the impedance of coil **35A** and the inertia of the armature **37**.

The pulse of current which reaches the pulse shaping circuit is modified and passed on to the modulator and radio transmitter. When key A is released, wires **35**, **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. The radio receiver is connected by wires to the trigger circuit **124** and conductors project from the trigger circuit, which have been designated by numeral **48**.

It must be remembered that the equipments at the two stations are 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 several methods commonly employed for this purpose, and the shafts S at the two stations therefore rotate in exact synchronism.

Whenever the pulse shaping circuit is energized, which occurs each time a sending key is pressed down, a pulse is instantly transmitted to the modulator which modulates, keys or interrupts the carrier wave sent out by the radio transmitter. The carrier wave is received at Station B, and the modulations, or interruptions or pulses operate trigger circuit **124** all of which is common in the art of radio. Trigger circuit **124** through conductors **49** cause the strobotron to light. Since such impulses are controlled as to time by the closing of circuit from any one of brushes **16** to the corresponding contact **13**, and since the brushes are all in the radial 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.

Brushes **16** and conductors **13** are of a width to allow for engagement through the maximum angle of "hunting" of the motors.

The strobotron is connected through conductor **58**, brush **57**, commutator **56**, conductor **55**, slip ring **54**, brush **53**, conductor **52**, rheostat **51**, and conductor **50** to the battery. Battery potential on the strobotron is necessary before it can be fired by the signal from the receiver. Due to the very narrow brush **57** and the size and arrangement of the conductors of commutator **56**, the strobotron fires at only the instant when a letter on disk G is at exactly its maximum height of travel, thus reducing distortion.

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 teletypewriter 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 teletypewriter machine. The two motors M and MB are operated 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 **35** is energized and by means of radio as described above, the trigger circuit and strobotron is activated. Since the source of light, brushes **16** and the stenciled character corresponding to any disk **12** are as previously pointed out, 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 or during 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, a portion only of which has been 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 teletypewriter now in use. The two stations are connected by a radio carrier wave instead of by wires. 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.

In Figure 1 of 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.

Having described the invention, what is claimed as new is:

A device for transmitting intelligence to and from two spaced stations comprising, in combination, a set of movable keys, one for each character to be transmitted, a source of direct electric current one pole of which is grounded, a stationary contact electrically connected with the ungrounded pole of the current source, operatively positioned adjacent each key, each key having two electrically insulated contacts positioned thereon for movement into electrical engagement with the corresponding stationary contact, each device having a rotatably mounted shaft, means comprising a synchronous motor

connected with said shaft to effect synchronous rotation of the shafts of spaced devices, each shaft having a disk attached to one end thereof, said disk having the characters to be transmitted arranged in a circular zone, in angularly spaced relation, the characters having transparent outlines, the shaft having a contact for each character supported thereon for conjoint rotation therewith, each contact moving in a circular path when the shaft turns, a brush positioned in the path of each contact so as to be in conductive engagement therewith once each revolution of the shaft, the several contacts being angularly spaced so that they come into engagement with their corresponding brushes successively when the shaft turns, the angular displacement of the contacts being equal to 360 degrees divided by the number of characters, a strobotron positioned to throw a beam of light on the zone of the disk which contains the outlines of the characters, a slip ring on the shaft, means for electrically connecting all of the said contacts with the slip ring, one of the two contacts on each key being electrically connected with one of said brushes whereby the said contact on the key will be in electric conductive relation with the slip ring once each revolution of the shaft, means effecting an operation of the strobotron at the instant when an energized brush comes into electric engagement with a rotating contact whereby the character on the rotating disk which corresponds to the energized brush will be illuminated, means including a multivibrator and a pulse shaping circuit connected in parallel to the slip ring, a locking relay operatively connected with the multivibrator for breaking the circuit from the slip ring to the multivibrator and the pulse shaping circuit after the multivibrator has functioned to allow only a single operation of the strobotron for each operation of a sending key, and means comprising a photosensitive tape for producing a photographic record of the characters successively illuminated by the strobotron.

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