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FACSIMILE TELEGRAPH SYSTEM

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FIG. 1

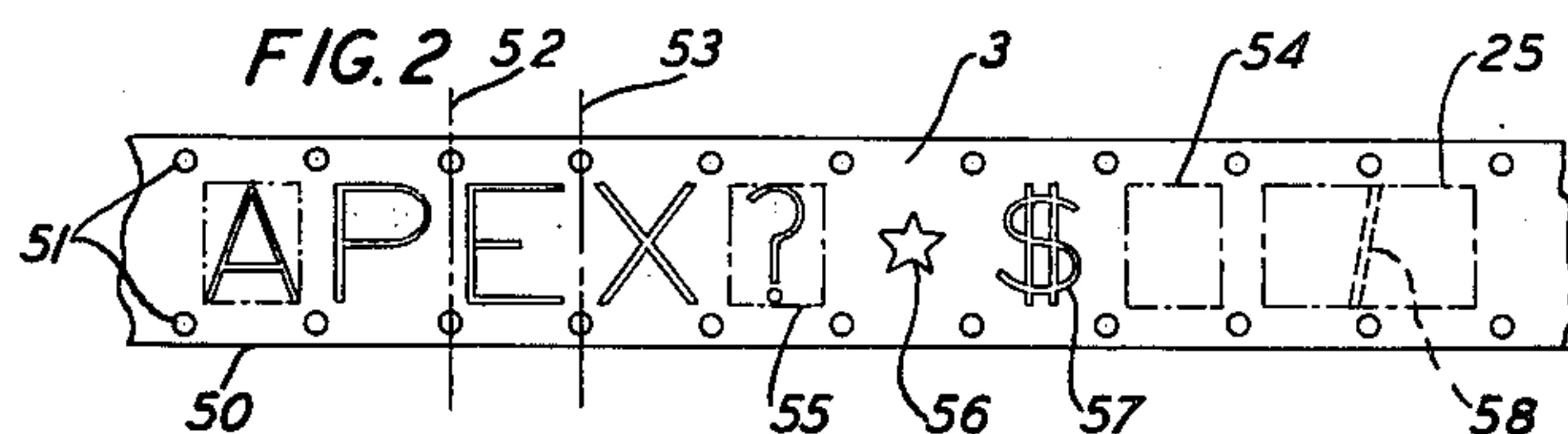
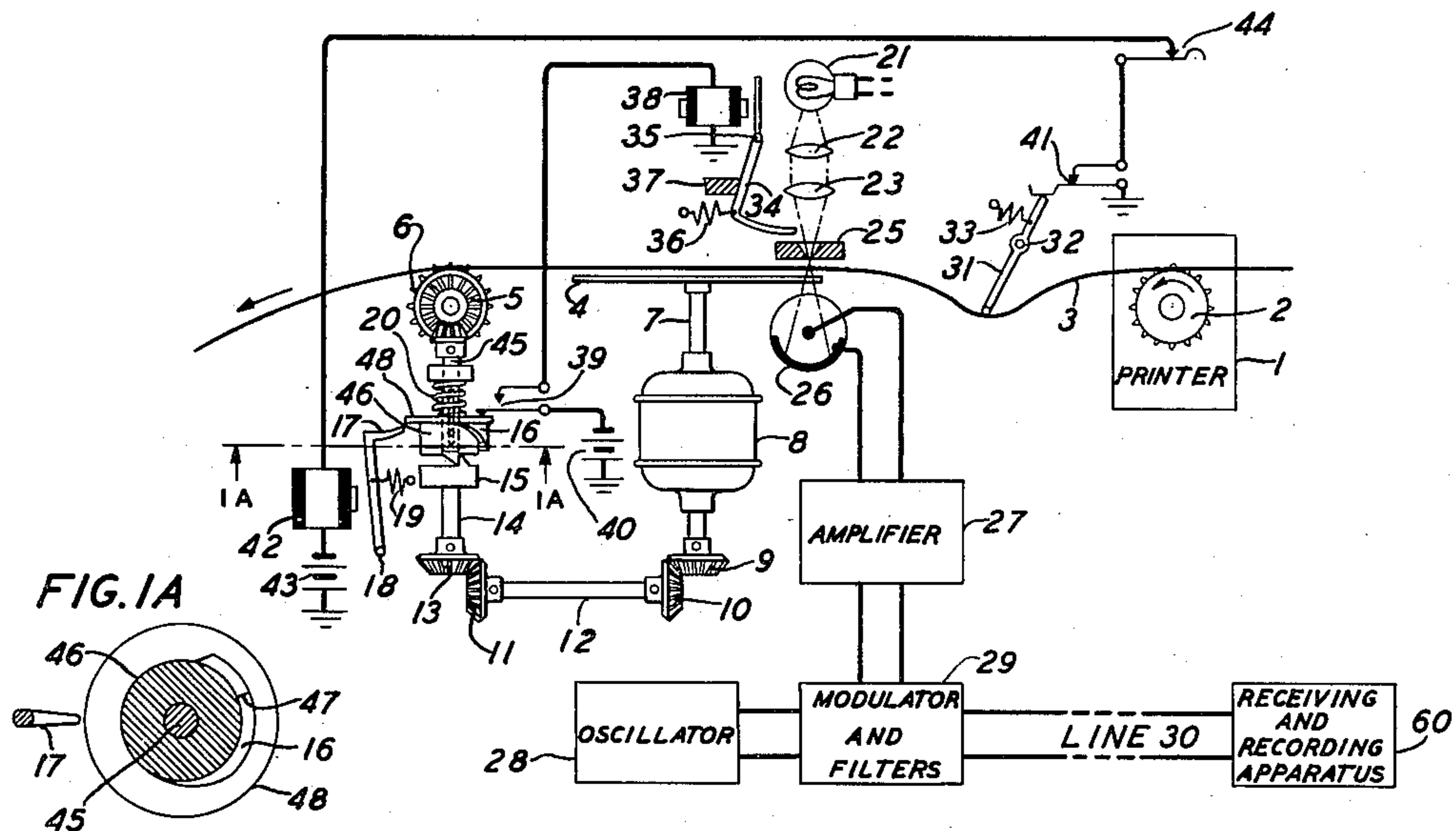
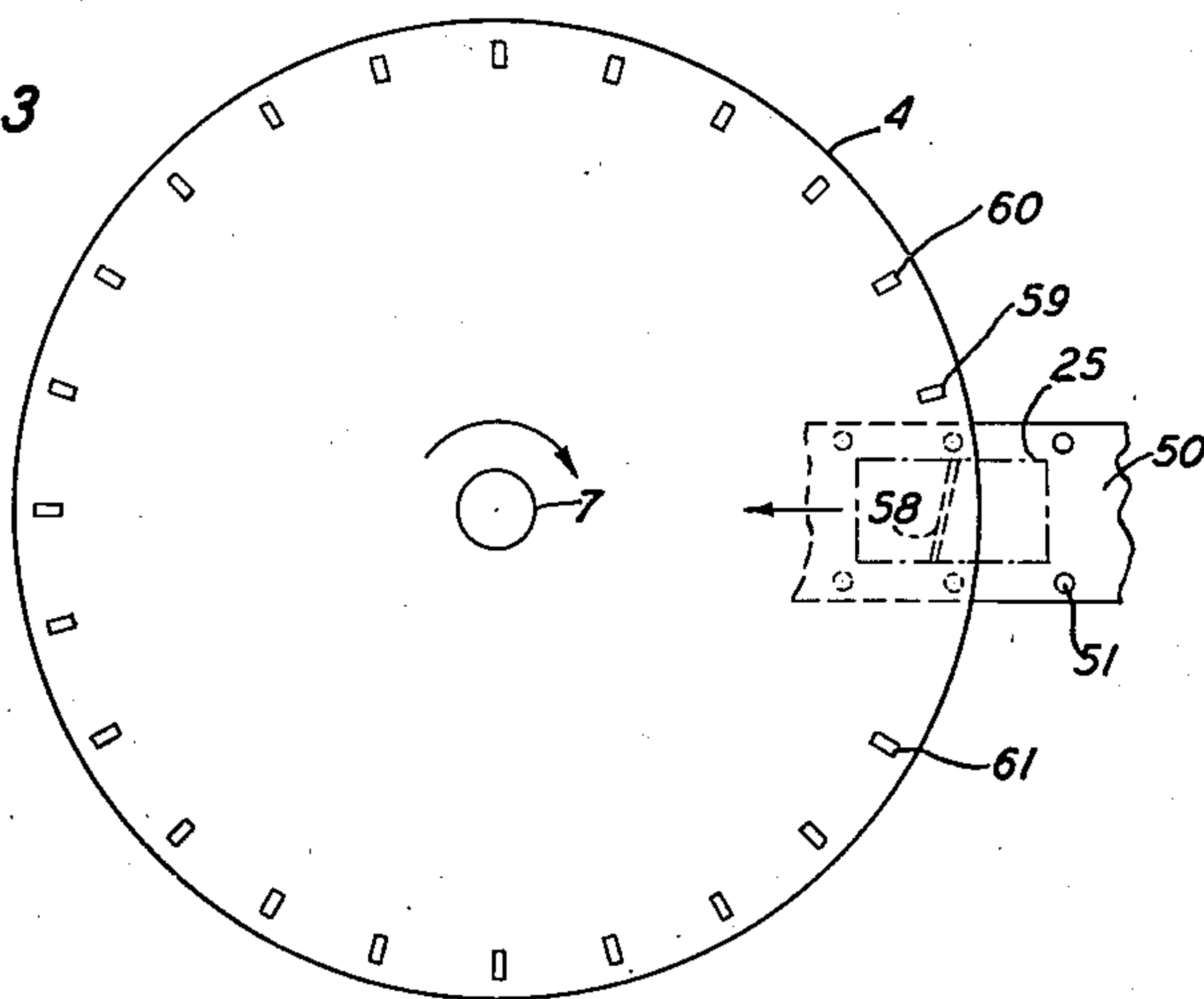


FIG. 3



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FACSIMILE TELEGRAPH SYSTEM

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6 Claims. (Cl. 178—5)

This invention relates to facsimile telegraph printing systems and more particularly to the transmitters for transmitting facsimile telegraph impulses in accordance with symbols printed on a tape.

The usual facsimile telegraph transmitter, such as disclosed in the British Patent No. 380,217, granted September 15, 1932 to W. W. Triggs, employs a cam to transmit each symbol. This limits the number of symbols that can be transmitted by a given transmitter to the number of cams in said transmitter. In addition the operation of the cam is not very satisfactory due to sparking and bouncing of the associated brushes.

The object of this invention is to overcome these limitations by providing photoelectric means to scan the symbols printed on a tape and translate them into electrical impulses suitable for operating facsimile telegraph receiving printers.

However, there is difficulty in attempting to operate a transmitter having photoelectric scanning means on a start-stop facsimile telegraph system. The scanning disc has too much inertia to be rapidly started and stopped between each symbol as has been necessary in the past to transmit the proper start and stop signals. In addition it is difficult to properly send stop and start impulses between the symbols when the scanning disc is continuously rotated.

Another object of the invention is to provide a simple and reliable device employing photoelectric scanning means for automatically retransmitting messages received on a permutation code telegraph tape printer, to a circuit for operating facsimile receiving machines.

A further object of this invention is therefore to provide means for transmitting start and stop impulses in proper relation to the impulses representing the symbols with a continuously rotated scanning disc. This is accomplished by providing a positive tape feeding device for advancing the tape past the continuously rotating scanning disc and by accurately placing the symbols to be transmitted on the tape. In addition, the tape feeding device is coupled to the continuously rotating scanning disc through a special clutch which engages said rotating scanning disc in only one position so that the symbols on the tape and the scanning wheel always have the same relative positions. The clutch is controlled by the supply of printed tape to be transmitted so that when the supply becomes exhausted the clutch disengages and discon-

nects the tape feeding device from the continuously rotated scanning disc after a symbol has been completely transmitted.

A feature of the invention resides in a shutter in the optical system which shuts off the light under control of the clutch so that when the clutch disengages and stops the tape the light will be shut out of the photoelectric cell. This causes the transmitter to transmit a continuous marking signal until another supply of tape is available and said clutch again engages the continuously rotating scanning disc. At this time the shutter is again operated so that it allows light to fall on the photoelectric cell. This causes the transmitter to again start transmitting the characters printed on said tape.

The invention may be more fully understood from the following description when read with reference to the attached drawing of which;

Figure 1 represents diagrammatically the arrangement of apparatus and circuits employed in one embodiment;

Fig. 1A is a plan view upward across AA of Fig. 1 showing a clutch detail;

Fig. 2 shows a section of the transparent tape on which the characters to be transmitted are printed; and

Fig. 3 shows a view of the scanning disc looking from the photoelectric cell 26 of Fig. 1 toward the light source 21.

With reference to the drawing, a transparent tape 3 is provided upon which the message is printed by typewriter, printer or teletypewriter 1 which is adapted to print on a tape. This machine is also equipped with a sprocket wheel 2 to move the tape so that the characters will be accurately spaced and located on the tape. The transmitter is provided with a slotted disc scanning device 4, photoelectric cell 26 and light source such as lamp 21 which is connected to any suitable source of power together with suitable condensing lenses such as 22 and 23 and aperture or slit in block 25 to provide for optical scanning of the characters printed on the transparent tape. For an amplified description and discussion of similar optical systems reference may be had to the Bell System Technical Journal, vol. VI, pages 551 et seq., October, 1927. The photoelectric cell is shown connected to an amplifier 27, oscillator 28, and modulator and filters 29, details of which have not been illustrated since these devices function in their normal manner. Details of their operation have, therefore, been omitted. If, however, more detailed operation is desired, reference may be

had to an article in Bell System Technical Journal, vol. VII for 1928 entitled "Carrier systems on telephone lines." The purpose of this equipment is of course to amplify and pass over the line 30 the small variations of current flow set up by the action of light source 21 on the photoelectric cell 26 and it will be readily understood by those skilled in the art that details of the oscillator, modulator and filter equipment will depend largely on the design of the particular carrier system with which this invention is used. For example, they may be omitted as in cases where the line conditions are such as to permit of direct connection to a facsimile printer.

There is further provided a motor 8 for continuously driving the scanning disc 4 and for intermittently driving the sprocket wheel 5 through clutch 48 which is connected to the motor through members 9 to 13. Suitable speed regulating and control apparatus are provided for motor 8. Since this apparatus functions in its normal manner its "details" have not been shown or described.

Suitable control features include contact springs 41, operating lever 31 and clutch magnet 42 for starting and stopping the driving sprocket 5; also contact springs 39, magnet 38 and shutter 34 for shutting off the light source from the tape when the latter is stopped; also a key contact 44 arranged for manual operation.

Let it now be assumed that the transparent tape 3 of Fig. 1, a face view of which is shown in Fig. 2, is being drawn to the left by the sprocket wheel 5, in the direction shown by the arrow. It is further assumed for descriptive purposes that the printer 1 is printing characters on the tape faster than they are scanned by the transmitter. The tape therefore does not press against stop lever 31 pivoted at 32. This allows either the weight of lever 31 or spring 33, if provided, to raise the upper end of lever 31 and hold contact 41 closed. Current flowing in the closed circuit from ground through contact 41 and key 44 to battery through clutch magnet 42 holds stop lever 17, which is pivoted at 18, out of engagement with the clutch 48, allowing the upper member 46 to engage lower member 15 under tension of spring 20. The lower member 15 is constantly rotated by shaft 14, gears 11 and 13, shaft 12, gears 9 and 10 and motor 8. The upper member 46 of the clutch being splined to shaft 45 rotates wheel 5. Teeth 6 which engage the holes 51 of the tape, in turn, move the tape in the direction indicated in the drawing. With the clutch in engagement as shown, contact 39 remains open and battery is removed from the magnet 38 permitting the armature of shutter 34 which is pivoted at 35 to be drawn back against stop 37 by spring 36 and thus allow the light from source 21 to fall on the photoelectric cell 26 through tape 3.

If at any time the operator stops writing on the teletypewriter or printing mechanism 1, sprocket 2 stops but driving sprocket 5 will continue until tape 3 raises lever 31 and opens contact 41. This causes clutch magnet 42 to release stop lever 17 which will engage cam 16 on clutch member 46 and stop driving wheel 5 at the end of the symbol being transmitted. The same action would take place if it were desired to stop transmitting by manually operating key 41. Opening the circuit through clutch magnet 42 permits spring 19 to draw lever 17 toward member 46 of the clutch. Then when shaft 45

rotates far enough, lever 17 will begin to cause the camming sleeve member 16 to ride upward carrying the clutch 48 with it and the rotation of shaft 45 will cease when the end of lever 17 drops into a notch 47 shown more clearly in Fig. 1A. Raising of clutch 48 closes contact 39 which causes magnet 38 to operate and move the shutter lever 34 to the right across the scanning aperture in block 25 to shut off light from source 21.

The transmission of characters in the system of this invention as above described is adapted to start-stop operation principally because of four mechanical features. First the scanning disc 4 and driving sprocket 5 are definitely geared to each other. Second, the upper and lower members of clutch 48 have only one tooth so that sprocket 5 always starts to move at a definite point in relation to the scanning disc which is at the beginning of the character space. Third, the clutch members can not fall out of engagement except at the end of the character being sent even if clutch magnet has deenergized because camming sleeve 16 working on lever 17 can move upper member 46 upward only at a definite point in rotation of shaft 45. Fourth, the cellophane tape on which the characters are accurately located is perforated along the edge in a definite relation to the character, so that the tape will advance a space of exactly one character for each revolution of the scanning disc. These features insure that the symbols or symbol space on the tape moves past the scanning disc with but one relative position to the position of the disc or is synchronized with it so that the start and stop impulses are transmitted before and after, respectively, the impulses representing the symbol.

The operation of scanning a symbol or character on a tape to convert it into electrical impulses for transmission over a line circuit is well known and need not be described in detail. Scanning devices of the kind described above operate upon the principle that light passing through the transparent part of the tape affects the sensitive photoelectric cell causing it to send out a very feeble current or no current at all if the light is prevented from passing through the tape by the dark portions of the character. These currents are then amplified and modulated if desired and transmitted over line 30 to a receiver which may include amplifying and demodulating apparatus in addition to facsimile telegraph receiving and recording apparatus such as described in the above identified British Patent 380,217. The space on the tape of Fig. 2 for the letter E for example is represented as between dotted lines 52 and 53 and since the disc, as shown in Fig. 3 has 22 slots such as 59, 60, and 61 and makes one revolution per character it means that the character spaces such as 54 to 57, etc. are scanned in 22 vertical areas. A start signal is sent by virtue of the space left before the character proper starts. A stop signal is sent at end of the character by the blank space of disc 4 between slots 61 and 59. It may be observed that slot or aperture 58 of block 25 as shown clearly in Figs. 2 and 3, is made to have a small angle to the vertical by the width of one vertical area. In this manner compensation is made for the speed of the tape and the strip of tape which is scanned by each slot 59, 60, etc. is vertical and not slightly diagonal.

It will be understood that this invention is not limited to the use of any particular code, nor

is it necessary that any particular number of vertical areas be scanned. It is enough that a number of vertical areas be employed which is suitable to the proper scanning of a letter or other character and that the number of openings or slots in scanning disc correspond thereto. In general while a specific embodiment of the invention has been described, it is to be understood that it is capable of embodiment in many other and widely different forms within the scope of the appended claims.

What is claimed is:

1. A tape controlled facsimile telegraph transmitter comprising a light source, an optical system, for concentrating the light from said source upon a tape, a continuously rotating scanning disc for directing said concentrated light over said tape, a photoelectric cell for receiving said light from said tape and generating current impulses in accordance with the symbols printed on said tape, an amplifier and a modulator connected to said photoelectric cell, an electrical transmission channel connected to said modulator, means for advancing said tape passed said scanning disc, means for stopping said tape and transmitting a continuously marking signal when the supply of printed tape becomes exhausted, means for transmitting stopping and starting impulses between each symbol.

2. In a facsimile telegraph transmitter controlled by a printer tape, comprising an optical and photoelectric scanning system having a continuously rotated scanning disc for translating the symbols printed on said tape into electrical impulses, and means for advancing said tape passed said scanning disc, means for transmitting a start and a stop impulse before and after each symbol, respectively, and means for stopping said tape and transmitting a continuous marking signal after a complete symbol has been transmitted when the supply of said printer tape has become exhausted and means for starting said tape in correct time relation with said continuously rotating scanning disc for properly transmitting the next start impulse, symbol impulses and stop impulse.

3. A facsimile telegraph transmitter comprising a perforated tape, means for recording symbols to be transmitted on said tape in areas definitely related to the perforations of said tape

scanning means for scanning and converting the symbols recorded on said tape into electrical impulses, said scanning means including a continuously rotating device, tape advancing means for moving said tape past said scanning means and a clutch arrangement for connecting said continuously rotating scanning member and said tape feeding means so that the symbols on said tape move past said continuously rotating scanning member in but one relative position, and means for transmitting start and stop impulses before and after the impulses representing the symbol transmitted.

4. A facsimile telegraph transmitter comprising a perforated tape, means for printing on said tape the symbols to be transmitted, scanning means for scanning the symbols printed on said tape, said scanning means comprising a light source, an optical system, a continuously moving member, and a photoelectric cell for changing light variations into electrical signals, means for moving said tape past said scanning means, clutch means for connecting said tape moving means to said continuously rotating scanning member so that the symbols on said tape move past said continuously rotating member with but one relative position thereto, instrumentalities for transmitting start and stop impulses before and after respectively the impulses representing the symbols transmitted.

5. In a telegraph signal impulse transmitting device continuously operating optical scanning means, photoelectric transmitting means controlled thereby, a tape divided into symbol spaces, means for advancing said tape past said continuously operating scanning means, and means operatable to stop said tape only with said scanning means between said symbol spaces.

6. A facsimile telegraph signal impulse transmitter comprising a continuously operating optical scanning means, a photoelectric transmitting device controlled thereby, a tape divided into character spaces, means for advancing said character spaces on said tape past said continuously operating scanning means, means for stopping said tape with said scanning means between character spaces and means for preventing the operation of said transmitting device when said tape is stopped.

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