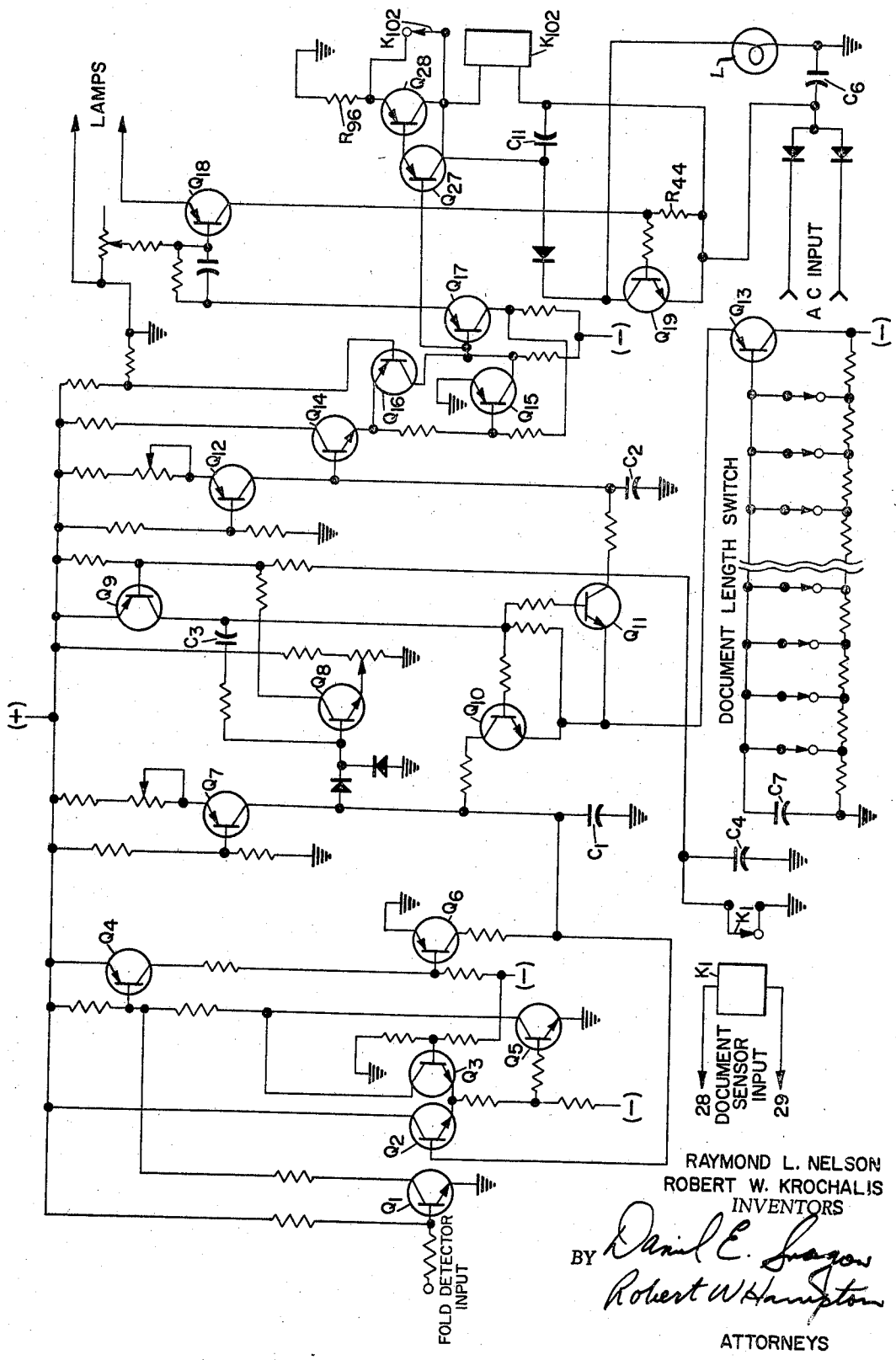
Dec. 9, 1969

R. L. NELSON ET AL

3,482,496

IMAGE MARK ARRANGEMENT

Filed July 12, 1967



RAYMOND L. NELSON
ROBERT W. KROCHALIS
INVENTORS

BY David E. Dragon
Robert W Hampton

ATTORNEYS

United States Patent Office 3,482,496 Patented Dec. 9, 1969

3,482,496

IMAGE MARK ARRANGEMENT

Raymond L. Nelson and Robert W. Krochalis, Rochester, N.Y., assignors to Eastman Kodak Company, Rochester, N.Y., a corporation of New Jersey

Filed July 12, 1967, Ser. No. 652,879
Int. Cl. G03b 17/24
U.S. Cl. 95—1.1 4 Claims

ABSTRACT OF THE DISCLOSURE

A system for placing image marks on photographic copies of a continuous folded document wherein the position of the fold is sensed. After a preselected time, a lamp is flashed to produce the image mark. Gating circuitry is provided to prevent spurious triggering anywhere except in the vicinity of the fold.

BACKGROUND OF THE INVENTION

The present invention relates to photographic copying apparatus and more particularly to apparatus for placing an image mark on photographic copies of a folded continuous document.

It is desirable to be able to photograph a continuous folded document such as the printer output of a computer. It is furthermore desirable to place an image mark upon the document at regular intervals so that the information which is copied onto the film has ready accessibility.

In the prior art it has been suggested that the document be marked at regular intervals. However, this has been difficult to accomplish automatically, since the correlation of the information with the mark could not be done automatically.

SUMMARY OF THE INVENTION

It is therefore an object of the invention to provide an image marking system which is able to correlate the image mark with the document being copied.

It is a further object of the invention to provide an automatic image marking system in which the image mark is precisely spaced with respect to a fold in the document, and preferably midway between the folds.

These and other objects of the invention are accomplished by providing a circuit which is responsive to the folds of the document as they pass through the apparatus. Each fold triggers a timing circuit which, after a predetermined time, energizes the lamps to flash the image mark.

Since the continuous document is folded at regular intervals, a gating circuit is provided to desensitize the fold detector except in the immediate vicinity of the fold. This prevents spurious triggering of the image mark flash.

BRIEF DESCRIPTION OF THE DRAWING

Other objects and advantages of the invention will be apparent to those skilled in the art by the description which follows. Reference is made to the accompanying drawing wherein:

The sole figure is a schematic diagram of the circuit according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The circuit has been divided into three parts, a gating and synchronization function, a timing function, and a flash function. The gating and synchronization function processes pulses from a pulse source which senses the fold in the document to be copied. These pulses then actuate the timing function if they occur within a predetermined time period of time in the cycle. The timing

function introduces a delay in order that the flash function occurs at a predetermined point on the copy. The flash function triggers the flash lamps or turns off the machine if there happens to be a flash lamp failure.

More particularly, there is shown transistor Q_1 whose input is a pulse source derived from the folds in the paper. Pulse sources of this type are disclosed in U.S. Patent 3,037,381, to Grant et al., issued June 5, 1962. It is to be understood that any type of pulse source can be used which gives an output when the sensor senses a discontinuity in the paper.

The timing circuitry comprises a free running relaxation oscillator which includes transistor Q_8 and capacitor C_1. Transistor Q_8 is initially off. Capacitor C_1 charges through transistor Q_7 which acts as a constant current source. When the charge on capacitor C_1 reaches a high enough value, transistor Q_8 is biased on which in turn turns on transistor Q_9 which turns on transistor Q_{10}, which discharges the capacitor and returns it to its minimum potential level. This minimum potential level is determined by the document length switch and is controlled by transistor Q_{13}. Since the document length switch has 24 different settings, 24 different document lengths can be accommodated by this circuit. Transistor Q_8 stays on long enough, due to charge on capacitor C_3, to fully discharge capacitor C_1. Transistor Q_8 then turns off and the cycle is repeated.

The pulses from the fold detector are fed to transistor Q_1 which serves as an amplifier, then to transistor Q_4. Transistor Q_4 is thereby turned off, providing that both transistor Q_3 and transistor Q_5 are not conducting. When transistor Q_4 turns off, transistor Q_6 is turned on for a time determined by the length of the pulse from the fold detector. When transistor Q_6 is turned on, the charge on capacitor C_1 is quickly brought to ground. In this way, the phase of the relaxation oscillator is brought into synchronization with the pulses from the fold detector.

As stated above, transistors Q_3 and Q_5 must be off in order for transistor Q_6 to be turned on when a pulse from the fold detector occurs. These two transistors and transistor Q_2 serve as the gating function. They inhibit any noise from triggering transistor Q_6 such as pulses occurring at the wrong time in the cycle. Transistor Q_3 is initially on, thus preventing transistor Q_4 from turning off in response to a pulse from the fold detector. By the time a pulse from the fold detector is to occur, capacitor C_1 has charged to a high level. When capacitor C_1 reaches this predetermined level, transistor Q_2 is turned on. The turning on of transistor Q_2, in turn, turns off transistor Q_3. This allows transistor Q_4 to be turned off by a pulse coming from transistor Q_1, thus bringing the charge on capacitor C_1 to ground. Then as capacitor C_1 charges positively, the potential at the emitter of transistor Q_2 increases which thus turns on transistor Q_5, which holds transistor Q_4 in its conducting state. Transistor Q_2 turns off again when the charge on capacitor C_1 falls, thus turning transistor Q_3 back on.

A signal is applied between points **28** and **29** which is indicative of the leading and trailing edges of document being copied, i.e., when the document is within the machine, a signal is provided which energizes relay coil K_1, which in turn opens switch contacts K_1. Capacitor C_4 insures that transistor Q_9 remains off until K_1 relay contacts close. When the switch contacts of relay K_1 are opened, transistor Q_9 is turned off. Thus the unit does not operate unless there is a document to be copied.

The desired location of the image mark is at a point in the approximate center of the edge of the document. Therefore, the signal that triggers the coding lamps must be delayed for a length of time corresponding to the time required for the paper to travel the distance from the fold

detector to the camera lens plus one half of the length of the frame to be copied. This delay is determined by the charging rate of capacitor C_2. Capacitor C_2 has its minimum charge level established by the document length switch in the same manner and to the same potential as capacitor C_1. However, when transistor Q_9 is cut off, thus cutting off transistor Q_{11}, capacitor C_2 charges through transistor Q_{12} to its maximum charge at twice the rate that capacitor C_1 charges. Initially, capacitor C_2 is charged to its minimum potential through transistor Q_{11}. Transistors Q_{14} and Q_{16} are not conducting while transistor Q_{15} is conducting. Since transistor Q_{15} is conducting, its collector is at approximately ground potential so that transistors Q_{17}, Q_{18}, and Q_{19} are all cut off. In order to generate a flash signal, capacitor C_2 is allowed to charge positively as described above. When the capacitor reaches a predetermined potential, transistor Q_{14} turns on which in turn turns off transistor Q_{15}. The base potential of transistor Q_{17} becomes more negative until it gets a point where transistor Q_{17} conducts and turns on transistor Q_{18}. The current then flows through the flash lamps and an image mark is recorded on the film. As capacitor C_2 charges more positively, a potential is reached that turns transistor Q_{16} on. When this happens, transistors Q_{17} and Q_{18} turn off, thus preventing any further flashing during this cycle. In this way, an image mark of the desired duration is then encoded on the film.

Whenever transistor Q_{18} is on, and none of the lamps are burned out, transistor Q_{19} turns on, thus operating the indicator lamps L. It is desirable that if any one of the flash lamps is burned out, that the machine will not operate. To do this, transistors Q_{27} and Q_{28} supply current to relay coil K_{102} every time that transistor Q_{17} is energized. This happens whenever the lamps are flashed. If the lamps are functioning, there is enough voltage drop across resistance R_{44} to turn on transistor Q_{19}, which in turn shorts out the coil of relay K_{102} so that the relay does not operate. If any of the lamps should burn out, transistor Q_{19} does not turn on and hence, relay K_{102} operates. The contacts of relay K_{102} are used to stop the machine.

While the invention has been described with respect to a particular embodiment, it is to be understood that modifications can be made by persons skilled in the art. The scope of the invention is therefore to be limited only by the appended claims.

We claim:

1. An apparatus for placing an identifying mark on a photographic copy of a document by flashing a lamp in timed response to a discontinuity in said document, said apparatus comprising:
   (a) means for sensing discontinuity and for producing a signal in response to said discontinuity,
   (b) timing means coupled to said sensing means and responsive to said signal for flashing said lamp a predetermined interval after said discontinuity has been sensed by said sensing means,
   (c) gating means coupled between said sensing means and said timing means for preventing said timing means from flashing said lamp during a first time period after said sensing means has produced a signal, and for preventing said timing means from flashing said lamp again during a second time period after said timing means has once flashed said lamp, said first time period being less than said interval.

2. An apparatus as in claim 1 further comprising means for rendering said system inoperative if said lamp means becomes defective.

3. An apparatus as in claim 1 further comprising means for varying said interval in order to accommodate various document sizes.

4. An apparatus as in claim 1 further comprising means for sensing the presence of a document, and for preventing operation of said apparatus unless a document is sensed.

References Cited

UNITED STATES PATENTS

3,263,581 8/1966 Linderman ---------- 95—1.1

JOHN M. HORAN, Primary Examiner

U.S. Cl. X.R.

355—40