

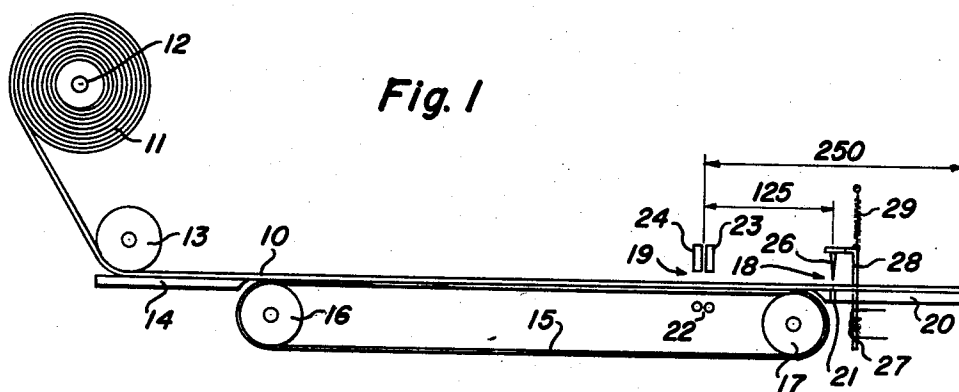
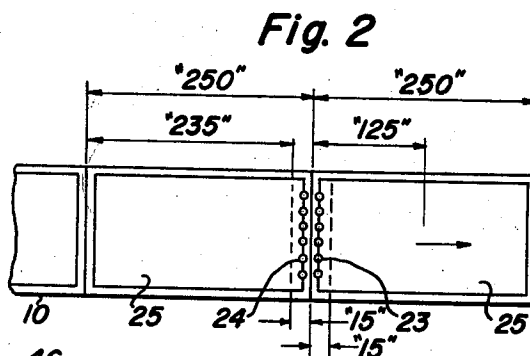
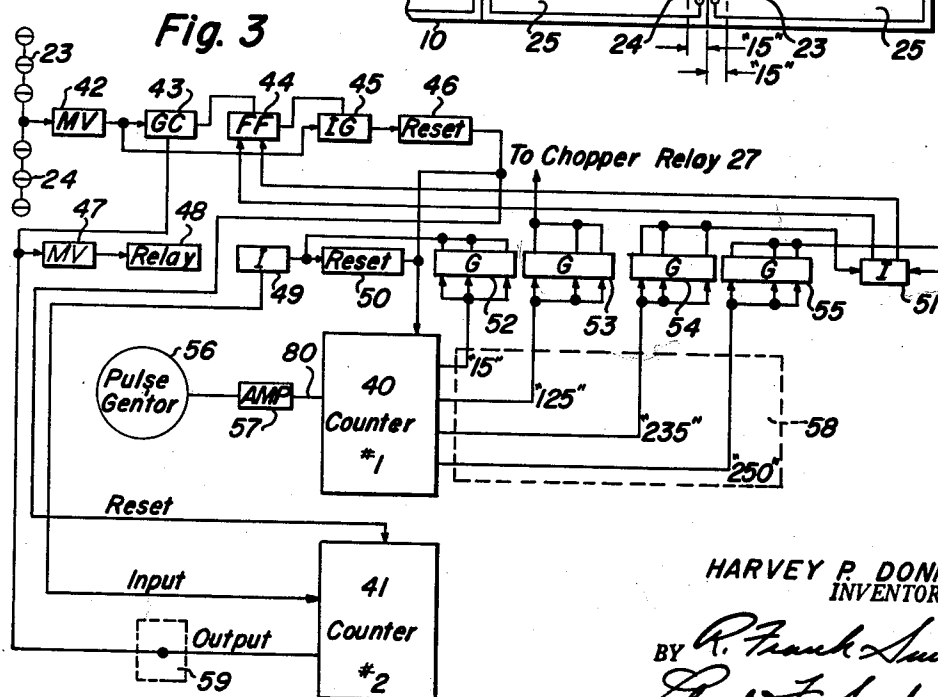
Aug. 4, 1964

H. P. DONNELL
 DEVICE FOR CONTROLLING THE SEVERING OF
 A STRIP MATERIAL INTO SHEETS

3,143,017

Filed July 28, 1960

4 Sheets-Sheet 1



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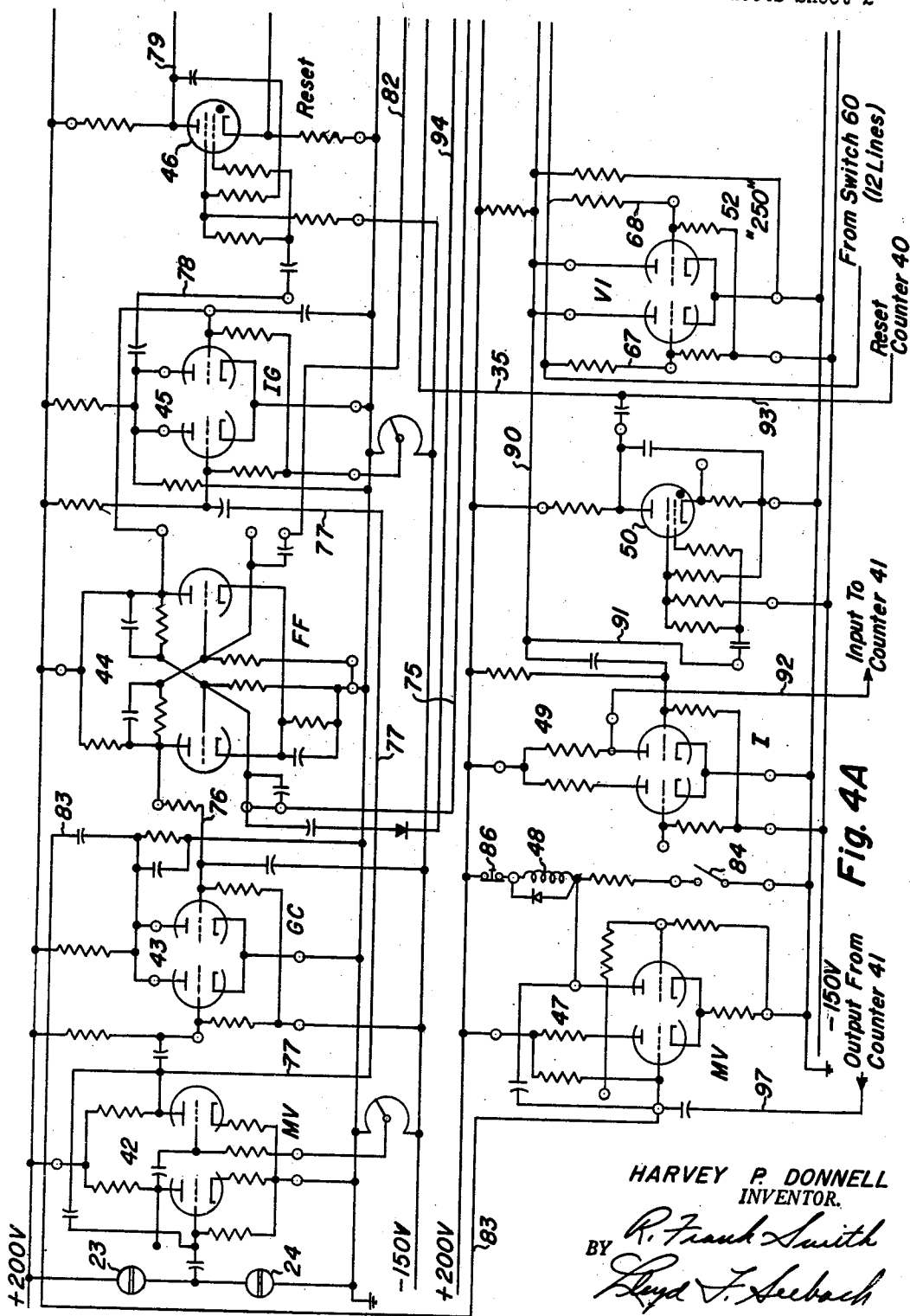
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4 Sheets-Sheet 2



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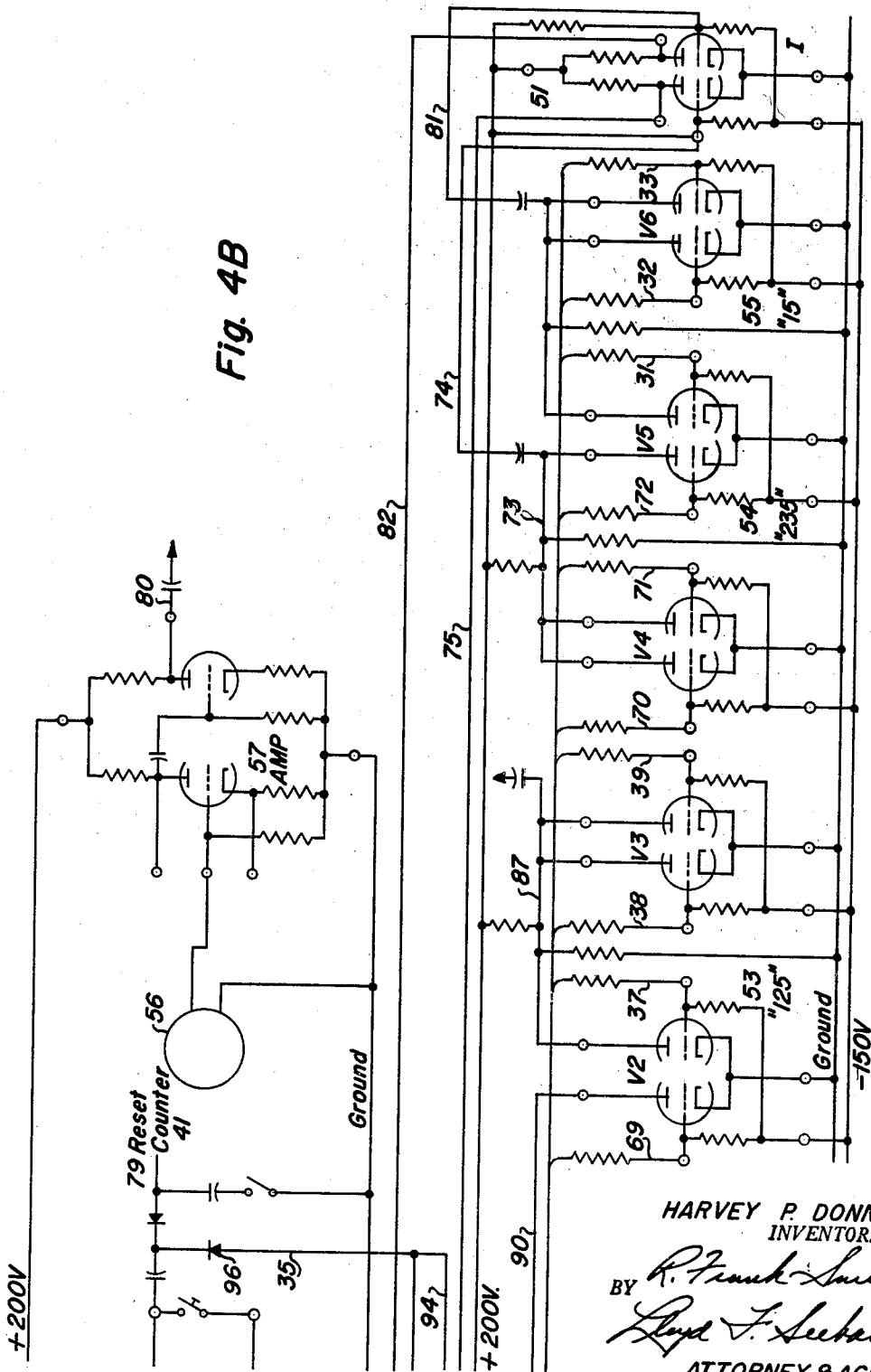
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4 Sheets-Sheet 3

Fig. 4B



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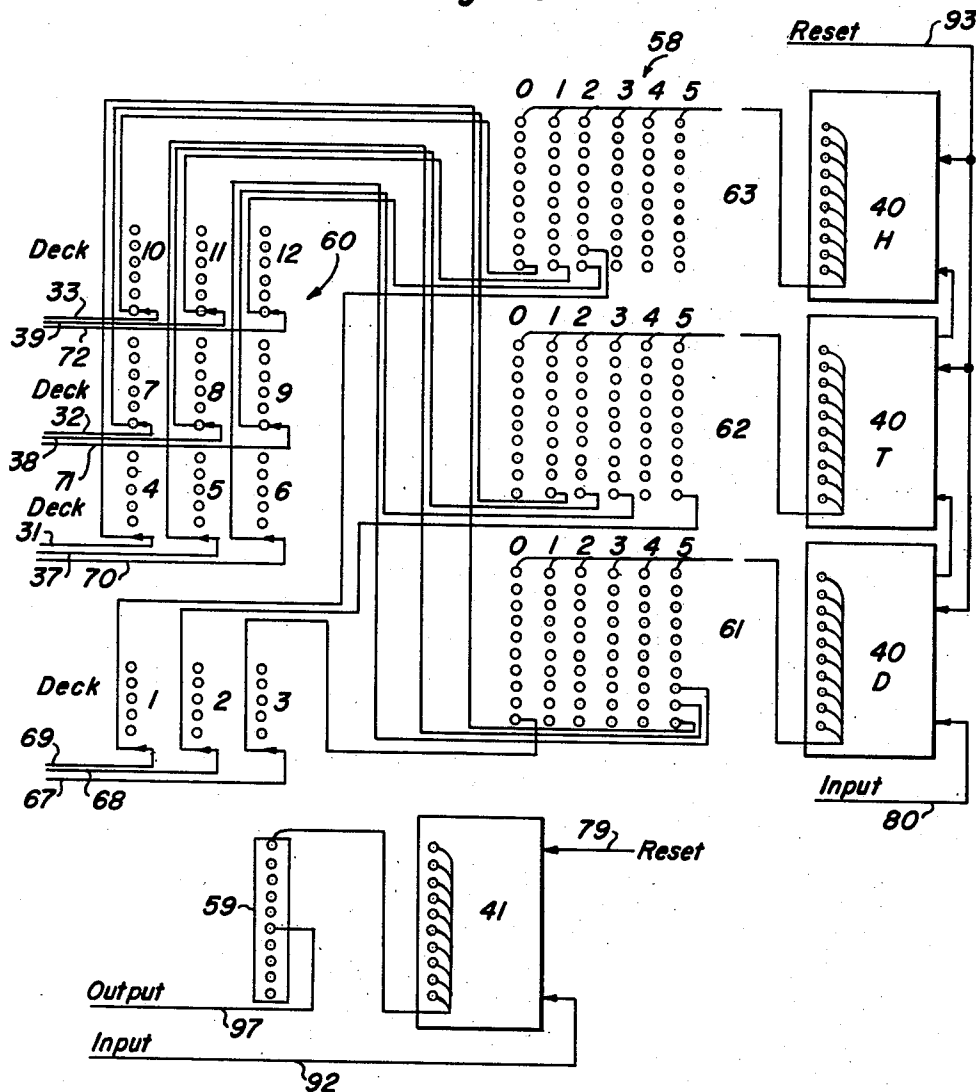
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Filed July 28, 1960

4 Sheets-Sheet 4

3,143,017

Fig. 4C



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3,143,017

DEVICE FOR CONTROLLING THE SEVERING OF A STRIP MATERIAL INTO SHEETS

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Filed July 28, 1960, Ser. No. 45,984

10 Claims. (Cl. 83—211)

The present invention relates to a cutting device for severing a strip of material into discrete sheets and more particularly to a device for controlling actuation of the cutting device by detection of the area of space separating distinguishable areas on the strip of material.

It is well known in the prior art to utilize a detecting or sensing means which derives a signal from marks, notches or slits in a strip for actuating a cutting element. In some instances the detecting means is located either ahead of the cutting station or at the cutting station depending on the type of cutting device being utilized and whether the strip of material is moved continuously or intermittently. Such devices require that the mark, notch or slit be accurately located in order that the discrete sheets be of uniform length. If such marks, notches or slits are displaced longitudinally due to the operator or the apparatus for providing such control marks, then the entire strip is cut into sheets in accordance with such displacement. When such marks are displaced with respect to the printed material or other matter on the strip of material, it is possible to cut the strip through some portion of the matter rather than therebetween as required. The disadvantages of such apparatus is overcome by the present invention in that no marks, notches or slits are utilized to actuate the cutter device. Instead, actuation of the cutter device is controlled by the space between successive areas of matter on the strip. The advantages of the invention will be apparent when considered with respect to a specific embodiment such as used in conjunction with a device for cutting a strip of photographic material into discrete sheets or prints.

In the embodiment of the invention described more fully hereinafter, a strip of photographic material having image areas thereon arranged longitudinally of the strip and equally spaced therealong is moved either intermittently or continuously past a detecting station and a cutting station. These stations are spaced from one another and the detecting station is preferably adjustable or movable with respect to the cutting station so as to permit its use with image areas of different length. Two groups of detectors are arranged in the detecting station, each group being normal to the direction of movement of the strip of photographic material and spaced from each other in accordance with the spacing between the image areas on the strip. A pulse generating means is driven by the means for moving the strip and provides a series of periodic pulses. These pulses are utilized to actuate a counter which provides a cycle of operation for each predetermined image size and provides a number of output pulses to control the detectors, the cutter and the resetting of the counter via appropriate circuitry. By properly positioning the detecting station with respect to the cutting station and positioning of a selector switch in accordance with the size of the image area to be cut, the cycle of operation for the selected image area and actuation of the cutter device is automatically established. In other words, a predetermined number of periodic pulses is utilized to measure the length of the sheet to be cut with no reliance being placed upon marks on the print, the actual cutting being measured and controlled by the space between successive image areas.

The primary object of the invention is, therefore, to provide a device which is responsive to a predetermined

number of periodic pulses for establishing a cycle of operation to control the cutting of a strip of material into discrete sheets of the same size.

Another object of the invention is to provide a device for controlling the cutting of a strip of material into discrete sheets of the same size which is responsive to detection of the space between distinguishable areas on the strip.

Still another object of the invention is to provide a device for controlling the cutting of a strip of material into discrete sheets of the same size in which a counter initiates a cycle of operation for controlling detection of the space between successive areas on the strip and actuation of the cutting device.

Yet another object of the invention is to provide a device for controlling the cutting of a strip of material into discrete sheets of the same size in which the cutting element is actuated in timed relation to detection of the space between successive distinguishable areas on the strip of material and upon lack of such detection, by the output of an electronic counter responsive to a series of periodic pulses generated in synchronism with the movement of the strip material.

Still another object of the invention is to provide a device for controlling the cutting of a strip of material into sheets of the same size in which the cutting element and movement of the strip of material are rendered inoperative after a predetermined number of actuations of the cutter have been made due to lack of detection of the space between successive distinguishable areas.

And yet another object of the invention is to provide a device for controlling the cutting of a strip of material into discrete sheets of the same size in which the cutting element and movement of the strip material are rendered inoperative upon detection of an area equivalent to the space between successive distinguishable areas within any one of the distinguishable areas.

These and other objects and advantages will be apparent to those skilled in the art by the disclosure of a preferred embodiment of the invention as described hereinafter.

Reference is now made to the accompanying drawings wherein like reference numerals designate like parts and wherein:

FIG. 1 is a diagrammatic view of a device for moving a strip material through a detecting station and beneath a cutting element;

FIG. 2 is a diagrammatic view of a portion of a strip material having distinguishable areas therein and showing the relation of the detecting elements to said areas and the cutting station as the strip is moved thereunder;

FIG. 3 is a block diagram of the circuitry for controlling the cycle of operation including actuation of the cutting element; and

FIGS. 4A, 4B and 4C are schematic arrangements of the circuits disclosed in FIG. 3.

As is well known in the photographic field and particularly in the field of photofinishing, the photographic negatives are printed on a continuous strip of photographic paper which is then cut to provide individual photographic prints. Such prints are usually spaced longitudinally of the strip, the space between successive images being of uniform width. While the invention is described with respect to photographic images of the same size equally spaced longitudinally of the strip of photographic paper, it will be recognized and is to be understood that the invention is applicable in conjunction with any strip of material having equally spaced areas of the same length which are distinguishable from the background of the strip of material; for example, labels, decalcomanias, or any printed matter on a strip of material.

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As shown in FIG. 1, the strip of material 10 is in the form of a roll 11 which is mounted on an arbor 12 and is fed between roll 13 and table 14 onto transparent belt 15 which encircles pulleys 16 and 17. Arbor 12, roll 13 and/or one of pulleys 16 or 17 can be driven by any suitable motor to move strip 10 either continuously or intermittently. A cutting station 18 and a detecting station 19 are mounted above table 20 and belt 15, respectively, said table being provided with a transverse slit 21 and a source of illumination 22 being arranged beneath belt 15. Two groups of detectors, generally designated by numerals 23 and 24 are arranged over belt 15, each group being spaced in parallel relation and normal to the direction of movement of strip 10, see FIG. 2. As described more fully hereinafter, each group of detectors comprises at least five and preferably ten such detectors which are arranged ahead of cutting station 18, the space between the two groups of detectors, i.e., center to center, corresponding to the width of the space between successive areas on strip 10. The detectors 23 and 24 are balanced to provide a signal as the detectors 23 sense a change from dark to light whereas the detectors 24 sense the change from light to dark. Also more than half the detectors in either group must sense a change in order to provide a signal of sufficient amplitude. Although the length and width of areas 25 on strip 10 will vary with the film size, detectors 23 and 24 can be fixed in position with respect to the cutting station to accommodate the detectors to the different lengths of areas 25, the widths being of no consequence and the difference in lengths being accommodated for by the counts derived from a counter, as described hereinafter.

The cutting station 18 comprises a cutter or knife 26 which is actuated in a downward direction by solenoid 27 and the connecting link 28, the cutter being returned to its upper position by spring 29. With the position of knife 26 being fixed in relation to table 20 and detecting station 19, it can be appreciated that the count for actuating knife 26 will be the same for each roll 11 of prints even though the image areas are of a size different from the one previously out into prints. While the knife 26 described hereinabove is shown in FIG. 1 as being actuated by solenoid 27, this knife can take the form of either a reciprocatory type or a rotary type depending on whether the strip material 10 is moved intermittently or continuously. As will be described more fully hereinafter, the electrical pulse which is obtained from the detectors 23 and 24 can be utilized to trip or actuate either a solenoid or a single-revolution clutch as shown in U.S. Patents 2,077,439, 2,599,430, 2,779,408. These patents disclose various types of cutters per se which can be actuated in conjunction with the presently disclosed invention and any further description of the cutter mechanism per se is deemed not to be necessary.

The strip material 10 shown in FIG. 2 comprises a series of areas 25 which are spaced from one another longitudinally of the material. While a single area 25 is shown arranged longitudinally of strip 10 in FIG. 2, such areas can also extend transversely of the strip of material providing the areas are properly and accurately aligned. The areas 25 can be of any length and as pointed out above, the lengths will vary with the size of the film. In order to provide a means for measuring the length of each sheet, a pulse generator 56 is provided for generating a series of periodic pulses which, after amplification by amplifier (AMP) 57, are transmitted to counter 40 via line 80. Such a pulse generator may be any commercially available photoelectric tachometer, which is driven by the same means that is used to drive the strip of material 10 and which is driven in synchronism therewith. By way of example and as shown in FIG. 2, the center-to-center distance is equivalent to 250 pulses, each pulse being equivalent to .01 inch of this center-to-center distance. By this means the length of each sheet is actually measured by a specific number of pulses.

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With reference to FIG. 3, the circuitry for controlling operation of the detectors 23 and 24, actuation of knife 26 and resetting of counters 40 and 41 comprises a multivibrator (MV) 42, a gate circuit (GC) 43, a flip-flop (FF) 44, an inhibiting gate (IG) 45, a reset thyatron 46, a multivibrator (MV) 47 including relay 48, an inverter circuit (I) 49, a second reset thyatron 50, an inverter circuit (I) 51 and a group of gates (G) 52-55. The aforementioned circuits are well known and commercially available circuits and for this reason a detailed description of their components is deemed not to be necessary and will only be described from a functional standpoint. In addition, a commercially available photoelectric tachometer, designated by the numeral 56, is operatively connected to the drive means for moving the strip material so as to be operated in synchronism therewith and provides a series of periodic pulses which are transmitted to counter 40 through amplifier (AMP) 57.

Counter 40 comprises three units, that is a digit unit (D), a tens unit (T), and a hundreds unit (H). The output of each counter unit is connected to a section of a plugboard 58, see FIG. 4C. The output from unit counter 41 is also connected to a plugboard 59. The counters are settable to a zero position as described hereinafter.

Gates 52-55 comprise three triodes and, as shown in FIGS. 4A and 4B, such triodes actually comprises a duo-triode and one-half of a second duo-triode, gates 52-55 comprising V1 and one-half V2, one-half V2 and V3, V4 and one-half V5, and one-half V5 and V6, respectively. The gates 52-55 are connected so as to be responsive to four counts, these counts being "250", "125", "235", and "15" for a purpose to be described hereinafter. The grids of tube V1 and one-half of V2 are connected, respectively, to the three movable contacts of decks 1, 2, and 3 of switch 60; the grids of the other half of tube V2 and of tube V3 are connected, respectively, to the movable contacts of decks 5, 8, and 11 of switch 60; the grids of tube V4 and one-half of tube V5 are connected, respectively, to the movable contacts of decks 6, 9, and 12 of switch 60; and the grids of the other half of tube V5 and of tube V6 are connected, respectively, to the movable contacts of decks 4, 7, and 10 of switch 60. For the purpose of illustration, switch 60 is shown in FIG. 4C as comprising 12 decks with each deck including six positions. The six positions of each deck are connected to plugboard sections 61, 62, and 63 in accordance with the desired counts necessary for cutting a strip into six different lengths. In other words, for a particular print size the operator merely sets switch 60 to the indicated size thereby placing the movable contacts in engagement with the same contact in each deck. Since each deck position is connected to plugboard 58 to provide the necessary counts beforehand, no further work is required of the operator. This will be evident from the description which follows wherein the connections are described for the counts of "15", "125", "235", and "250."

The first positions of decks 1, 2, and 3 of switch 60 are connected, respectively, to a "2" position in the hundreds section 63 of plugboard 58, to a "5" position in the tens section 62 and to a "0" position in the digits section 61, thereby providing a "250" count for the purpose described hereinafter. The first positions of decks 10, 7, and 4 are connected to sections 63, 62, and 61 to provide a "15" count, the first positions of decks 11, 8, and 5 are also connected to plugboard 58 to provide a "125" count, and in a like manner the first positions of decks 12, 9, and 6 are connected to provide a "235" count. The other positions of each deck are connected to sections 61, 62, and 63 in the same manner in accordance with the counts required for the print size indicative of each position. As shown in FIG. 4C, each section D, T and H of counter 40 is connected to its respective section of plugboard 58. For the arrangement actually shown connected in FIG. 4C, when a "15" count is produced by

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counter 40, negative signals will occur at the "5" position in section 61, at the "1" position in section 62 and at the "0" position in section 63. With the occurrence of these three signals simultaneously, they will be transmitted via switch 60 to the grids of the other half of tube V5 ("5") and the grids of tube V6 ("1") and ("0"), to place the three triodes below cut-off thereby providing a positive output pulse. This same condition occurs with respect to tubes V1, V2, V3, V4 and V5 when the other counts are obtained as will be more fully described hereinafter. Since an output signal is derived from any three triodes only when the proper count is made by counter 40, these triodes act in effect as gates to permit and provide an output only when all three grids are biased so as to place them below cut-off. Although the tubes of each gate are normally conducting, a negative signal on the grid of any one or two of the tubes will have no effect due to the shorting effect of the tube or tubes still in a conducting state. For this reason all these tubes must be below cut-off to obtain an output signal.

The mode of operation can be best described with reference to the movement of the strip of material 10 with respect to cutting station 18 and detecting station 19. If it is assumed that an area 25 is moving to the right as shown in FIG. 1 with the space between the next and successive area 25 approaching the detectors 23 and 24, the decade counter 40 will then be approaching the count "235." As the trailing edge of an area 25 is aligned with, or just past, the detectors 24, the counter 40 reaches the "235" count. At this point a pulse will be delivered to each of sections 61, 62, and 63 of plugboard 58 at the "5," "3," and "2" positions, respectively, and thence to decks 6, 9, and 12 of switch 60 to provide signals on the lines 70, 71 and 72 connected to the grids of triodes V4 and one-half V5 (gate 54), see FIG. 4B. These simultaneous signals place the triodes V4 and one-half V5 below cut-off, and since all three are in this condition a positive output is obtained on line 73. This positive pulse is transmitted via line 74 to the left-hand grid of inverter 51, which is a duo-triode I, and a negative pulse is then transmitted via line 75 to flip-flop 44. When flip-flop 44 is thus triggered, the output therefrom via line 76 places the righthand side of gate 43 below cut-off to condition the gate circuit 43 so as to block any signals delivered to the lefthand side thereof by detectors 23 and 24. When flip-flop 44 is thus triggered, gate 45 is conditioned for reception of signals derived from detectors 23 and 24. This, in effect, renders the detectors 23 and 24 operative. As the area 25 continues to move beneath detectors 23 and 24, at the instant the trailing edge of an area 25 is aligned with detectors 23 and the leading edge of the next and successive area 25 is aligned with detectors 24, pulses will be obtained from the detectors simultaneously due to the detectors sensing the difference in light intensity as detectors 24 go from light to dark and detectors 23 go from dark to light and these pulses are then combined to trigger the one-shot multivibrator 42. The output pulse from multivibrator 42 is transmitted via line 77 to the lefthand grid of inhibitor circuit 45 and since this gate is open, the output pulse therefrom is transmitted via line 78 to the control grid of thyatron 46 to render this tube conductive and thereby provide a signal on line 79 to reset counter 41 and this same signal via lines 35 and 93 is utilized to reset counter 40.

As the strip continues to move, the counter 40 immediately begins to start counting from the zero count. With the "15" count, the trailing edge of an area 25 has been moved past the detectors 23 and the leading edge of the next and successive area 25 is preferably just approaching detectors 23 or at the extreme aligned therewith. At this time, counter 40 provides the "15" count and the signals of this count are transmitted via plugboard 58 and decks 4, 7, and 10 of switch 60 and via lines 31, 32 and 33 to the grids of the duo-triode

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V6 and the lefthand side of duo-triode V5 (gate 55) to place these triodes simultaneously below cut-off. In this state a positive signal is provided and transmitted via line 81 to the righthand grid of duo-triode inverter 51 which inverts the positive input to a negative output which is then transmitted via line 82 to flip-flop 44. Flip-flop 44 is therefore triggered, the righthand side thereof now being conductive or in the "On" position. In this state of flip-flop 44, gate 45 is also switched and thereby conditioned to block any signals which may be transmitted thereto by detectors 23 and 24. At the same time, the condition of gate 43 is also switched so as to render it receptive to signals from detectors 23 and 24. At this point the next and succeeding area 25 is passing under the detectors 23 and 24.

If an area within the area 25 moving under the detectors 23 and 24 is equivalent to the width of the space between any two successive areas 25, such as a white column extending across an area, the detectors 23 and 24 will, of course, derive signals from each edge. In this event, the amplifier signal is transmitted to the lefthand grid of gate circuit 43, thereby placing the tube below cut-off and transmitting a signal via line 83 to the lefthand grid of the tube in circuit 47, which is a one-shot multivibrator. When circuit 47 is so conditioned relay 48 is energized, thereby opening a switch, not shown, in the drive for the strip material 10 to bring the advancing mechanism to a stop and closing switch 84 to hold relay 48 energized. By this means any false chops by knife 26 are averted and after adjustment by the operator, the strip can be again started, by actuating switch 86 which de-energizes relay 48, without any loss of count or readjustment of the cycle. Also, if a splice has been made in the strip of material which, because of the manner in which it was made, reduces the length of an area 25, then the space between the area 25 containing the splice and the previously detected area 25 will be sensed by detectors 23 and 24 at a time when the control signals are blocked by gate 45. Such signals will, therefore, be transmitted to gate circuit 43 and via line 83 to multivibrator 47 which will cause relay 48 to be energized and shut down the drive for the strip material. Any false chops by knife 26 are therefore averted by an area equivalent to a space between successive images which lies within an area, as well as by an image area which is smaller than the other image areas which might result from a splice or by inadvertently splicing a group of images of a different size into the wrong roll.

Assuming no areas appear in the succeeding area being moved under detectors 23 and 24 and the "15" count has triggered flip-flop 44 and gate 45 is conditioned so as to inhibit any signals which might be transmitted by detectors 23 or 24, then counter 40 will continue to be pulsed periodically by the pulse generator 56. With the "125" count, the space between the trailing edge of an image area 25 and the leading edge of the next and succeeding image area 25 will be centrally located beneath knife 26. At this instant, the "125" count produces pulses simultaneously to plugboard 58 and through switch 60, that is, through decks 5, 8, and 11, these signals are transmitted via lines 37, 38 and 39 to the grids of the righthand side of V2 and V3 (gate 53), thereby producing a positive pulse on line 87 which is connected to solenoid 27. Solenoid 27 is therefore energized and actuates knife 26 to sever the area 25 from the strip. As pointed out above, the pulse on line 87 which occurs with a "125" count, can be utilized to stop the advance of the strip material momentarily and actuate knife 26 or it can be used to release the clutch of a flying cutter in which case the strip material need not be stopped. Depending on how the "125" count pulse is used, the movement of strip material 10 can be either intermittent or continuous.

Up to this point, it is evident that the "235" count

is used, in effect, to render detectors 23 and 24 operative; that when the detectors 23 and 24 sense the trailing and leading edges of successive areas, the count or cycle is restarted by resetting the counter 40; that the "15" count, in effect, prevents or renders the detectors 23 and 24 inoperative unless an area is detected within an area 25 which causes the detectors to function as if sensing a space between successive areas 25 in which case the entire apparatus is stopped; and that the "125" count causes the knife 26 to be actuated or released to sever an area 25 from the strip material 10. In the event, detectors 23 and/or 24 fail to sense the leading and trailing edges of successive areas 25 simultaneously because the density at either or both of these edges is not sufficient to cause the detectors to derive a signal therefrom, then the "250" count will produce a signal to reset the counter 40 and at the same time provide an input to counter 41. As shown in FIGS. 3 and 4C the output of counter 41 is connected to plugboard 59 which, in turn, is connected to gate 47. The connection to plugboard 59 can be plugged to any one of the ten positions on said plugboard, the connection being to the "4" position in FIG. 4C. As described hereinafter, if four successive cycles are restarted by failure of the detectors to derive a signal, that is by the "250" count, then relay 48 is energized to stop the machine. Such a condition can prevail when the trailer which is spliced to the strip material is being moved under the detectors 23 and 24. When this occurs, stoppage of the strip material after four actuations of knife 26 would indicate that the strip material no longer includes any image areas and that the roll of prints has been completely cut into individual prints.

With occurrence of the "250" count, signals are simultaneously presented on plugboard 58 and are transmitted through decks 3, 2, and 1 of switch 60 via lines 66, 67 and 68 to the grids of tube V1 and the righthand grid of tube V2 (gate 52), respectively. Since all three tubes are then placed below cut-off, the positive pulse is transmitted via line 90 to the righthand grid of inverter 49 and via line 91 to the control grid of thyatron 50. The output from circuit 49 is transmitted via line 92 to counter 41 to provide an input pulse thereto for actuating said counter. Thyatron 50 is rendered conducting by the positive pulse from gate 52 and the output therefrom is transmitted via line 93 to the D, T and H sections of counter 40 to reset said sections and is blocked by diode 96 in line 35 so counter 41 is not reset. If four successive cycles are started by the "250" count, counter 41 will then produce a pulse with the fourth "250" count which will be transmitted to plugboard 59 and via line 97 to the lefthand grid of multivibrator 47. This results in a signal being applied to relay 48 which, when energized, causes the advancement of the strip material to be stopped. If at any time before counter 41 reaches a "4" count, detectors 23 and 24 sense a space between successive images 25, then thyatron 46 will be rendered conductive, as described above, and counter 41 will be reset to zero together with counter 40.

While the invention has been described only with respect to a specific size for an area 25, it is to be understood that upon determination of the proper counts for a group of different sizes, these counts are connected to the other and respective positions on switch 60 so that merely by setting switch 60, the proper counts for a particular size is thus obtained. Detectors 23 and 24 can be movable to properly position them in relation to each other as well as with respect to knife 26, if such movement is necessitated by the size of the sheets. Switch 60 can vary with the number of sizes desirable, that is, the number of positions in a deck and the number of decks. If the size of the sheets do not vary greatly in length, then detectors 23 and 24 can be fixed in relation to knife 26 and the count for actuating knife 26

can be varied so as to be more or less than half the cycle count as described herein.

In the device described hereinabove, detectors 23 and 24 are arranged in groups and at least half of the detectors in each group must sense the space between successive image areas in order to derive a signal which is of sufficient amplitude to trigger multivibrator 42. However, detectors 23 and 24 can be connected so that a signal of sufficient amplitude can be obtained from any one detector in each group. In this case, if only a portion of either or both edges of two successive areas presents a difference in density to a detector in each group, irrespective of their position along the edges, a single detector will sense this difference to provide the necessary signal. This arrangement would also permit a fewer number of detectors to be used in each group. With this arrangement, a multivibrator 42 can be used with each group of detectors and the output of the multivibrators can be connected to a coincidence gate to assure proper coincidence of the signals, the output from the gate being connected to gate circuit 43 and to inhibitor gate 45, as shown in FIG. 3 and described above.

The invention has been disclosed in the drawings in conjunction with circuitry comprising well-known electronic elements. However, it is to be understood that other types of electronic components, such as transistor circuits, can be used without departing from the spirit of the invention. Also, other modifications and variations may be suggested to those skilled in the art and the invention is not to be limited to the embodiment described herein but is of a scope as defined by the appended claims.

Having now particularly described my invention, what I desire to secure by Letters Patent of the United States and what I claim is:

1. In a device for actuating a cutting element to sever a moving strip into discrete sheets, said strip having spaced areas thereon of equal length distinguishable from said strip, the combination comprising a cutting station including a cutter and means for actuating said cutter, a second station spaced from and ahead of said cutting station, means for moving said strip past said second station and said cutting station, means arranged in said second station for deriving a control signal upon simultaneous detection of the trailing edge of one area and the leading edge of the next and successive area, and means responsive to said control signal for initiating said actuating means when the area between the detected areas is located centrally with respect to said cutter.

2. In a device for actuating a cutting element to sever a moving strip into discrete sheets, said strip having spaced areas thereon of equal length distinguishable from said strip, the combination comprising a cutting station including a cutter and means for actuating said cutter, a second station spaced from and ahead of said cutting station, means for moving said strip past said second station and said cutting station, means arranged in said second station for deriving a first control signal from the trailing edge of one area, means arranged in said second station ahead of said first-mentioned deriving means by a distance equivalent to the space between said areas for deriving a second control signal from the leading edge of the next and successive area, and means responsive to coincidence of said first and second control signals for initiating said actuating means when the area between the detected areas is located centrally with respect to said cutter.

3. A device in accordance with claim 2 wherein said means for deriving said first and second control signals comprises two groups of photocells, each group being arranged transversely of said strip and in space parallel relation to each other in the direction of strip movement by a distance equivalent to the space between successive areas.

4. In a device for actuating a cutting element to sever a moving strip into discrete sheets, said strip having spaced

areas thereon of equal length and distinguishable from said strip, the combination comprising a cutting station including a cutter and means for actuating said cutter, a detecting station spaced from and ahead of said cutting station, means for moving said strip past said detecting station and said cutting station, a first group of detectors arranged in said detecting station normal to the direction of movement of said strip for deriving a first control signal from the trailing edge of one of said areas, a second group of detectors arranged in said detecting station in spaced and parallel relation to said first group of detectors in accordance with the space between said areas for deriving a second control signal from the leading edge of the next and successive area, means operatively connected to said strip moving means for generating a series of periodic pulses, and a counter circuit initiated by coincidence of said first and second control signals and responsive to a predetermined number of said periodic pulses to provide an output signal for initiating said actuating means when the area between the detected areas is located centrally with respect to said cutter.

5. In a device for actuating a cutting element to sever a moving strip into discrete sheets, said strip having spaced areas thereon of equal length and distinguishable from said strip, the combination comprising a cutting station including a cutter and means for actuating said cutter, a detecting station spaced from and ahead of said cutting station, means for moving said strip past said detecting station and said cutting station, a first group of detectors arranged in said detecting station normal to the direction of movement of said strip for deriving a first control signal from the trailing edge of one of said areas, a second group of detectors arranged in said detecting station parallel to and spaced from said first group by a distance equivalent to the space between successive areas on said strip for deriving a second control signal from the leading edge of the next and successive area, means operatively connected to said strip moving means for generating a series of periodic pulses, a counter circuit initiated with coincidence of said first and second control signals and responsive to a predetermined number of said periodic pulses in accordance with the location of said detecting station from said cutting station for providing an output signal to initiate said actuating means when the area between the detected areas is located centrally with respect to said cutter, circuit means initiated only with non-coincidence of said first and second control signals for resetting said counter circuit and providing an output pulse, and a second counter responsive to a predetermined number of successive output pulses from said circuit means for rendering said strip moving means inoperative.

6. In a device for actuating a cutting element to sever a moving strip of photographic material into discrete sheets, said strip having image areas thereon of equal length arranged in equally spaced relation longitudinally of said strip, the combination comprising a cutting station including a cutter and means for actuating said cutter, a detecting station spaced from and ahead of said cutting station, a first group of detectors arranged in said detecting station normal to the direction of movement of said strip for deriving a first control signal from the trailing edge of one of said image areas, a second group of detectors arranged in said detecting station parallel to and spaced from said first group by a distance equivalent to the space between successive image areas on said strip for deriving a second control signal from the leading edge of the next and successive image area coincident with said first control signal, means operatively connected to said strip moving means for generating a series of periodic pulses, a counter circuit responsive to said periodic pulses and settable to a predetermined number of said periodic pulses equivalent to the distance between said detecting and cutting stations for providing an output pulse when the area between the detected area is located centrally with respect to said cutter, means responsive to

coincidence of said first and second control signals for initiating said counter circuit, and means responsive to said counter output pulse for initiating said actuating means.

7. In a device for actuating a cutting element to sever a moving strip of photographic material into discrete sheets, said strip having image areas thereon of equal length arranged in equally spaced relation longitudinally of said strip, the combination comprising a cutting station including a cutter and means for actuating said cutter, a detecting station spaced from and ahead of said cutting station, means for moving said strip past said detecting station and said cutting station, a first group of detectors arranged in said detecting station normal to the direction of movement of said strip for deriving a first control signal from the trailing edge of one of said image areas, a second group of detectors arranged in said detecting station parallel to and spaced from said first group by a distance equivalent to the space between successive image areas on said strip for deriving a second control signal from the leading edge of the next and successive image area coincident with said first control signal, means operatively connected to said strip moving means for generating a series of periodic pulses, a counter circuit responsive to said periodic pulses and settable to predetermined numbers of said periodic pulses to provide a first, second and third output pulse for a cycle of operation, means responsive to said first output pulse when the trailing edge of an image area is substantially aligned with said first group of detectors for rendering said device receptive to signals derived from said groups of detectors, means responsive to said first and second control signals, when coincident, for resetting said counter to a zero count, means responsive to said second output pulse when the leading edge of said next area is aligned with said second group of detectors for rendering said device unresponsive to signals derived from said groups of detectors, and means responsive to said third output pulse for initiating said actuating means when said area between the detected images is centrally located with respect to said cutter.

8. In a device for actuating a cutting element to sever a moving strip of photographic material into discrete sheets, said strip having image areas thereon of equal length arranged in equally spaced relation longitudinally of said strip, the combination comprising a cutting station including a cutter and means for actuating said cutter, a detecting station spaced from and ahead of said cutting station, means for moving said strip past said detecting station and said cutting station, a first group of detectors arranged in said detecting station normal to the direction of movement of said strip for deriving a first control signal from the trailing edge of one of said image areas, a second group of detectors arranged in said detecting station parallel to and spaced from said first group by a distance equivalent to the space between successive image areas on said strip for deriving a second control signal from the leading edge of the next and successive image area coincident with said first control signal, means operatively connected to said strip moving means for generating a series of periodic pulses, a first counter circuit responsive to said periodic pulses and settable to predetermined numbers of said periodic pulses to provide a first, second, third and fourth output pulse for a cycle of operation, a second counter circuit responsive to said second output pulse for registering a count only when said second output pulse occurs without coincidence of said first and second control signals and for providing an output pulse only with a predetermined count of successive second output pulses, means responsive to said first output pulse when the trailing edge of an image area is substantially aligned with said first group of detectors for rendering said device receptive to signals derived from said groups of detectors, means responsive to said first and second control signals, when coincident,

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for resetting said first and second counter circuits to a zero position, means responsive to said third output pulse, when said leading edge of said next area is aligned with said second group of detectors for rendering said device unreceptive to signals derived from said groups of detectors, means responsive to said fourth output pulse for initiating said actuating means when said area between the detected images is centrally located with respect to said cutter, and means responsive to the output pulse from said second counter for stopping movement of said strip material.

9. A device in accordance with claim 8 wherein said means responsive to said first output pulse and said means responsive to said third output pulse comprises an inhibitor circuit operatively connected to said detectors which is conditioned by said first output pulse to transmit said first and second control signals only during the interval the space between successive images is being moved through said detecting station and which is conditioned by said third output pulse to block any signals derived by said detectors during the interval an image area is being moved through said detecting station.

10. In a device for actuating a cutting element to sever a moving strip of photographic material into discrete sheets, said strip having image areas thereon of equal length arranged in equally spaced relation longitudinally of said strip, the combination comprising a cutting station including a cutter and means for actuating said cutter, a detecting station spaced from and ahead of said cutting station, means for moving said strip past said detecting station and said cutting station, a first group of detectors arranged in said detecting station normal to the direction of movement of said strip for deriving a first control signal from the trailing edge of one of said image areas, a second group of detectors arranged in said detecting station parallel to and spaced from said first group by a distance equivalent to the space between successive image areas on said strip for deriving a second control signal from the leading edge of the next and successive image area coincident with said first control

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signal, means operatively connected to said strip moving means for generating a series of periodic pulses, a first counter circuit responsive to said periodic pulses and settable to predetermined numbers of said periodic pulses to provide a first, second, third and fourth output pulse for a cycle of operation, a second counter circuit responsive to said second output pulse for registering a count only when said second output pulse occurs without coincidence of said first and second control signals and for providing an output pulse only with a predetermined count of successive second output pulses, means responsive to said first output pulse when the trailing edge of an image area is substantially aligned with said first group of detectors for rendering said device receptive to signals derived from said groups of detectors, means responsive to said first and second control signals, when coincident, for resetting said first and second counter circuits to a zero position, means responsive to said third output pulse, when said leading edge of said next area is aligned with said second group of detectors for rendering said device unreceptive to signals derived from said groups of detectors, means responsive to said fourth output pulse for initiating said actuating means when said area between the detected images is centrally located with respect to said cutter, means responsive to the output pulse from said second counter for stopping movement of said strip material, and means responsive to coincident signals derived by said first and second groups of detectors from an area within the image area being moved through said detecting station, which corresponds to the space between successive images, for rendering said device inoperative.

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