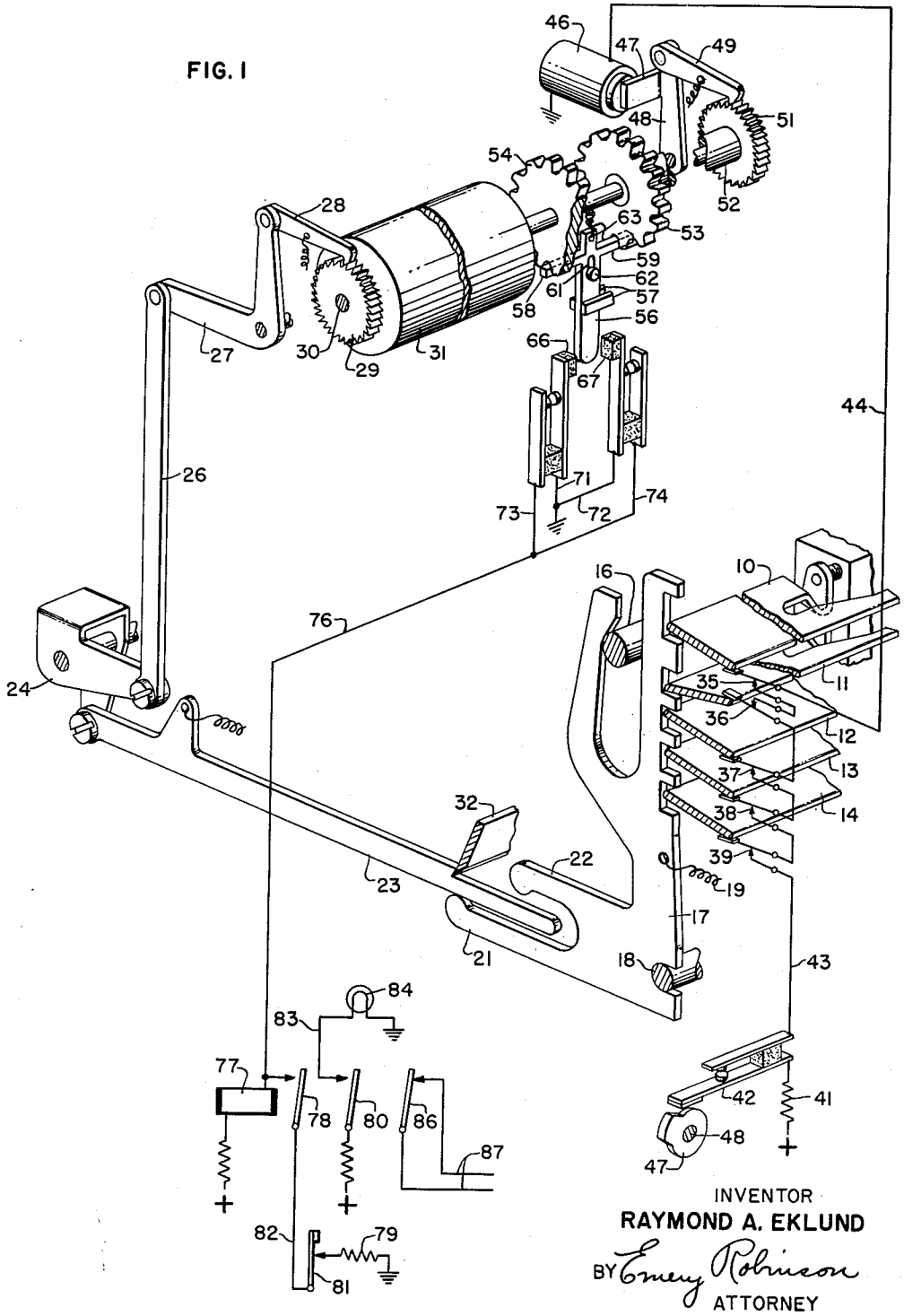
Dec. 27, 1955 R. A. EKLUND 2,728,905

LINE FEED FAILURE INDICATOR

Filed Nov. 10, 1951

FIG. 1



INVENTOR
RAYMOND A. EKLUND
BY Emery Robinson
ATTORNEY

United States Patent Office 2,728,905 Patented Dec. 27, 1955

2,728,905

LINE FEED FAILURE INDICATOR

Raymond A. Eklund, Chicago, Ill., assignor to Teletype Corporation, Chicago, Ill., a corporation of Delaware

Application November 10, 1951, Serial No. 255,854

11 Claims. (Cl. 340—259)

This invention relates to a line feed failure indicator and more particularly to an apparatus for indicating a failure of a platen on a telegraph printer to advance upon reception of a line feed signal in the telegraph apparatus.

Often in the operation of printing telegraph systems, it is a primary consideration for the efficient operation of the system that some preselected function be performed at each receiving telegraph printer in response to a signal indicative of the preselected function. More particularly, in operation of receiving telegraph printers, it is of utmost importance that the platen advances upon each reception of a line feed signal by the telegraph printer, otherwise the obvious result is the superimposing of succeeding printed characters over the characters previously printed. In adjunct to this situation there often arise occasions wherein the printing telegraph apparatus is utilized to print on forms, coupons, etc. having preselected areas provided thereon for the insertion of printed information; consequently, it is a paramount criterion that the telegraph apparatus function to advance the platen upon each reception of a line feed signal or else the failure of the platen to advance will result in the improper positioning of the printed information in relation to the preprinted matter on the forms, coupons, etc., the ultimate result in such a situation being an unintelligible message.

It is a primary object of this invention to provide means for indicating the failure of a printing telegraph apparatus to perform a predetermined function in response to the reception of a preconcerted signal which is indicative of that function.

It is another important object of the invention to provide apparatus for indicating the failure of a platen to properly advance in response to a line feed telegraph signal.

It is a further object of this invention to interrupt the operation of a telegraph system whenever a platen does not advance in response to a line feed telegraph signal.

Another and more specific object of this invention is to provide an auxiliary device which is advanced in synchronism with the advance of a platen in printing telegraph apparatus upon each reception of a line feed telegraph signal.

A further specific object of the invention is the provision of an indicating device and a signal line interruption means which are operable upon the existence of any discrepancy between the advance of the platen and the auxiliary device.

A complete description of the printing telegraph apparatus utilized in the present specification to illustrate the invention is contained in the patent to S. Morton et al., No. 1,904,164 and dated April 18, 1933, therefore, a complete description of the elemental parts and subassemblies of the printer which are not necessary for a complete understanding of the present invention are omitted for the purpose of simplifying the disclosure and hence making the present invention more readily understandable. It is to be understood, however, that the principles of the present invention are not to be restricted to an incorporation in an identical printer but may be advantageously adapted

to incorporation in other types of printing telegraph apparatus.

With these and other objects in view the present invention contemplates a control circuit energized upon each reception of a line feed signal by a printing telegraph apparatus. Energization of this circuit results in the operation of a solenoid actuated pawl and ratchet device to cause a multilobed cam to be advanced. The reception of a line feed signal by the printing telegraph apparatus also results in the normal advance of the platen. Attached to the platen shaft for movement therewith is a second multi-lobed cam. The number of lobes on each cam is identical and upon each reception of a line feed signal both multi-lobed cams are caused to advance in unison. A cam follower is provided to span both of the cams and be reciprocated in a rectilinear motion whenever the cams advance in unison. Whenever there is a discrepancy in the advance of either multi-lobed cam due to the failure of the platen feeding mechanism, the cam follower is caused to move in a pivoted movement by the advance of the other multi-lobed cam. Pivotal movement of the cam follower functions to complete a control circuit which upon energization interrupts the signal line and operates a visual indicating device to draw the operator's attention to the fact that the platen feeding mechanism is not properly functioning.

Other objects and advantages of the invention will be apparent from the following detailed description when considered in conjunction with the accompanying drawing wherein:

Fig. 1 discloses a perspective view of a line feed mechanism of the type shown in the aforementioned Morton et al. patent together with the control circuits and necessary mechanism for operating said control circuits embodying the principal features of the present invention.

With reference to the drawing there is disclosed a plurality of selector vanes **10**, **11**, **12**, **13** and **14** substantially identical to the selector vanes **36** to **40** shown in the aforementioned S. Morton et al. patent. As described in the Morton et al. patent, these selector vanes are permutatively positioned in accordance with the reception of a series of telegraph signal impulses by the receiving telegraph apparatus. As shown in the drawing, the selector vanes are set in accordance with the line feed condition, that is, the second impulse of the series of incoming signal impulses is a marking impulse which causes the second selector vane **11** to be pivoted upwardly. Upon the selector vanes assuming the permutated setting and the subsequent operation of a function lever bail **16**, by the main shaft of the printing telegraph apparatus, a function lever **17** is pivoted about a function lever shaft **18** under the impetus of a spring **19**. The function lever **17** is permutatively slotted in accordance with the line feed selection of the selector vanes whereby the selector vanes are adapted to be positioned within the slots whenever the function lever **17** is pivoted and the selector vanes are positioned in a condition indicative of line feed condition. The function lever **17** is provided with a pair of lobed tines **21** and **22** spaced apart to subtend one end of an operating arm **23**. The opposite end of the operating arm is rotatably connected to one arm of a pivoted bracket **24**, having a second arm connected to one end to a link **26**, the other end of which is connected to a bell crank **27**. Pivotally secured to the bell crank **27** is a feed pawl **28** spring biased to engage with a ratchet wheel **29** securely mounted on a platen shaft **30**. Mounted on the platen shaft **30** is a platen **31** of the printing telegraph apparatus. The mechanism heretofore set forth is further described in great detail in the aforementioned Morton et al. patent.

Briefly, the operation of the line feed mechanism heretofore set forth is as follows; the reception of a line feed signal positions the selector vanes **10** to **14** to allow the

function lever 17 to pivot, thus moving the lobed tine 21 into engagement with the operating arm 23 to move the operating arm into position to be engaged by a bail blade 32. Movement of the bail blade 32 by a mechanism associated with the main shaft of the printing telegraph apparatus is imparted to the operating arm 23, thus causing the bracket 24 to pivot in a clockwise direction to move the link 26 downwardly to pivot the bell crank 27 in a counterclockwise direction. Counterclockwise movement of the bell crank 27 causes the pawl 28 to engage a tooth on the ratchet 29 to advance the platen 31 one increment.

Turning now to the specific improvement of the present invention over the aforementioned Morton et al. patent, there is associated with the selector vanes 10 to 14 a plurality of movable contact elements 35 to 39 which are adapted to be closed whenever the selector vanes assume a permutated position such as shown in Fig. 1 which is indicative of a line feed condition. Closure of the contacts 35 to 39 causes the completion of a circuit from positive battery, through a resistance 41, through a make break contact 42, over a conductor 43, through the now closed contacts 39 to 35, over a lead 44, through a solenoid 46 to ground. The make break contact 42 is controlled by a cam 47 mounted on a shaft 48. The shaft 48 is driven by the main shaft of the printing telegraph apparatus and as described in the aforementioned Morton et al. patent the main shaft is caused to complete one cycle of rotation upon the reception of each separate series of permutated signal impulses. The timing of the cam 47 is such that the contact is closed just after the selector vanes are permutatively positioned to complete the energization circuit of the solenoid 46. Energization of the solenoid 46 attracts an armature 47 which is in reality an arm projecting from a pivot lever 48. Connected to the free end of the pivot lever 48 is a pawl 49 adapted to engage the teeth on a ratchet 51. The ratchet 51 is attached to a sleeve 52 which is rotatably mounted about the platen shaft 30.

A first multi-lobed cam 53 is fixed to the sleeve 52 and hence each time the pawl 49 engages and advances a tooth on the ratchet 51, the sleeve 52 is advanced one increment to move the multi-lobed cam 53 a like distance. A second multi-lobed cam 54 is fixed to the platen shaft 30, hence each time the pawl 28 engages and advances a tooth on the ratchet 29, the shaft 30 is caused to rotate one increment to impart a movement of a like distance to the multi-lobed cam 54. A cross-shaped cam follower member 56 is mounted for movement between a pair of guides 57. The cross arms 58 and 59 of the cross member 56 extend laterally to act as followers for the respective cams 54 and 53. The cross member 56 is provided with a vertical slot 61 into which is positioned a guide pin 62 secured to the frame of the printing telegraph apparatus. A tension spring 63 is attached to the upper end of the upright of the cross member 56 and urges the cam followers 58 and 59 into engagement with the cams 54 and 53.

The number of lobes on each of the multi-lobed cams 53 and 54 are equal in number. The number of teeth on each of the ratchets 29 and 51 is double the number of lobes on each of the multi-lobed cams 53 and 54. When the printing telegraph apparatus is functioning properly, the platen is advanced one increment upon each reception of a line feed signal. The positioning of the selector vanes 10 to 14 in accordance with the incoming signal impulses completes the energizing circuit for the solenoid 46 to cause the multi-lobed cam 53 to be advanced in one step increments in unison with the advance of the cam 54. Consequently if the lobes on each of the cams 53 and 54 are in alignment with each other the cross member 56 will merely reciprocate in a rectilinear movement within the guides 57.

Situations often arise wherein due to some mechanical difficulty, the reception of a line feed signal by the printing telegraph apparatus does not always result in the advance of the platen 31 through a distance of one increment. In such a situation the reception of the line feed signal impulses causes the selector vanes 10 to 14 to assume the permutated position shown in Fig. 1 whereupon the energizing circuit for the solenoid 46 is completed hence causing the pawl 49 to advance the ratchet 51 and the multi-lobed cam 53 one increment. Inasmuch as the platen 30 has not advanced due to some failure in the operation of the line feed mechanism, the multi-lobed cam 54 remains stationary. Movement of the multi-lobed cam 53 causes the cross arm 59 to pivot about the extremity of the cross arm 58; thus, the lower portion of the cross member 56 is moved into engagement with either a spring contact 66 or 67 depending upon whether the cross arm 59 was resting within a recess or on a lobe of the cam 53 prior to the reception of the line feed signal which did not actaute the platen advancing mechanism. If the follower 59 was resting within a recess as shown in Fig. 1, the positioning of the selector vanes 10 to 14 in a position indicative of a line feed condition causes the multi-lobed cam 53 to advance and hence pivot the follower arm 59 in a clockwise direction to close the spring contact 66. In the situation wherein both arms 58 and 59 are resting on lobes of the cams 53 and 54, the failure of the line feed mechanism to properly function and the subsequent advancement of the ratchet 51 and the multi-lobed cam 53 causes the follower arm 59 to pivot in a counterclockwise direction to bring the lower extremity of the cross member 56 into engagement with the spring contact 67 and hence close the contact 67.

Closure of either of the contacts 66 or 67, which are connected in parallel, results in the completion of a circuit which may be traced from ground over lead 71 or 72, through the closed switch 66 or 67, over lead 73 or 74, over a lead 76, through a relay 77 to positive battery. Energization of the relay 77 draws up its armature 78 to complete a locking circuit for the relay 77 which may be traced from ground, over a lead 79, through a manual switch 81, over a lead 82, through the now drawn up armature 78, through the relay 77, and thence to positive battery. An armature 80 is also drawn up upon energization of the relay 77 to complete a circuit which may be traced from positive battery, through the now drawn up armature 80, over a lead 83, through an indicating lamp 84 to ground. Illumination of the indicating lamp 84, immediately notifies the operator that the receiving telegraph apparatus has failed to perform a line feed function in response to the reception of a permutated signal indicative of a line feed operation.

Energization of the relay 77 also draws up an armature 86 which is connected within the circuit of the signal line interconnecting the receiving telegraph apparatus and an outlying transmitting station which is transmitting the message. The breaking of the signal line 87 results in the interruption of the operation of the transmitter at the outlying transmitter station, consequently, the operator at the outlying transmitting station will be immediately appraised of the situation existing in the receiving printing telegraph apparatus and as a result will discontinue any attempt at further transmission of the message until the necessary corrections or repairs are made in the line feed mechanism. As soon as the necessary repairs or corrections are made, the operator will reposition the multilobed cams 53 and 54 in alignment with each other and then open the switch 81 breaking the locking circuit of relay 77 thus restoring the signal line 87 to a condition for further reception of messages.

The particular invention has been described in great detail with respect to the printing telegraph apparatus shown in the aforementioned Morton et al. patent, however, it is readily understandable that it is within the providence of anyone skilled in the art to adapt the principles embodying the present invention to any other type of printing telegraph apparatus. All that would be necessary would be to have a number of elements similar to or performing the same function as the selector vanes 10

to 14 in the present disclosure which would complete an electrical circuit for the energization of the solenoid 46. Energization of the solenoid 46 would again cause the advance of a cam similar to the multi-lobed cam 53 which would rotate in synchronism with another cam, similar to the multi-lobed cam 54, mounted on the platen shaft of any type of printing telegraph apparatus. Any discrepancy in the advance in either cam would again operate an indicating circuit to appraise the attendants of the fact that the printing telegraph apparatus is not properly functioning.

A much broader aspect of the invention may be comprehended when considering the present invention as a means for ascertaining the proper functioning of any component mechanism in a printing telegraph apparatus which is actuated by the reception of a series of signal impulses indicative of the function to be performed. Such additional checking functions could be readily performed by providing some selective means, such as the selector vanes 10–14, positioned in response to incoming signal impulses and then providing two separate instrumentalities, such as cams 54 and 53, the first of which would be operated by the performance of the function by the component mechanism and the second of which would be directly operated by the selective means. Any variance in the operation of either instrumentality would operate an indicating device to draw an attendant's attention to the fact that the receiving telegraph apparatus is not properly functioning.

It is to be understood that the above described arrangements of apparatus and construction of elemental parts are simply illustrative of the application of the principles of the invention and many other modifications may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. In a printing telegraph apparatus, a signal responsive means, a mechanism, means controlled by the signal responsive means for actuating the mechanism to perform a function in response to the reception of a predetermined permutative signal, an auxiliary mechanism, means controlled by the signal responsive means for simultaneously actuating the auxiliary mechanism to perform a function in response to the reception of the aforesaid predetermined permutative signal, and common means cooperable with both said mechanisms for indicating the failure of either mechanism to perform its respective function.

2. In a printing telegraph apparatus, a signal responsive means, a mechanism, means operated by the signal responsive means for actuating the mechanism to perform a function in response to the reception of a predetermined permutative signal, an auxiliary mechanism, means operated by the signal responsive means for simultaneously actuating the auxiliary mechanism to perform a function in response to the reception of the aforesaid predetermined permutative signal, and means for precluding the further reception of permutative signals whenever either of said mechanisms fails to perform its respective function.

3. In a printing telegraph apparatus, a signal responsive means, a platen, means operated by the signal responsive means for advancing the platen in response to an incoming predetermined permutative signal, and further means operated by the signal responsive means for precluding the reception of any further signals by the telegraph apparatus whenever the platen fails to advance in response to the reception of said predetermined permutative signal.

4. In an apparatus for verifying the advance of a platen, means for advancing the platen in one step increments, an instrumentality for controlling the actuation of the advancing means, a second means simultaneously advanced under the control of the instrumentality, and means for indicating the failure of the first or second means to advance under the control of the instrumentality.

5. In a line feed failure indicator, means for advancing a platen in one step increments, means for actuating said advancing means in response to a preconcerted telegraph signal, an instrumentality also advanced by reception of the preconcerted telegraph signal, and means for indicating the failure of the platen or the instrumentality to advance upon reception of the preconcerted telegraph signal.

6. In a printing telegraph apparatus, a signal responsive means, a platen, control means permutatively positioned in accordance with the reception of a line feed signal by the signal responsive means, means actuated by said control means for advancing the platen in one line increments each time the control means is permutatively positioned in accordance with a line feed signal, an auxiliary device adapted to be actuated by the control means each time the control means is permutatively positioned by the signal responsive means receiving a line feed signal, and means for indicating the failure of the platen advancing means or the auxiliary device to properly function.

7. In a printing telegraph apparatus, a signal responsive means, selector vanes adapted to be permutatively positioned by the signal responsive means upon reception of a preconcerted permutative signal, a first multi-lobed cam, means controlled by the aforesaid permutative setting of the selector vanes for advancing the first multi-lobed cam in one step increments, a second multi-lobed cam, an electrical circuit including a solenoid, a plurality of contacts, said contacts adapted to be closed by the aforesaid permutative setting of the selector vanes whereby the solenoid is energized, means actuated by the energization of the solenoid for advancing the second multi-lobed cam in one step increments, and means for indicating any discrepancy in the advance of the multi-lobed cams.

8. In a printing telegraph apparatus, a signal responsive means, a plurality of selector vanes adapted to be permutatively positioned by said signal responsive means in accordance with a series of incoming permutative signal impulses, a platen, means controlled by the aforesaid permutative setting of the selector vanes for rotating the platen in one step increments, an electric circuit including a solenoid, a series of normally open contacts included within the electrical circuit which are adapted to be closed by the selector vanes assuming the aforesaid permutative position, said closure of the contacts energizing the solenoid, a first multi-lobed cam connected to and advanced by the platen, a second multi-lobed cam, means actuated by the energization of the solenoid for advancing the second multi-lobed cam in one step increments, each of said multi-lobed cams having an equal number of lobes which are in axial alignment with each other, a cam follower adapted to follow the periphery of both multi-lobed cams, and means actuated by the cam follower for indicating any discrepancy in the advance of the cams.

9. In a printing telegraph apparatus, a mechanism, signal responsive means, means actuated by the signal responsive means upon reception of a predetermined permutative code signal for actuating the mechanism, an auxiliary mechanism, a circuit having included therein a plurality of normally open contacts, said signal responsive means adapted to close said contacts upon reception of said predetermined permutative code signal, means operated by the telegraph apparatus following the closure of the contacts for completing the electrical circuit, means included within the electrical circuit and adapted to be operated thereby for actuating the auxiliary mechanism, and means operated by either of said mechanisms whenever one of said mechanisms fails to be actuated by the signal responsive means.

10. In a telegraph apparatus, means responsive to permutative signals, a first mechanism, a second mechanism,

means actuated by said signal responsive means receiving a predetermined permutative signal for actuating said first mechanism to perform a function, further means actuated by said signal responsive means receiving said predetermined permutative signal for simultaneously actuating said second mechanism to perform a function, indicating means, and common means cooperable with both said mechanisms for operating said indicating means when only one of said mechanisms performs its assigned function in response to the reception of said predetermined permutative signal.

11. A printing apparatus comprising a platen movably mounted therein, means for moving the platen through predetermined incremental distances, a selectively operable mechanism for controlling the actuation of the means for moving the platen, a device simultaneously actuated by said selectively operable means for verifying the movement of the platen through said predetermined incremental distance, and means controlled by the verifying device for precluding further operation of the selectively operable mechanism when said platen does not move through said predetermined incremental distance.

References Cited in the file of this patent

UNITED STATES PATENTS

2,165,302	Rabenda	July 11, 1939
2,351,014	Connery et al.	June 13, 1944
2,512,038	Potts	June 20, 1950
2,546,819	Gooderham	Mar. 27, 1951
2,547,525	Hague	Apr. 3, 1951
2,628,346	Burkhart	Feb. 10, 1953