Dec. 27, 1966 R. H. GARTSIDE 3,294,015

ARTICLE CONTROLLED ACTUATING MEANS FOR CODE PRE-SET WHEEL PRINTER

Filed Dec. 21, 1964 2 Sheets-Sheet 1

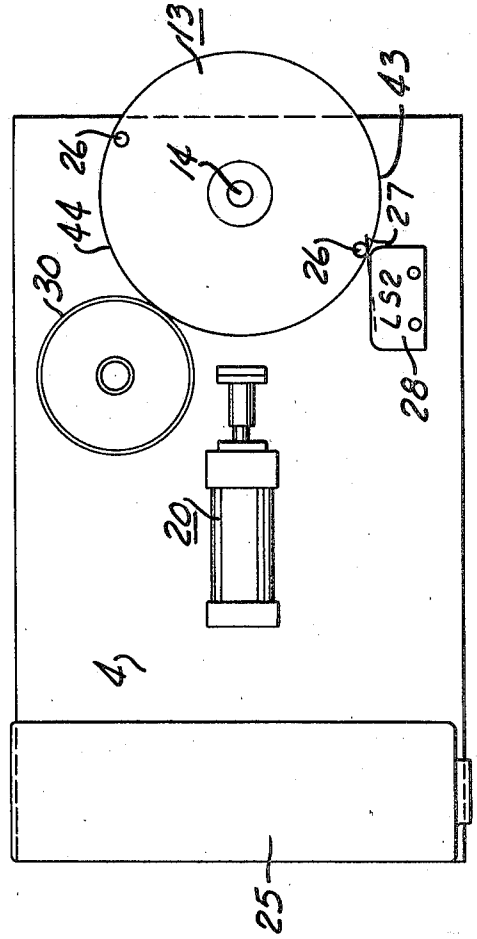

Fig. 2

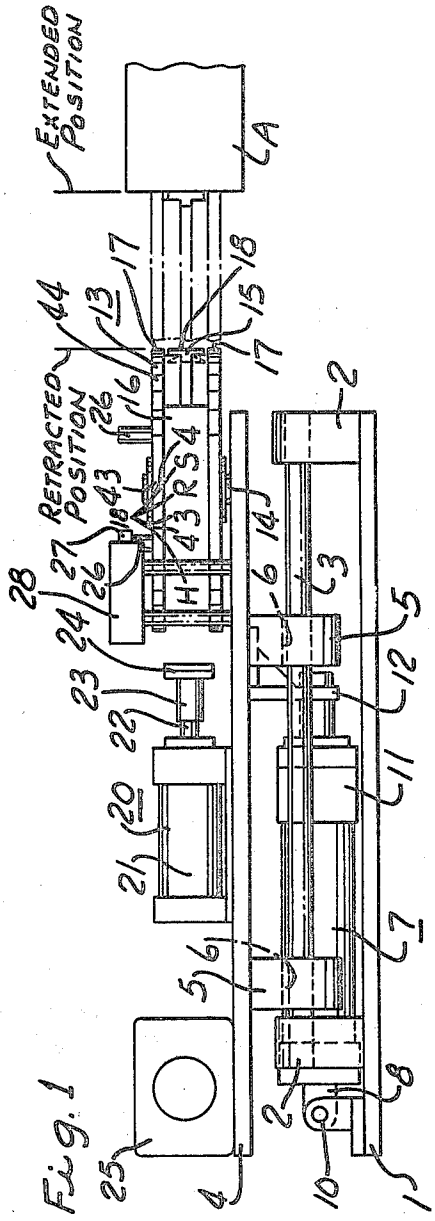

Fig. 1

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Fig. 3

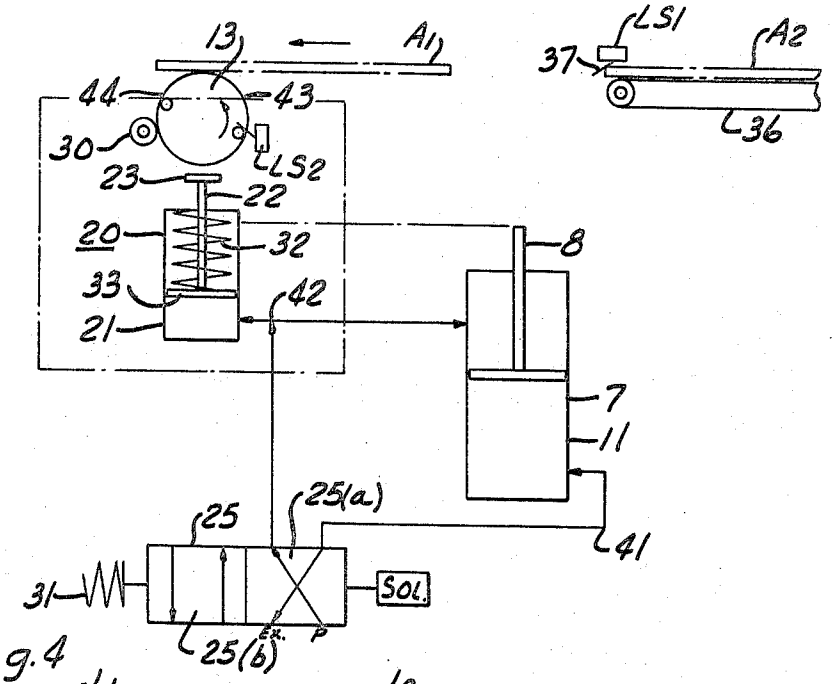
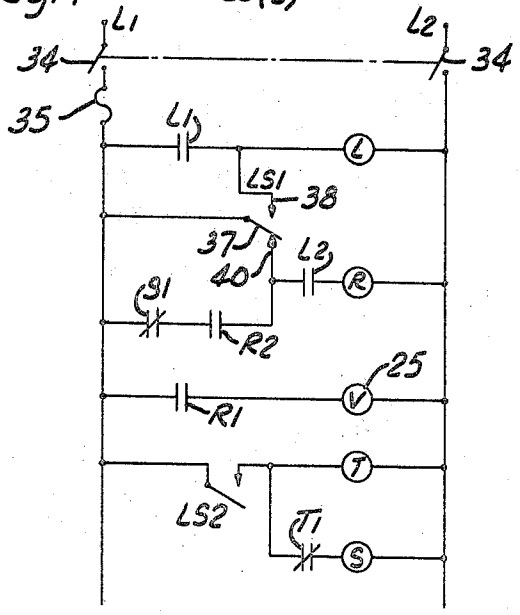


Fig. 4



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ARTICLE CONTROLLED ACTUATING MEANS FOR CODE PRE-SET WHEEL PRINTER

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6 Claims. (Cl. 101—35)

This invention relates generally to code printers and more particularly to an automatic code preset wheel printer which prints intelligence on articles moving in succession along a defined path.

It is many times necessary to print coded intelligence on articles which are moving along a conveying system such as a production line so that upon subsequent examination of the printed code, information concerning the article can be readily made known such as size, weight, grade, quality, trademark, shipping date, etc. This intelligence can be printed on the article as it is moving along the line or path or, in many cases more preferably, at the end of the conveying system where such intelligence may, at last, be known and, thus, recorded on the surface of the article.

The principal object of this invention is a pre-set wheel printer to apply automatically printed intelligence to articles of manufacture as they are continually conveyed off the discharge end of a conveyor system.

Another object of this invention is the provision of a pre-set wheel printer which automatically prints intelligence on articles as they are consecutively conveyed along a defined path wherein the code printer wheel is brought into printing position on the article to be printed, the printer wheel being in relative stationary relationship with the article to be printed at the time the printer wheel contacts the article. Intelligence is printed on the article as the article is subsequently conyeved along the path.

Another object of this invention is the provision of a pre-set wheel printer which automatically prints intelligence on articles being conveyed or moved intermittently along a conveyor system wherein, the printer wheel is in contact with the article to be printed and rotatably prints thereon as the article is moved by successive articles being discharged off the end of the conveyor system.

Another object of this invention is the provision of an automatically operated pre-set wheel printer which is actuated into extended printing position by prepositioning of the article to be printed, and is retracted from extended printing position to its retracted position by a predetermined rotational distance of its printing wheel at the completion of code printing on the moving article.

Another object of this invention is the provision of a pre-set wheel code printer with a brake which engages the wheel printer at the end of the code printing so that the wheel printer will be in proper printing position for the next consecutive article to be printed. Thus, when the carriage is in extended printing position, the brake is released to permit the article to rotate the printer wheel. When the carriage is being positioned in retracted position, the brake is applied to maintain the printer wheel in proper printing position.

Other objects and advantages appear hereinafter in the following description and claims.

The accompanying drawings show for the purpose of exemplification, without limiting this invention or the claims thereto, certain practical embodiments of the invention wherein:

FIG. 1 is a side elevation of the pre-set wheel code printer comprising this invention.

FIG. 2 is a plan view of the printer shown in FIG. 1.

FIG. 3 is a fluid circuit diagram for operating the code printer.

FIG. 4 is the electrical circuit diagram for operating the printer.

Referring to FIGS. 1 and 2, the pre-set wheel code printer comprises the base **1** which is provided with the way supports **2** for the parallel ways **3**, which are on each side of base **1**. The carriage **4** is provided with depending lugs **5** having bearings supports **6**. The ways **3** support the carriage **4** for reciprocal movement on the base **1**. The fluid reciprocal motor **7** provides the reciprocal movement of the carriage relative to the base and has its piston rod **8** attached to the base **1** as shown at **10** and its cylinder **11** attached to the underside of the carriage **4** as shown at **12**.

The top of the carriage **4** supports the rotatable printer wheel **13** which is mounted on the vertical axle **14** by any convenient manner. The printer wheel **13** is provided with a dove-tail groove **15** for the insertion of a printing die **16**. The printer wheel **13** is provided with frictional bands **17**, which may be made of rubber or other elastic material, or may consist of metal bands having a knurled surface. The frictional surfaces **17** are at the same relative perimetral plane as the printing surface **18** of the printing die **16**. The frictional surfaces **17**, upon frictional contact with the article to be printed, insure continual contact during the complete printing cycle.

It should be noted that the printer wheel **13** is mounted on the carriage **4** forwardly of the front end of the carriage, since the printer wheel **13** will have to make contact with the article to be printed.

The carriage **4** is also provided with the brake **20** which consists of the cylinder **21** and the piston **22**. The brake shoe **23** has a frictional pad **24** on its forward end for engagement with the frictional surface **17** of the printer wheel **13** upon actuation of the brake. Thus, the frictional surfaces on bands **17** perform a two-fold purpose. Not only do these surfaces provide the necessary frictional engagement with the article to be printed, but also provide a frictional surface for engagement by the brake shoe **23** in order to maintain the printer wheel **13** in the proper printing position.

On the rearward end of the carriage **4**, the solenoid control valve **25** is provided which controls the fluid pressure supply to the brake **20** and a reciprocal motor **7** as explained hereinafter.

As shown in FIGS. 1 and 2, the printer wheel **13** is provided with 2 cam pins **26** which on 180° rotation of the printer wheel **13**, will contact the finger **27** of the limit switch **28**. As will be explained below the cam pin **26**, contacting the finger **27** closes an electrical circuit which permits the carriage to be placed in a retracted position as shown in FIG. 1, and, simultaneously, apply the brake **20** to the printer wheel **13**.

The printer wheel **13**, as shown in FIGS. 1 and 2, is ararnged to print for two cycles of 180° each. Thus, two articles may be printed with code information for every complete revolution of the printer wheel **13**. It is obvious, therefore, that the printer wheel **13** could easily be made of a larger radius in order to permit more than 2 cam pins

26 or two printing cycles for every revolution of the printer wheel 13. For an example, 4 cam pins could be placed 90° from each other on the outer edge of the printer wheel 13 to permit the code printer to have 4 printing cycles for every complete revolution of the printer wheel 13.

As shown in FIG. 2, an inker 30 is rotatably supported from the carriage 4 in engagement with the printer wheel 13 in order to continually supply the printing surface 18 of the die member 16 with ink to be used in printing articles during the printing cycle.

FIG. 3 shows the fluid circuit for operating the code printer comprising this invention. FIG. 3 also aids to demonstrate the sequential operation of the code printer. The fluid for operating the code printer is preferably air since this eliminates the need of pressure relief means at each end of the piston stroke of the motor 7. However, operation through the use of a liquid such as oil may be readily substituted, if necessary.

The solenoid operated valve 25, is shown in de-energized position in FIG. 3, and is held by the spring member 31 until actuated by the solenoid. The brake 20 is spring biased as shown at 32 so that the piston 33 will be retracted, upon release of the pressure supplied at the rearward or blank end of the cylinder 21 when the solenoid operated valve 25 is in its energized position.

In order to explain the order of sequence of operation there is shown in FIG. 4 the electrical circuit for operating the code printer of this invention. As shown in FIG. 4 the electrical circuit is electrically operated from lines L1 and L2 through the switch 34, and may be protected by the fuse 35.

In order to operate the code printer the switch 34 is turned on. Shown in FIG. 3 an article A, to be printed, is received off the end of the conveyor system 36 and actuates the limit switch LS1 which, as shown in FIG. 4, is a double throw switch. Thus, the article A causes the actuator 37 of LS1 to make contact with the contact 38 which in turn energizes the relay L across lines L1 and L2. The front stick L1 of the relay L is closed which permits relay L to remain energized across lines L1 and L2 even though the actuator 37 of the limit switch LS1 may not be in contact with the contact 38. The use of the relay L in the electrical circuit of FIG. 4 is to provide an interlock and thus prevent initial forward movement or extension of the carriage 4. When power is first supplied through the switch 34 and an article A has not initially actuated the limit switch LS1 to make contact with the contact 38, the actuator 37, thus being in its lower position in contact with the contact 40, will not permit the initial energizing of the relay R due to the open front contact L2 in series therewith. Thus, the relay R is not permitted to be energized until the initial energizing of the relay L. This relay L prevents the initial extension of the carriage 4 when the power is first applied through the switch 34.

The relay R has a front contact R1, which is connected in series with the solenoid control valve 25 across the supply lines L1 and L2. The front contact R2 of the relay R is connected in series with the back contact S1 and in parallel with the limit switch LS1 and contact 40. LS1 and contacts S1 and R2 connected in parallel as such, are connected in series to the front contact L2 and relay R.

Thus, as an article A proceeds along the conveyor 36 as shown in FIG. 3, and comes in contact with the actuator 37 of the limit switch LS1, contact will be made with contact 38 energizing relay L enclosing its two front contacts L1 and L2. As the end of the article A passes off the end of the conveyor system 36 the actuator 37 of the limit switch LS1 is permitted to drop, making contact with the contact 40, and, thus, actuating the relay R since the front contact L2 is, now, in close position. Relay R being energized closes its front contacts R1 and R2, and, since the contact S1 is normally closed, the contact R2 acts as a hold contact for its relay R. The closing of the contact R1 permits the solenoid 25 to be energized, placing the solenoid valve in position 25*b*. Fluid is, therefore, supplied by supply line 41 to the cylinder 11 of the reciprocal motor 7 which supplies a force against the piston of the motor causing the piston rod 8 to extend from within the cylinder 11. The carriage 4 is moved forwardly with respect to the base 1 on the ways 3. It should be noted that when the solenoid valve 25 is energized and in position 25*b*, the fluid supply in the cylinder 11 and in the cylinder 21 of the brake 20 is exhausted through line 42 to the source of fluid supply or to the atmosphere. The forces applied against the piston 33 of the brake 20 are, thus, simultaneously released permitting the spring 32 to release the brake shoe 23 from the frictional bands 17 of the printing wheel 13.

The carriage 4, being in extended position and traveling a sufficient distance to come in contact with article A to be printed, as shown in dotted representation in FIG. 1, will remain in this position until the next succeeding article A is passed off the end of the con- 36 and pushes the first said article forwardly along the path of conveyance. Due to the frictional band 17 in contact with the surface of the article A, the printer wheel 13 is caused to rotate on its axis 14 permitting the printing of coded information or intelligence by the printing surface 18 of die member 16 on the surface of the article A.

As illustrated in the drawing, the printer wheel 13 is provided with two cam pins 26. After rotation of 180° of the printer wheel, one of the said pins will come in contact with the finger 27 of the limit switch 28, which is also referred to as LS2. As shown in FIG. 4 the limit switch 28 or LS2 upon closing, due to the cam pin 26, energizes the stop relay S. Since the back contact T1 of the time relay T is normally closed, relay S will be energized across lines L1 and L2. The back contact S1 of the stop relay S is connected in series with the relay R. Thus, upon energizing of the relay S, the back contact S1 is opened causing the de-energizing of the relay R. The relay R being de-energized, de-energizes the solenoid control valve 25 since the contact R1 is again opened. The spring 31 of the solenoid control valve 25 returns the solenoid valve to its de-energized position 25*a* which permits a supply of fluid through line 42 to the forward or piston rod end of the cylinder 11, and also to the blank end of the cylinder 21. The rearward end of the cylinder 11 is exhausted through line 41 to exhaust or back to the place of fluid supply.

The time relay T is timed to actuate after a predetermined amount of time upon closing of the limit switch LS2. The period of time between the closing of the limit switch LS2 and actuation of the time relay T must be sufficient to permit the relay S to de-energize the relay R, which in turn de-energizes the solenoid valve 25. When the time relay T is actuated, back contact T1 is open which de-energizes relay S and permits its back contact S1 to close. Thus, the limit switch LS1 is in a position to again reactivate the relay R, and in turn the solenoid control valve 25. The time relay T will reset itself for the next subsequent actuation of the limit switch LS2 when the finger 27 of the limit switch LS2 is released from the cam pin 26.

A simple resume of the sequence of operation is as follows: The article A passes in contact with the limit switch LS1 permitting the energizing of the relay L. As the article A is ejected off the end of the moving conveyor system, the actuator 37 of the limit switch LS1 is released and fluid is directed from the solenoid valve A to the rearward or blank end of the cylinder 11. The dropping of the actuator 37 permits the energizing of the relay R, and in turn picking up the solenoid valve 25, the latter being placed in its energizing position 25*b*. The carriage 4 is, thus, moved forward, the printer wheel 13 making contact with the article A1 having been positioned in front of the code printer as shown in FIG. 3. It should be noted that the article A1 is stationary, hav-

ing been previously discharged from the rearward end of the conveyor 36. Also, it should be noted that the frictional bands 17 of the printer wheel 13 are in engagement with the article A1 and not the printing surfaces 18 of the printing die member 16. The printing die member 16, at this time, is positioned "upstream" on the perimeter of the printer wheel 13 which is indicated, generally, in FIGS. 1 and 3 at 43.

The next article A, designated as article A2, passes in contact with the actuator 37 and, while still on the conveyor 36, comes in contact with the first article A1 and commences to move article A1, causing the printer wheel 13 to rotate in a counterclockwise direction as shown in FIG. 3. As the printer wheel 13 rotates, the printing surface 18 of the die member 16 comes in contact with the surface of the article A1 to perform the printing operation. It should be noted that corresponding die member 16 positioned on the opposite side of the printing wheel 13, indicated at 44, comes in contact with the inker 30 so that the printing surfaces 18 are given a supply of ink which will subsequently be used in printing on the surfaces of the article A2.

As the printer wheel 13 rotates in a counterclockwise direction, the cam pin 26 generally opposite of that printing die member 16 printing on the surface of the article A1, will come in contact with the finger 27 the limit switch LS2. As previously described, the limit switch LS2 energizes the relay S causing its back contact S1 to open and, thus, de-energize relay R in solenoid valve 25 as shown in FIG. 4, signaling the end of the printing operation. Solenoid valve 25 is returned to de-energized position 25*a* causing fluid to be directed through lines 42 to the piston rod end of the reciprocal motor 7, which permits the rod printer carriage 4 to move rearwardly. Line 42 also supplies fluid to the blank end of the brake cylinder 21 causing the brake shoe 23 to stop the printer wheel 13 from rotating due to either the movement of the article A1 or inertia forces on the wheel. Thus, the printer wheel 13 will be in the position as shown in FIG. 2, and is prepositioned accurately for the subsequent printing on the surface of article A2 which, at this time, is being completely ejected off the end of the conveyor system 36 adjacent the code printer.

The sequence of operation is thus repeated in that the actuator 37, after the passing of the article A2 off the end of the conveyor system 36, is released and the printer wheel 13 is positioned properly on the surface of the article A2 and is caused to rotate in a counterclockwise position on contact by a subsequent article A3 (not shown) being ejected off the end of the conveyor system.

It should be noted that the limit switch LS1 and, as a matter of fact, also the limit switch LS2 may be easily replaced by other switching means such as a photoelectric cell.

The code printer of this invention thus, permits the use of a frictional driven rotary printer to apply intelligence or other coded information on the articles which are conveyed with an intermittent motion. Thus, it's necessary that the article to be printed be stationary at the time the printer wheel 13 makes contact with the surface thereof. Thus, the invention is not limited at the discharge end of a conveyor system but, also has application where the article to be printed is, at one time or another, not in actual movement. For example, a reciprocating dog type feeder may convey the article to be marked or printed into printing position by a dog or lug member. The dog or lug member then would return to the place of beginning to pick up the next consecutive article to be printed which, upon being brought into printing position, would move the first said article ahead of it. This would allow the printer wheel 13 to rotate and print on the surface of the said first article until the cam pin 26 comes in contact with the finger 27 of the limit switch LS2.

I claim:

1. A code pre-set wheel printer for printing pieces as they travel consecutively along a defined path, consisting of a base adjacently of said path and carrying a guide way disposed transversely of said path, a carriage reciprocal on said guide way, a reciprocal motor on said base and connected to said carriage to extend and retract said carriage on said guide way, an annular printing wheel rotatably mounted on a vertical axis on said carriage, one portion of said wheel extending beyond the front of said carriage to engage and print a piece travelling along said path, cam means on said wheel, a limit switch adjacent said path to engage consecutive pieces travelling along said path, circuit means initiated by said limit switch being engaged by consecutive pieces travelling along said path to extend said carriage to engage said printing wheel on the piece to be printed, and cam switch means actuated by the cam means on said wheel to retract said carriage at termination of the printing of the code on said piece.

2. The code printer of claim 1 which also includes a brake shoe on said printing wheel, a spring biased brake actuated by said cam switch means to engage said brake shoe on said printing wheel when initiating the retraction of said carriage.

3. A code pre-set wheel printer for printing articles as they travel successively off the end of a moving conveying system in a defined path, consisting of a base disposed adjacently of said path, a carriage reciprocally mounted on said base to travel transversely of said path, a reciprocal fluid motor means on said base and connected to said carriage to extend and retract said carriage with respect to said base, an annular printing wheel rotatably mounted on a vertical axis on said carriage and having a printing surface on the perimeter thereof, reciprocal fluid brake means to engage and disengage said wheel, a portion of said wheel extending beyond the forward end of said carriage, cam means on said wheel, circuit means including switch means initiated by an article contacting the same to extend said carriage and release said brake means and permit said wheel to engage and print a code on said article travelling along said path, a cam switch means actuated by said cam means on said wheel to retract said carriage to its retracted position and to apply said brake means to said wheel at the termination of the code printing on said article, and fluid valve means actuated by said switch means and said cam switch means to respectively and simultaneously control the extension and retraction of said fluid motor means and the retraction and extension of said brake means.

4. The pre-set wheel printer of claim 3 characterized in that said fluid motor means is a double-acting piston and cylinder motor and said brake means is a single acting spring return cylinder, a first supply line connecting the blank end of said brake means and the piston end of said fluid motor means to said fluid valve means, a second supply line connecting the blank end of said fluid motor means to said fluid valve means, said fluid valve means actuated by said cam switch means to supply fluid under pressure to the blank end of said brake means and the piston end of said fluid motor means to simultaneously retract said carriage and apply said brake means.

5. A pre-set wheel printer for printing articles as they travel consecutively along a defined path, consisting of a base adjacent said path, carriage means reciprocal with respect to said base and carrying an annular printing wheel rotatably mounted on the forward end of said carriage, reciprocal motor means connected to said base and carriage to extend and retract said carriage with respect to said base, solenoid valve means to control said motor means, first switch means adjacent said path actuated by the consecutive passing of articles along said path, second switch means adjacent said printer wheel actuated by movement of said printer wheel, circuit means to operate said printer including a power supply, first relay means connected in series with said first switch means and across said power supply and having a first front contact

connected in series with said first relay means and in parallel with said first switch means, a second front contact connected in series with said solenoid valve means, said second front contact and solenoid valve means connected across said power supply, second relay means connected in series with said second switch means and across said power supply having a back contact connected in series with said first front contact of said first relay means and a time delay relay connected in series with said second limit switch and in parallel with and having a back contact in series with said second relay means.

6. The pre-set wheel printer of claim 4 characterized in that said switch means are photosensitive switches.

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