

[54] **TICKET PRINTER**
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Related U.S. Application Data

[63] Continuation of Ser. No. 347,349, April 2, 1973, abandoned, which is a continuation of Ser. No. 259,090, June 2, 1972, abandoned.
[52] U.S. Cl. **101/93.07; 83/175; 83/282; 83/365; 226/45**
[51] Int. Cl. **B41j 15/00**
[58] Field of Search **101/92, 93 C, 226-228, 101/66-70, 93.07; 83/365, 282, 175; 226/45**

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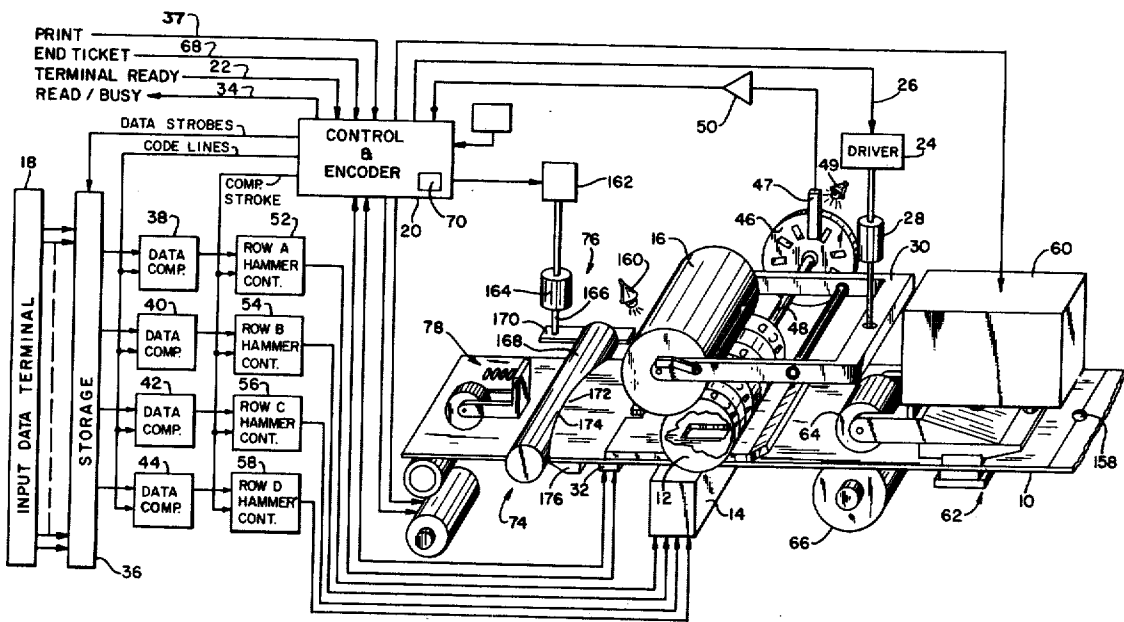
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[57] **ABSTRACT**

In a device for columnar printing of selected characters in rows on ticket stock using a print drum having rows of raised characters disposed about its periphery in arcuate columns and an impactor assembly having a ballistic element cooperating with each row of raised characters, the ticket stock is selectively advanced into registration with the print drum and ballistic elements for imprinting and is sheared by a cylindrical cutter mechanism thereafter, the positioning of the ticket stock after imprinting and before shearing being determined by a detector that is positioned between the print drum and the arcuate cutter. The sheared ticket then is propelled from the printer by means of an ejection mechanism.

16 Claims, 6 Drawing Figures



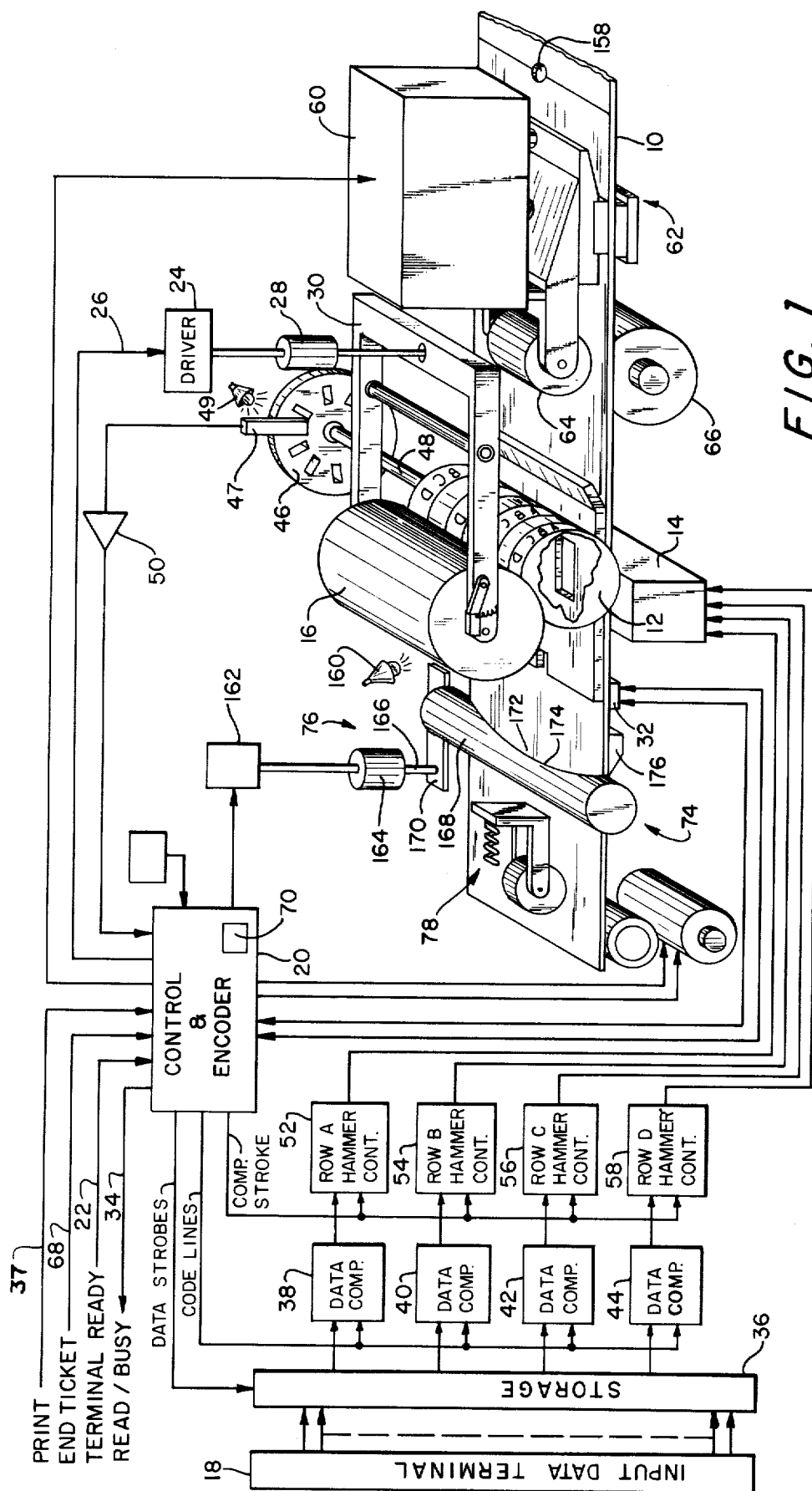
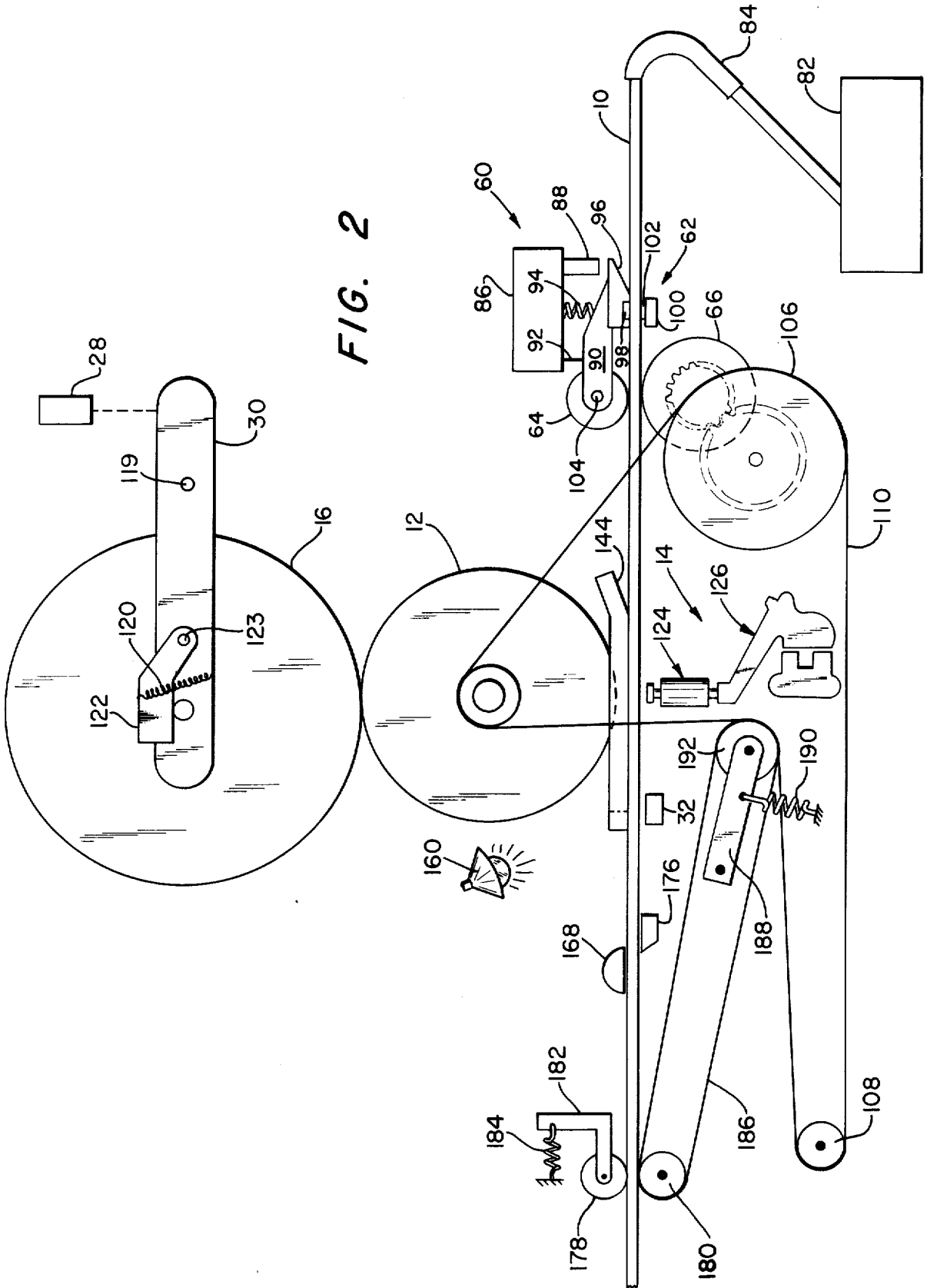


FIG. 1

FIG. 2



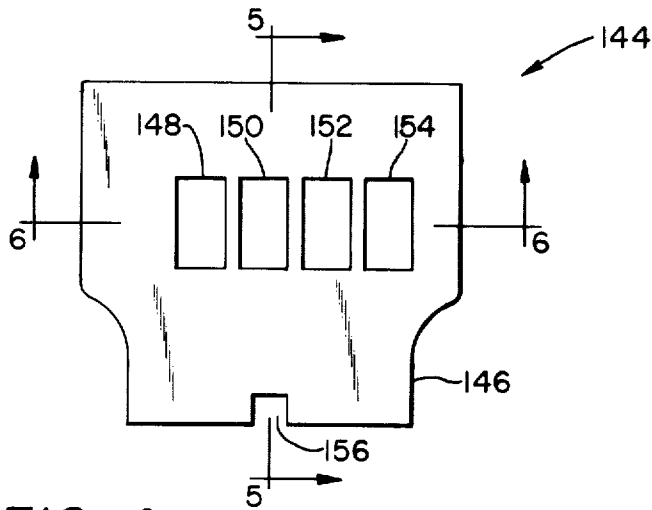


FIG. 4

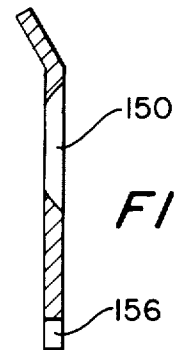


FIG. 5

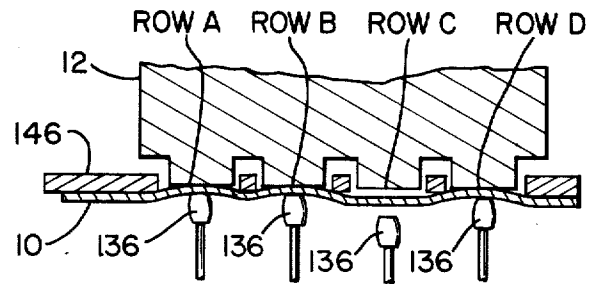


FIG. 6

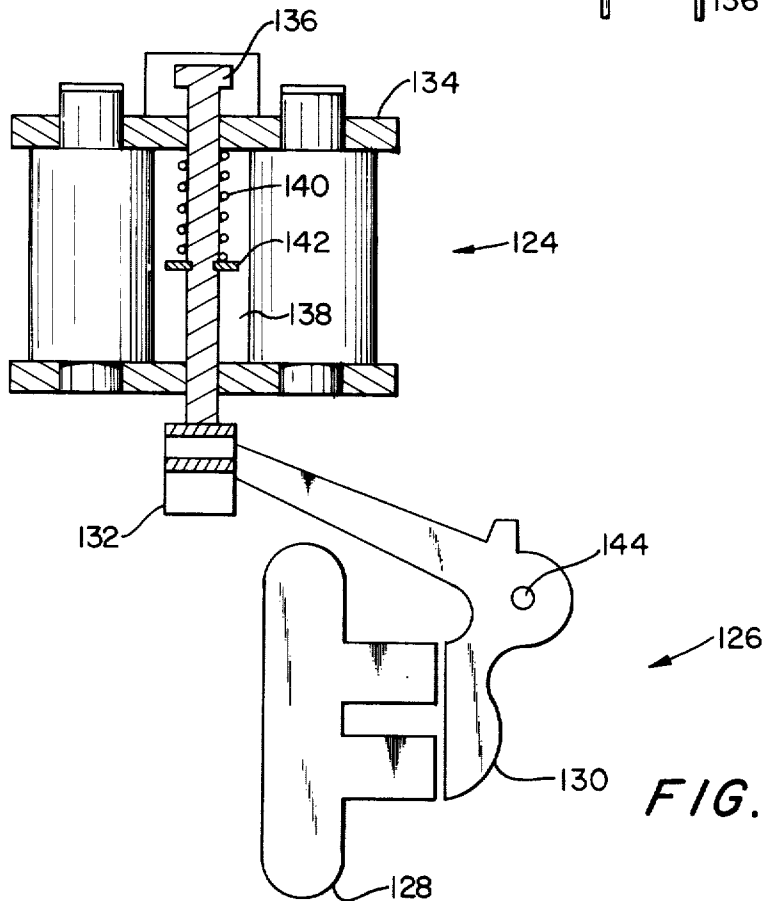


FIG. 3

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TICKET PRINTER

RELATED APPLICATION

This is a continuation of application Ser. No. 347,349 filed on Apr. 2, 1973, which is a continuation of application Ser. No. 259,090, filed on June 2, 1972 both of which are now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to printing devices and, more particularly, is directed towards a high speed rotary ticket printer.

2. Description of the Prior Art

High speed rotary printers are well known in the art as a means for printing the output of an electronic computer on ticket stock. In one type of ticket printer, the ticket stock is fed into a print gate by means of a rotating drum which is energized at predetermined increments. Such printers have suffered from the disadvantage that errors in the position of printed characters on the ticket stock are accumulated. In addition, such printers have suffered from the disadvantage that, when multiple sheet tickets, for example airline tickets, are used, the rotating drum tends to buckle some of the sheets. Another disadvantage found in prior art ticket printers is the use of scissor-type cutters which require precise alignment and frequent resharpening. It is apparent that a need exists for improvements in such high speed rotary ticket printers.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an inexpensive and expeditious ticket printer which does not suffer from the heretofore mentioned disadvantages.

The ticket printer embodying the present invention for columnar printing of selected characters in rows on ticket stock is characterized by a pinch and brake, solenoid actuated, ticket stock feed assembly for selectively advancing the ticket stock, by incrementally energizing the solenoid, into registration with a print drum and an impactor assembly. The impactor assembly includes a set of ballistic elements mounted for interaction with rows of raised characters disposed about the periphery of the print drum in arcuate columns, one ballistic element cooperating with one row of characters. An apertured plate, interposed between the print drum and ticket stock, operates to prevent ghosting when the ticket stock is urged against the print drum. The ticket stock is incrementally advanced by the pinch and brake feed assembly until all rows have been printed. Upon completion of the printing cycle, the ticket stock is slewed to a predetermined location as specified by a head of form sensing circuit which senses an index mark on the ticket stock. When the ticket reaches the predetermined location, the ticket stock is sheared by a solenoid actuated rotary cutter and the sheared ticket is propelled from the ticket printer by means of an ejection mechanism. It is a primary feature of the present invention that the head of the form sensing circuit is located between the print drum and the cutter.

The invention accordingly comprises the ticket printer possessing the construction, combination of elements, and arrangement of parts that are exemplified

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in the following detailed disclosure, the scope of which will be indicated in the appended claims.

BRIEF DESCRIPTION OF DRAWINGS

For a fuller understanding of the nature and objects of the present invention, reference should be had to the following detailed description taken in connection with the accompanying drawings wherein:

FIG. 1 is a block and schematic diagram, partly in perspective, of a ticket printer embodying the invention;

FIG. 2 is a schematic diagram illustrating certain features of the invention;

FIG. 3 is a side elevation, partly in section, showing the details of a printing element made in accordance with the present invention;

FIG. 4 is a plan view of an apertured ghosting plate;

FIG. 5 is a section taken along the lines 5—5 of FIG. 4; and

FIG. 6 is a section taken along the lines 6—6 of FIG. 4 and illustrates the relationships among the ghosting plate of FIG. 4, the printing elements of FIG. 3 and the print drum of FIG. 1, the printing elements and print drum shown in section.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to FIG. 1, there is shown a high speed, rotating drum printing system, embodying the present invention, for printing and dispensing of tickets for various uses. In the illustrated embodiment, the printing system is interconnected with an on-line, real-time, computer communication system terminal. Generally, printing of the ticket is accomplished by urging an endless web 10, for example ticket stock, against a rotating print drum 12 by means of printing elements 14. By way of example, print drum 12 includes four rows of 47 characters each, the characters of each row defining a raised column arcuately disposed about the periphery of print drum 12, adjacent rows being in spaced parallel relationship to one another.

In one example of system operation, a Ticket Print signal generated by a computer (not shown), is sent to a terminal 18 for storage therein. An Interrogate signal (Terminal Ready) is sent from terminal 18 to a control and encoder 20 via a line 22. In consequence, an Ink Roll Actuate signal, generated from control and encoder 20, is fed to an ink roll drive 24 via a line 26. An Ink Roll Drive signal, generated by ink roll driver 24, is applied to an ink roll actuator 28 which is operatively connected to a pivotally mounted frame 30. An ink impregnated roller 16 is rotatably mounted to frame 30. Although an ink impregnated roller is preferred, it is to be understood that, in alternate embodiments, means other than a roller are used, for example a ribbon. When actuator 28, for example a solenoid, is energized, frame 30 is pivoted and roller 16 contacts print drum 12, whereby ink is transferred to the raised rows of characters. If ticket stock 10 is properly positioned, a Ready/Busy signal, generated by control and encoder 20 in response to a signal initiated by a head of form sensor 32, is sent to the computer via a line 34. In order to ensure that type drum 12 is properly inked, the Ready/Busy signal is present for three revolutions of type drum 12, thereafter a Ready condition is initiated.

After initiation of the Ready condition and prior to generation of a Print Command, data representing four characters to be printed is applied to an input storage

36. When a Print Command, generated by the computer, is applied to control and encoder 20 via a line 37, the Ready/Busy signal changes to a Busy signal. The data stored in storage 36 for each character is continuously compared in data comparators 38, 40, 42 and 44 with similar characters derived from an apertured encoder wheel 46 which is directly coupled to print drum 12 via a shaft 48. Since encoder wheel 16 is directly coupled to print drum 12, at any instant of time, the Code Line signals derived from encoder wheel 46 correspond to the character on print drum 16 that is directly over ticket stock 10. The Code Line signals, generated by a photo-detector 47 which senses luminance emitted from a source 49, are applied to data comparators 38, 40, 42 and 44 via control and encoder 20 and an amplifier 50. When like signals from photo-detector 47 and storage 36 are presented at the input terminal of any one or all of data comparators 38, 40, 42, and 44, the correlative data comparator generates a signal which is applied to corresponding hammer controls 52, 54, 56 and 58. Data comparators 38, 40, 42, and 44 are connected to hammer controls 52, 54, 56 and 58, respectively.

Each hammer control is associated with only one row of characters on type drum 12. That is, hammer control 52 is associated with row A of characters, hammer control 54 is associated with row B of characters, hammer control 56 is associated with row C of characters and hammer control 58 is associated with row D of characters (see FIG. 6). Thus, when a comparison occurs, the corresponding hammer control generates a signal which causes ticket stock 10 to be pressed against print drum 12, whereby the appropriate character is printed on ticket stock 10. Comparator Stroke signals derived from encoder wheel 46 are gated with the Print Command in control and encoder 20 to ensure that printing occurs only when the selected character is properly aligned and a Print Command is present.

When print drum 12 and encoder wheel 46 have completed one revolution, one column of four characters will have been printed on ticket stock 10. At this point, the Ready/Busy signal is in the Busy state and a Paper Feed pulse is generated by control and encoder 20. The Paper Feed pulse is applied to a ticket driver 60, which releases a brake mechanism 62 and moves an idler capstan 64 toward a drive capstan 66. Ticket stock 10 is frictionally engaged between idler capstan 64 and drive capstan 66 and is moved an equivalent distance of one row in preparation for the printing of the next column of characters. After ticket stock 10 has been advanced, the Ready/Busy signal reverts to the Ready state. Data representing the next four characters to be printed is applied to storage 36. During the next revolution of print drum 12, these four characters are printed in columnar form on ticket stock 10. The sequence continues until all columns have been printed.

When all columns have been printed, an End Ticket signal, generated by the computer, is applied to control and encoder 20 via a line 68. The End Ticket signal energizes a slew ticket logic 70 in control and encoder 20 and the Ready/Busy line becomes Busy. An hereinafter described, ticket stock 10 is slewed into registration with a rotary cutter 74 which is controlled by a cutting mechanism 76. This slewing action positions ticket stock 10 in proper orientation for printing of the first column of characters on the next ticket. In addition, the End Ticket signal energizes an eject assembly 78

which maintains tension on ticket stock 10 while it is being severed by cutter 74 and propels the ticket stock through a ticket slot (not shown) as soon as the cut is completed.

From the foregoing discussion, it will be seen that there are five distinct mechanical operations in the printing sequence: ticket feeding, inking, printing, ticket cutting and ticket ejection.

a. Ticket feeding is accomplished by disengaging brake 62 and frictionally engaging the ticket stock between idler capstan 64 and continuously rotating drive capstan 66. When the ticket feed ends, capstan 64 and 66 disengage and brake 62 engages the ticket stock.

b. Inking is accomplished with an ink impregnated roll 16 which applies ink directly to the raised characters disposed about the periphery of print drum 12. Ink roll 16 is controlled by solenoid 28, so that inking occurs only while printing a ticket.

c. Printing is performed by driving, at the proper instant, printing element 14 against the back side of the ticket stock, the front side of ticket stock 10 being pressed against the pre-inked characters on print drum 12 to produce a clear, blur-free image on the front side face of ticket stock 10.

d. Ticket cutting is accomplished by solenoid operated rotary cutter 74.

e. Ticket ejection is performed by eject assembly 78.

Referring now to FIG. 2, it will be seen that endless ticket stock 10, which is stored in a hopper 82, is advanced to ticket feed mechanism 60 through a ticket guide 84. Ticket feed mechanism 60 includes an actuator 88, for example a solenoid, which is mounted to a housing 86. A rocker arm 90 is pivotally mounted to housing 86 by means of a resilient arm 92. A bias element 94, for example a spring, is operatively connected to housing 86 and rocker arm 90. An upper brake 96 having a shoe 98 is mounted at one end of rocker arm 90, a portion of brake 96 extending from rocker arm 90 in registration with solenoid 88. A lower brake 100 having a shoe 102 is mounted in spaced relationship to brake 96 at an opposite face of ticket stock 10. As hereinafter described, shoes 98 and 102 are adapted for engagement and disengagement with ticket stock 10. Idler capstan 64 is rotatably mounted to the other end of rocker arm 90 by means of a shaft 104. Drive capstan 66, which is mounted in spaced relationship to capstan 64 on an opposite face of ticket stock 10, is drivingly connected to a drive wheel 106 which is further connected to a motor 108 by means of an endless belt 110.

When ticket feed mechanism 60 is in an inactive state, i.e. no ticket motion, solenoid 88 is de-energized. Spring 94 pushes against rocker arm 90, whereby shoes 98 and 102 frictionally engage ticket stock 10 and prevents ticket motion. At the same time, idler capstan 64 disengages ticket stock 10, rocker arm 90 being pivoted about resilient arm 92. When ticket feed mechanism 60 is in an active state, i.e., ticket motion, solenoid 88 is energized. The pressure applied by spring 94 against rocker arm 90 is overcome and brake 96 is pulled toward solenoid 88. Shoes 98 and 102 disengage ticket stock 10 and idler capstan 64 and drive capstan 66 frictionally engage ticket stock 10. That is, when solenoid 88 is actuated, rocker arm 90 is pivoted about resilient arm 92, idler capstan 64 is forced downward so that ticket stock 10 is frictionally engaged between

capstans 64 and 66. Drive capstan 66 rotates constantly regardless of the state of solenoid 88 and ticket stock 10 advances until solenoid 88 is de-energized. Ticket stock 10 advancement is controlled by the surface speed of drive capstan 66 and the length of time idler capstan 64 forces ticket stock 10 against drive capstan 66. The length of time ticket stock 10 is forced against drive roll 66 is equal to the time solenoid 88 is energized, minus the pull-in time of solenoid 88, and plus the release time of solenoid 88.

As discussed in connection with FIG. 1 and best shown in FIG. 2, ink impregnated roll 16 is mounted to solenoid actuated frame 30. When solenoid 28 is actuated, frame 30 is pivoted about a pin 119 and roll 16 engages print drum 12. When solenoid 28 is de-energized, a return spring (not shown) on the solenoid plunger returns frame 30 to its initial position and roll 16 disengages print drum 12. The force at which roll 16 presses against print drum 12 is controlled by a pair of springs 120 mounted on each end of a tension bracket 122 which is pivotally mounted to frame 30 via a pin 123. As ink is transferred from roll 16 to the characters on print drum 12 over extended periods of printing, springs 120 maintain proper pressure of roll 16 against print drum 12.

In the illustrated embodiment, print drum 12 is a cylinder having four rows of 47 raised characters each, the characters of each row being disposed about the periphery of print drum 12 in an arcuate column. Like characters in each column are disposed in rows along a plane parallel to the longitudinal axis of shaft 48. Printing element 14 comprises a bank of free-floating ballistic hammers 124 and a set of impactors 126. Since there are four rows of characters, there are four hammers, one to print each column of characters and there are four impactors, one impactor mounted below and in registration with one ballistic hammer.

As best shown in FIG. 3, impactor 126 includes an electromagnetic actuator 128, an impactor arm 130 and an impactor 132. Ballistic hammer 124 comprises a housing 134 and a hammer 136. Housing 134 is formed with a guideway 138 which is adapted to slidably receive hammer 136. A bias element 140, for example a compression spring, is spiraled about hammer 136 within guideway 138. A retaining ring 142 is mounted to hammer 136 for holding spring 140 in such a manner that hammer 136 is biased downwardly within guideway 138. When actuator 128 is energized, impactor arm 130, which is pivoted about a pin 144, is pulled toward actuator 128, whereby impactor 132 urges hammer 136 forward within guide 138. Thereafter, impactor arm 130 decouples from hammer 136 and returns to a rest position. Hammer 136 continues its forward flight to strike the under side of ticket stock 10, momentarily forcing ticket stock 10 against a raised character on print drum 16. Hammer 136, aided by its compressed control spring 140, bounces back and the control spring assures a return to the rest position. A character guide plate 144 is provided to prevent unwanted contact of ticket stock 10 and type drum 12.

Referring now to FIG. 4, 5, and 6, it will be seen that character guide plate 144 comprises a plate 146 which is formed with substantially rectangular openings 148, 150, 152 and 154. As best shown in the FIG. 5 sectional view, each opening has downwardly and outwardly diverging sidewalls which define a substantially concave profile. One end of plate 146 is upturned to facilitate

reception of ticket stock 10 and the opposite end of plate 146 is formed with a notch 156 which operates in conjunction with head of form sensors 32. As best shown in FIG. 6, it will be seen that character guide plate 144 operates to prevent contact between ticket stock 10 and type drum 12, except when the correlative hammer is energized. In other words, plate 146 operates to hold ticket stock 10 out of contact with type drum 12 and at the same time operates to allow ticket stock 10 to contact print drum 12 when the correlative hammer is energized. By way of example, in FIG. 6, the ballistic hammers corresponding to character rows A, B and D are energized and the ballistic hammer for row C is deenergized. Ticket stock 10 contacts character rows A, B and D through openings 148, 150 and 154, respectively. Ticket stock 10 is held away from character row C by portions of plate 146 between openings 150, 152 and 154.

As previously discussed, when printing of the ticket is completed, solenoid 88 is energized and the ticket is slewed until an index mark 158, for example an index hole, is detected by head of form sensors 32. In the illustrated embodiment, head of form sensors 32 are optical detectors which sense luminance emitted from a source 160 and directed through notch 156 to detectors 32. When index hole 158 is detected by head of form sensors 32, solenoid 88 is de-energized and ticket stock forward motion is stopped. At this time, the next ticket is in position for printing. After slewing of ticket is stopped, the End Ticket signal from control and encoder 20 is applied to a driver 162 which is further connected to a solenoid 164 having a retractable piston 166. A cylindrical cutter 168 is mounted to one end of an arm 170, the other end of which is connected to piston 166. Cutter 168 is formed with an opening 172 having a concave cutting edge 174. When solenoid 164 is energized, piston 166 is retracted therein, whereby cutter 168 is rotated so that cutting edge 174 severs ticket stock 10. A cutting block 176 is mounted on the opposite side of ticket stock 10 from cutter 168. In consequence, when cutter 168 is rotated, ticket stock 10 is severed by the scissor-like action between cutting edge 174 and block 176.

The severed ticket stock is propelled out of the printing system by means of ejector assembly 78 which comprises an eject roller 178 and a pinch roller 180. Eject roller 178 is mounted on an arm 182 which is further connected to a tension element 184, for example a spring. Pinch roller 180 is continuously rotated by an endless belt 186 which is frictionally held against endless belt 110 by means of an arm 188 and a spring 190. Endless belts 110 and 186 are threaded about an idler roller 192 which is rotatably mounted to arm 188. When a ticket is advanced between eject roller 178 and pinch roller 180, during the printing cycle, no ticket movement occurs as long as the ticket is connected to the ticket stock supply. However, once the printed ticket is severed by cutter 174, it is forcibly ejected from the printer. It is to be noted that eject roller 178 and pinch roller 180 frictionally engage ticket stock 10 during the cutting cycle in order to maintain the ticket stock in a stressed condition and enhance cutting.

Since certain changes maybe made in the foregoing disclosure without departing of the scope of the invention herein involved, it is intended that all matter contained in the above description and shown in the ac-

companying drawings shall be construed in an illustrative and not in a limiting sense.

What is claimed is:

1. A system for printing selected characters on a web having spaced indicia thereon, said system comprising:
 - a. web feeding means for selectively advancing the web, said web feeding means including first and second means adapted for mutually exclusive engagement and disengagement with the web, the web being advanced when said first means is engaged and said second means is disengaged, the web being held stationary when said second means is engaged and said first means is disengaged;
 - b. a print drum having at least two rows of raised characters disposed about its periphery in arcuate columns;
 - c. ink impregnated means adapted for engagement and disengagement with said print drum for transferring ink thereto;
 - d. at least two ballistic elements, a first ballistic element mounted in spaced registration with one row of characters and a second ballistic element mounted in spaced registration with the other row of characters, each said ballistic element having energized and deenergized states;
 - e. third means including optical sensor means communicating with said first and second means;
 - f. fourth means electrically communicating with said third means and ballistic elements for controlling the state of each said ballistic element, said fourth means including a plurality of data comparators and a plurality of ballistic element controls, one each of said plurality of data comparators and one each of said plurality of ballistic element controls being associated with one each of said rows;
 - g. encoder means coupled to said print drum for generating selected signals representing the position of each said character, said encoder means electrically connected to said third means;
 - h. rotary cutter means electrically communicating with said third means, said cutting means responsive to a first signal generated by said third means, said rotary cutter means operating to sever the web;
 - i. said optical sensor means positioned between said print drum and said rotary cutter means, said optical sensor means detecting a selected one of the indicia disposed between said print drum and said rotary cutter means;
 - j. said web feeding means advancing the web to a selected position between said print drum and said ballistic elements in response to position signals generated by said optical sensor means, said position signals generated by said optical sensor means when the selected one of the indicia is disposed between said print drum and said rotary cutter means;
 - k. said fourth means receiving signals from said third means and, in response thereto, generating signals for energizing selected ones of said ballistic elements, said signals received from said third means being responsive to said selected signals generated by said encoder means;
 - l. portions of the web in registration with an energized ballistic element being pressed against the character in spaced registration with said energized ballistic element, whereby the character is printed on the web;

- m. said web feeding means incrementally advancing the web between said print drum and said ballistic elements until all the selected characters are printed on the web;
 - n. when all of the selected characters are printed on the web, said web feeding means advances the web until another selected one of the indicia is disposed between said print drum and said rotary cutter means and is detected by said optical sensor means;
 - o. when the other one of the indicia is detected by said sensor means, a portion of the web is severed by said rotary cutter means and the unsevered portion of the web being in position for the printing of selected characters.
2. The system as claimed in claim 1 including a ghosting plate interposed between said printing drum and web, said ghosting plate formed with at least two apertures, each said aperture having a substantially rectangular profile, one aperture in spaced registration with said one row and said first ballistic element, said other aperture in spaced registration with said other row and said second ballistic element.
 3. The system as claimed in claim 2 wherein said rotary cutter means includes:
 - a. cylindrical cutter means formed with an opening having a substantially concave cutting edge, said cutter disposed in juxtaposition with one face of the web, said cutting edge adapted for engagement with the web; and
 - b. a solenoid having a reciprocating piston, said solenoid electrically connected to said third means, said piston operatively connected to said cylindrical cutter;
 - c. said piston retracted into said solenoid when energized, said cylindrical cutter rotating when said piston is retracted, said concave cutting edge engaging and severing the web when said cylindrical cutter is rotated.
 4. The system as claimed in claim 3 including eject means electrically communicating with said third means, said eject means responsive to a second signal generated by said third means, said eject means operating to engage the web when said second signal is applied thereto, the web being in a stressed state when engaged by said eject means, the web being propelled from said eject means when severed by said rotary cutter means.
 5. The system as claimed in claim 1 wherein said first means includes an idler capstan and a drive capstan, said idler capstan in spaced relationship to one side of the web, said drive capstan in spaced relationship to said idler capstan at an opposite side of the web; and wherein said second means includes a pair of brakes disposed on opposite sides of the web.
 6. The system as claimed in claim 5 wherein said web feeding means includes:
 - a. a housing;
 - b. a rocker arm;
 - c. resilient means, said rocker arm pivotally mounted to said housing by said resilient means;
 - d. actuator means operatively connected to said housing and rocker arm for pivoting said rocker arm in response to signals generated by said third means, said actuator means having first and second states;
 - e. said idler capstan mounted to said rocker arm at one end thereof;

- f. one of said brakes mounted to said rocker arm at an opposite end thereof;
 - g. the web is frictionally engaged between said idler and drive capstans when said actuator is in said first state, and disengaged from said brakes when said actuator is in said first state;
 - h. the web is frictionally engaged between said brakes when said actuator is in said second state, and disengaged from said idler and drive capstans when said actuator is in said second state.
7. The system as claimed in claim 1 wherein each said ballistic element includes:
- a. a housing formed with a guideway;
 - b. a hammer mounted within said guideway, said hammer adapted for reciprocating movement within said guideway;
 - c. an electromagnetic actuator responsive to signals generated by said fourth means;
 - d. an impactor arm mounted in spaced relationship to said electromagnetic actuator; and
 - e. an impactor mounted to said impactor arm, said impactor mounted in registration with said hammer;
 - f. said impactor arm being pulled toward said electromagnetic actuator when said electromagnetic actuator is energized by said signals generated by said fourth means;
 - g. said impactor propelling said hammer in said guideway when said impactor arm is pulled toward said magnetic actuator.
8. A system for printing selected characters on a web having spaced indicia thereon, said system comprising:
- a. web feeding means for selectively advancing the web, said web feeding means including first and second means adapted for mutually exclusive engagement and disengagement with the web, the web being advanced when said first means is engaged and said second means is disengaged, the web being held stationary when said second means is engaged and said first means is disengaged;
 - b. a print drum having at least two rows of raised characters disposed about its periphery in arcuate columns;
 - c. ink impregnated means adapted for engagement and disengagement with said print drum for transferring ink thereto;
 - d. at least two ballistic elements, a first ballistic element mounted in spaced registration with the other row of characters, a second ballistic element mounted in spaced registration with the other row of characters, each said ballistic element having energized and deenergized states;
 - e. first control means including sensor means communicating with said web feeding means for controlling said first and second means;
 - f. second control means electrically communicating with said first control means and ballistic elements for controlling the state of each said ballistic element;
 - g. encoder means coupled to said print drum for generating selected signals representing the position of each said character, said encoder means electrically connected to said first control means;
 - h. a plate interposed between said printing drum and web, said plate formed with at least two apertures, each said aperture having a substantially rectangular profile, one aperture in spaced registration with

- said one row and said first ballistic element, the other aperture in spaced registration with said other row and said second ballistic element;
 - i. said second control means receiving signals from said first control means and, in response thereto, generating signals for energizing selected ones of said ballistic elements, said signals received from said first control means being responsive to said selected signals generated by said encoder means;
 - j. portions of the web in registration with an energized ballistic element being pressed against the character in spaced registration with said energized ballistic element, whereby the character is printed on the web;
 - k. rotary cutter means electrically communicating with said first control means, said cutting means responsive to a first signal generated by said first control means, said rotary cutter means operating to sever the web; and
 - l. eject means electrically communicating with said first control means, said eject means responsive to a second signal generated by said first control means, said eject means operating to engage the web, the web being in a stressed state when engaged by said eject means, said second signal applied to said eject means when said first signal is applied to said rotary cutter means, the web being propelled from the system by said eject means when severed by said rotary cutter means;
 - m. said sensor means positioned between said print drum and said rotary cutter means, said sensor means detecting a selected one of the indicia disposed between said print drum and said rotary cutter means;
 - n. said web feeding means advancing the web to a selected position between said print drum and said ballistic elements in response to position signals generated by said sensor means, said position signals generated by said sensor means when the selected one of the indicia is disposed between said print drum and said rotary cutter means in registration with said sensor means;
 - o. said web feeding means incrementally advancing the web between said print drum and said ballistic elements until all the selected characters are printed on the web;
 - p. when all of the selected characters are printed on the web, said web feeding means advances the web until another selected one of the indicia is disposed between said print drum and said rotary cutter means and is detected by said sensor means;
 - q. when the other one of the indicia is detected by said sensor means, a portion of the web is severed by said rotary cutter means, the unsevered portion of the web being in position for the printing of selected characters.
9. The system of claim 8 wherein said sensor is photoelectric.
10. The system as claimed in claim 9 wherein said first means includes an idler capstan and a drive capstan, said idler capstan in spaced relationship to one side of the web, said drive capstan in spaced relationship to said idler capstan at an opposite side of the web; and wherein said second means includes a pair of brakes disposed on opposite sides of the web.
11. The system as claimed in claim 10 wherein said web feeding means includes:

- a. a housing;
- b. a rocker arm;
- c. resilient means, said rocker arm pivotally mounted to said housing by said resilient means;
- d. actuator means operatively connected to said housing and rocker arm for pivoting said rocker arm in response to signals generated by said first control means, said actuator means having first and second states;
- e. said idler capstan mounted to said rocker arm at one end thereof;
- f. one of said brakes mounted to said rocker arm at an opposite end thereof;
- g. the web is frictionally engaged between said idler and drive capstans when said actuator is in said first state, and disengaged from said brakes when said actuator is in said first state;
- h. the web is frictionally engaged between said brakes when said actuator is in said second state, and disengaged from said idler and drive capstans when said actuator is in said second state.

12. The system, as claimed in claim 9 wherein said rotary cutter means includes:

- a. cylindrical cutter means formed with an opening defining a cutting edge having a substantially concave profile, said cylindrical cutter means disposed in juxtaposition with one face of the web, said cutting edge adapted for engagement with the web; and
- b. a solenoid having a reciprocating piston, said solenoid electrically connected to said first control means, said piston operatively connected to said cylindrical cutter means;
- c. said piston retracted into said solenoid when energized, said cylindrical cutter means rotating when said piston is retracted, said concave cutting edge engaging and severing the web when said cylindrical cutter means is rotated.

13. The system as claimed in claim 9 wherein said ballistic element includes:

- a. a housing formed with a guideway;
- b. a hammer biasedly mounted within said guideway, said hammer adapted for reciprocating movement within said guideway said hammer in registration with a row of characters on said print drum;
- c. an electromagnetic actuator responsive to signals generated by said second control means; and
- d. impactor means mounted in spaced relationship to said electromagnetic actuator and mounted in registration with said hammer;
- e. said impactor means activating said electromagnetic actuator when said electromagnetic actuator is energized by said signals generated by said second control means, said activated impactor propelling said hammer in said guideway toward said print drum.

14. A system for printing selected characters on a web having spaced indicia thereon, said system comprising:

- a. print drum means having at least two rows of raised characters disposed about its periphery in arcuate columns;
- b. web feeding means positioned at one side of said print drum means, said web feeding means selec-

tively advancing the web towards said print drum means;

- c. at least two ballistic elements, a first ballistic element mounted in spaced registration with one row of characters and a second ballistic element mounted in spaced registration with the other row of characters, each said ballistic element having energized and deenergized states;
- d. first means electrically communicating with said web feeding means for control thereof, said first means including sensor means for detecting the indicia on the web, said sensor means disposed at a side of said print drum means opposite said side at which said web feeding means is positioned;
- e. second means electrically communicating with said ballistic elements for controlling the state of each said ballistic element; and
- f. third means coupled to said print drum means for generating selected signals representing the position of each said character, said third means operatively connected to said first and second means;
- g. cutter means adapted to engage and sever the web, said cutter means positioned at said side of said print drum means at which said sensor means is disposed, said sensor means disposed between said print drum means and said cutter means;
- h. said web feeding means advancing the web to a first position between said print drum means and ballistic elements in response to position signals generated by said sensor means, said position signals generated by said sensor means when a selected one of the indicia is disposed between said print drum means and said cutter means and is detected by said sensor means;
- i. said second means receiving signals from said first means and, in response thereto, generating signals for energizing selected ones of said ballistic elements, said signals received from said first means being responsive to said selected signals generated by said third means;
- j. portions of the web in registration with an energized ballistic element being pressed against the character in spaced registration with said energized ballistic element;
- k. said web feeding means incrementally advancing the web between said print drum and said ballistic elements until all the selected characters are printed on the web;
- l. when all of the selected characters are printed on the web, said web feeding means advances the web until another selected one of the indicia is disposed between said print drum and said cutter means and is detected by said sensor means;
- m. when the other one of the indicia is detected by said sensor means, the web is severed by said rotary cutter means.

15. The system of claim 14 wherein said sensor is a photoelectric device.

16. The system of claim 14 wherein said indicia are apertures in said web and said sensor includes an illuminator registrable with said apertures at one side of said web and a photoelectric detector in registration with said illuminator at the other side of said web.

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