United States Patent

Bremner et al.

[15] **3,690,250**

[45] **Sept. 12, 1972**

[54] **COMPACT LABEL PRINTER**

[72] Inventors: **David F. Bremner,** Bellbrook; **Stephen B. Smith,** Centerville, both of Ohio

[73] Assignee: **The National Cash Register Company,** Dayton, Ohio

[22] Filed: **July 16, 1970**

[21] Appl. No.: **55,361**

[52] **U.S. Cl.** .....**101/95,** 235/58 P

[51] **Int. Cl.**.....**B41j 7/48,** B41j 1/52

[58] **Field of Search**.....101/95–97; 235/58 P, 60 P, 146

[56] **References Cited**

UNITED STATES PATENTS

3,176,610	4/1965	Benson et al.	101/93 C
1,749,698	3/1930	Evans	101/95 X
2,142,352	1/1939	Fuller et al.	101/96 X
2,922,361	1/1960	Adler et al.	101/95

Primary Examiner—Clyde I. Coughenour

Attorney—Louis A. Kline, Wilbert Hawk, Jr. and George J. Muckenthaler

[57] **ABSTRACT**

A remotely-controlled print module for use in printing labels or the like wherein differential gears are aligned on a common drive shaft and oscillatably driven to a predetermined position controllable by means of a bail shaft extending through gear slots, the gears meshing with type wheels carried on a shaft parallel to the drive shaft. The gears are loaded in one direction by means of cables and springs and, during the remotely-controlled cycle of operation, are stopped at predetermined positions by means of indexing pawls which are selectively energized through electromagnetic solenoids, the stopped position of the type wheels being compatible for striking by print hammers. The differential gears and thus the type wheels are remotely selectively controlled by computer-type commands which allow for versatility of expansion and compactness of packaging of the print module.

3 Claims, 9 Drawing Figures

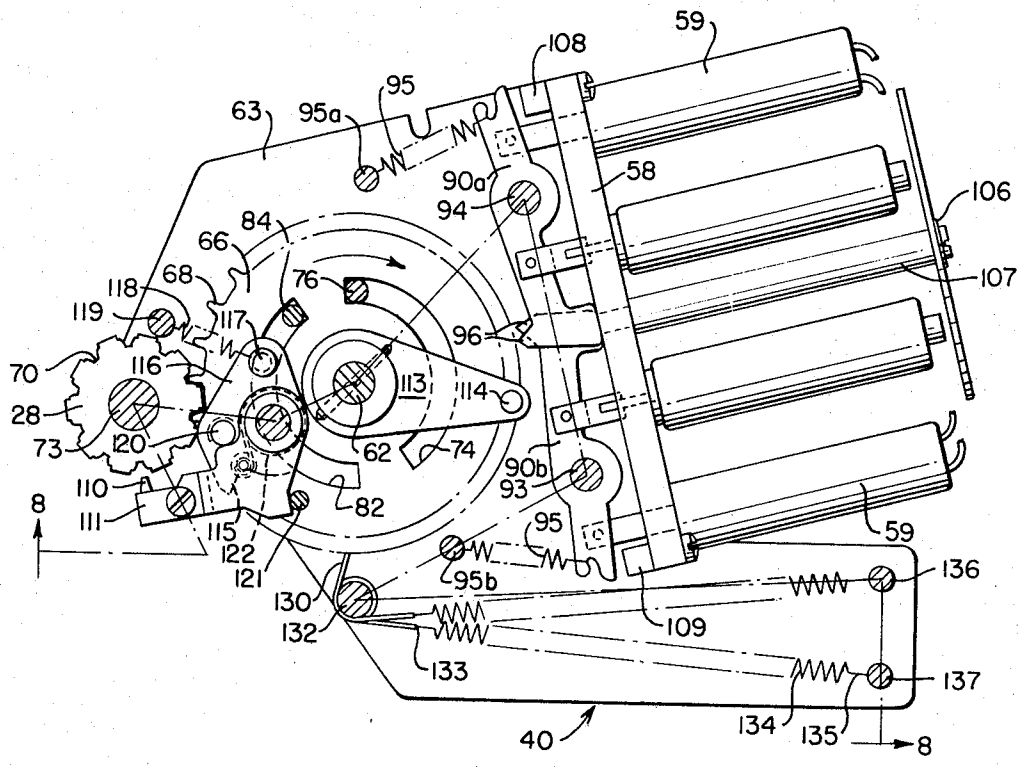


FIG. 1

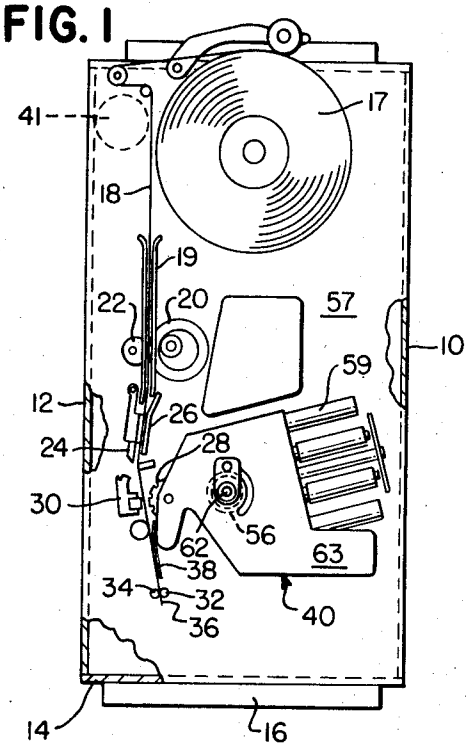


FIG. 1A

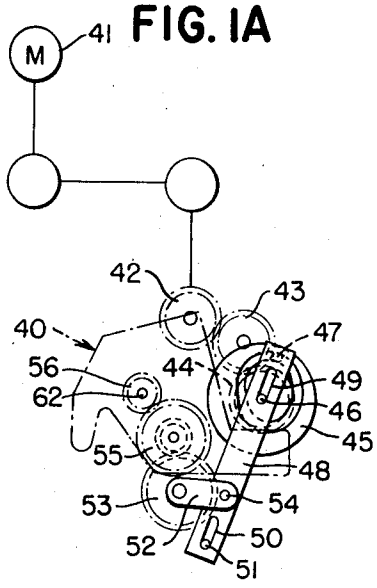
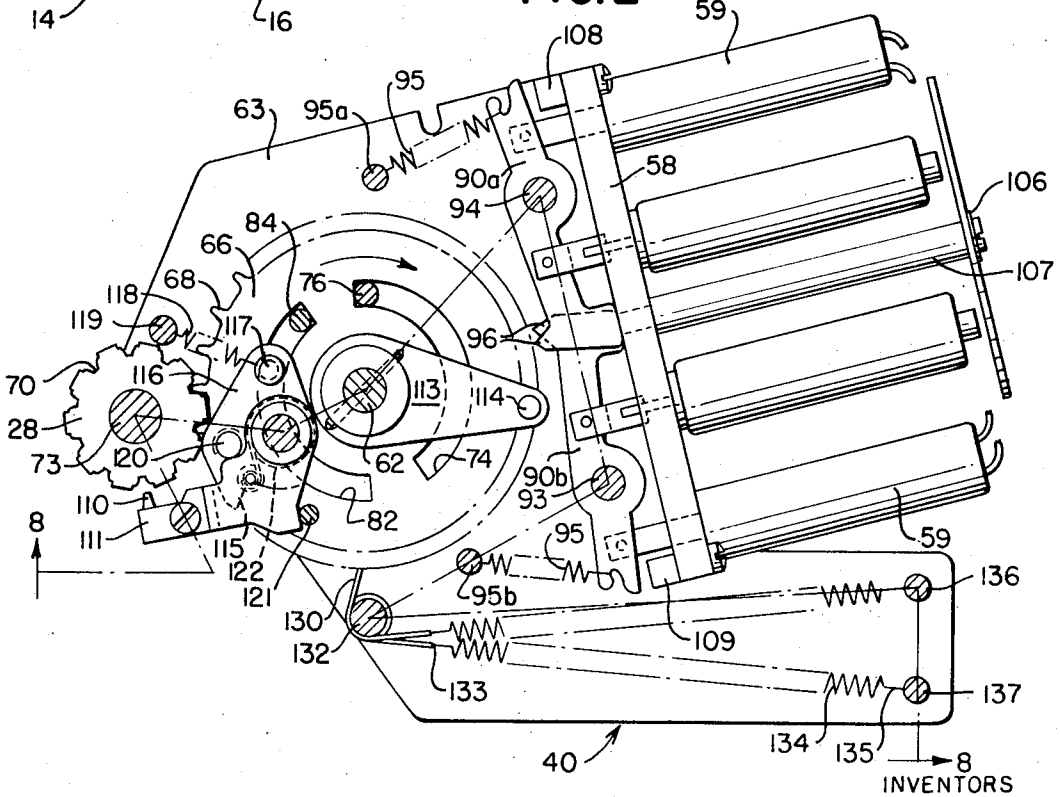


FIG. 2



INVENTORS
DAVID F. BREMNER &
STEPHEN B. SMITH
BY Louis A. Kline, Wilbert Bawle, Jr. & Geo. J. Muckenthaler
THEIR ATTORNEYS

FIG. 3

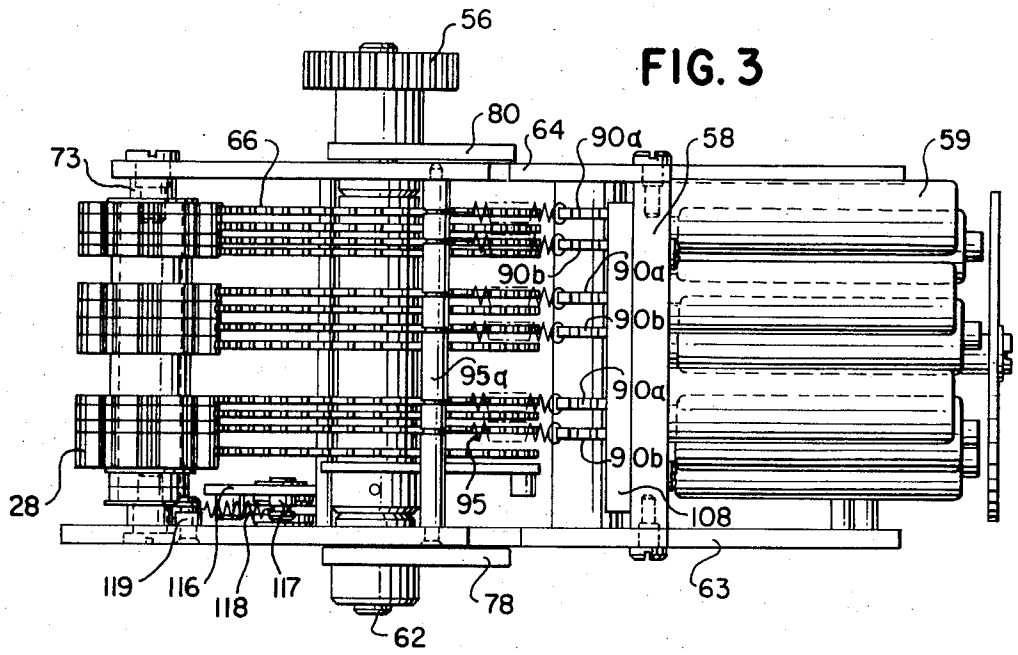
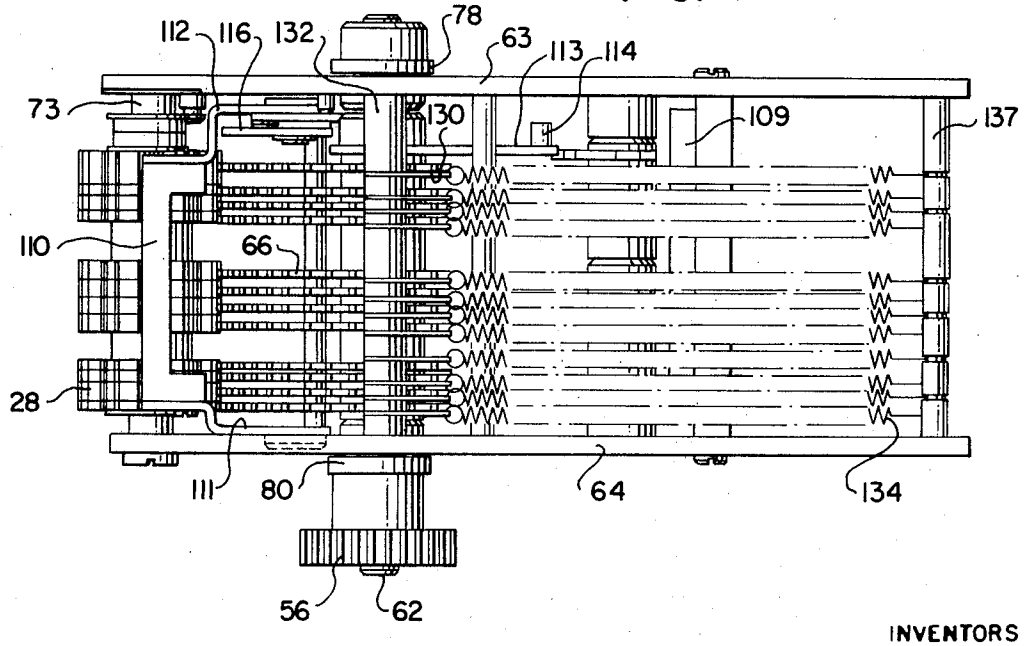


FIG. 4



INVENTORS
DAVID F. BREMNER &
STEPHEN B. SMITH

BY Wilbert Hawk, Jr.

THEIR ATTORNEYS

FIG. 5

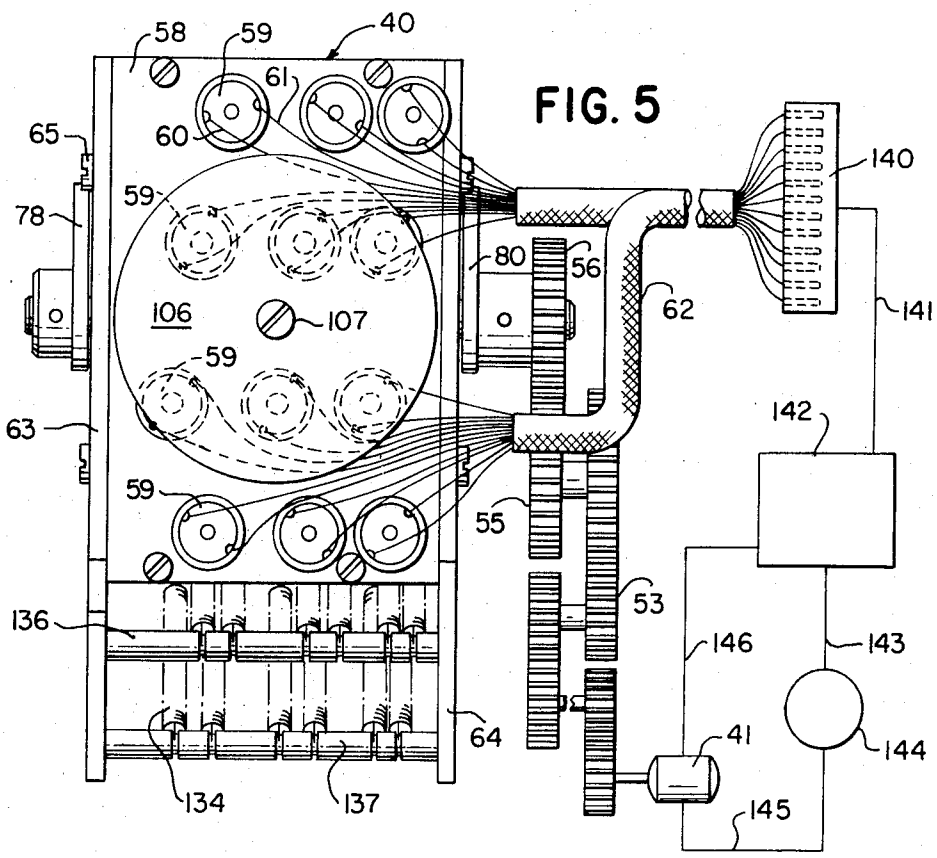
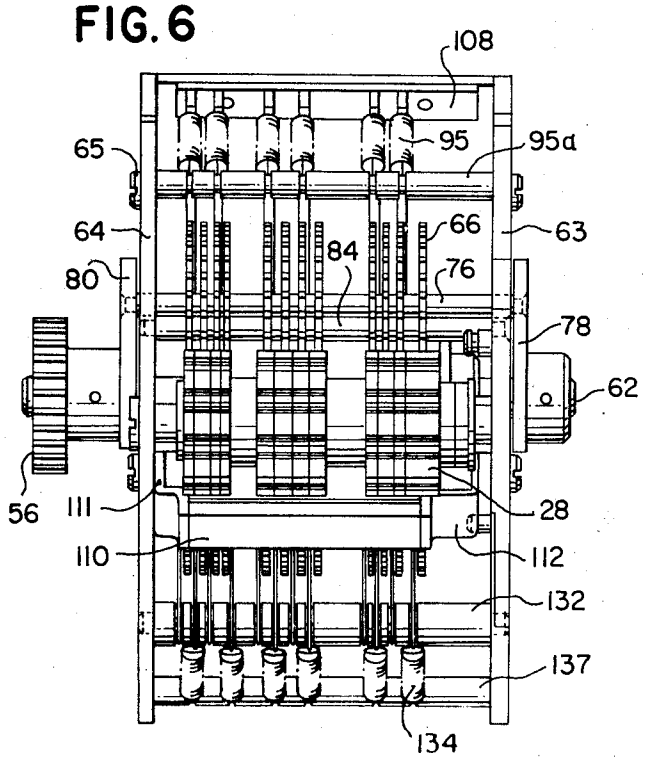


FIG. 6

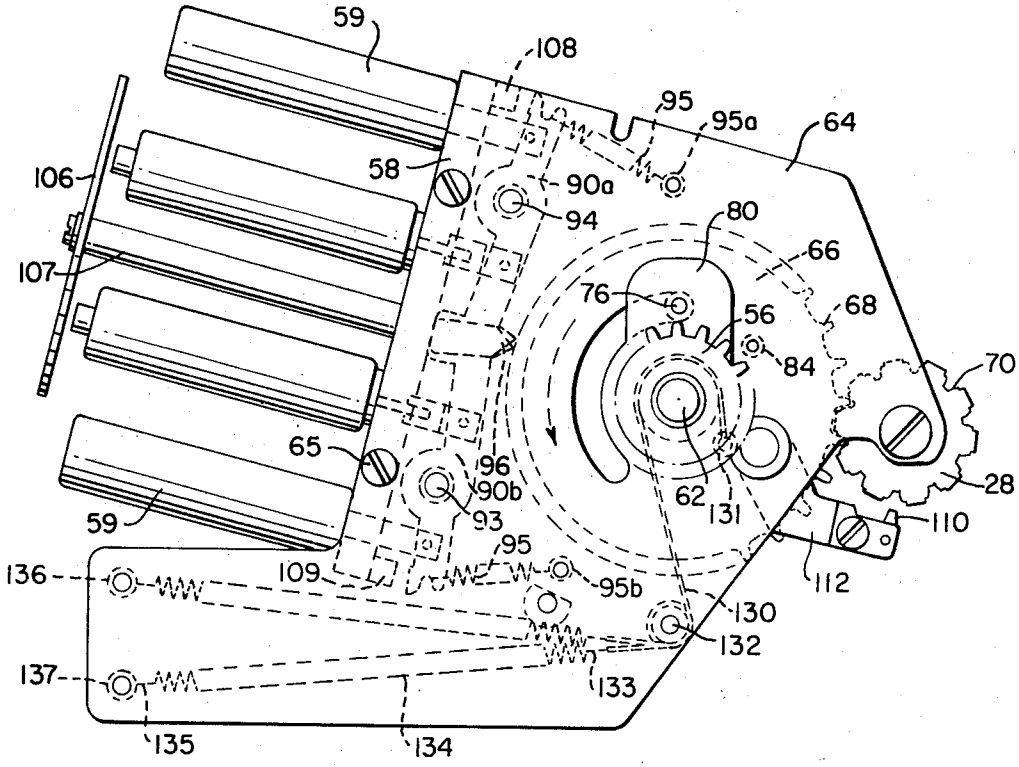


INVENTORS
DAVID F. BREMNER &
STEPHEN B. SMITH

BY Louis A. Kline
Wilbert Hawk & Co.

THEIR ATTORNEY

FIG. 7

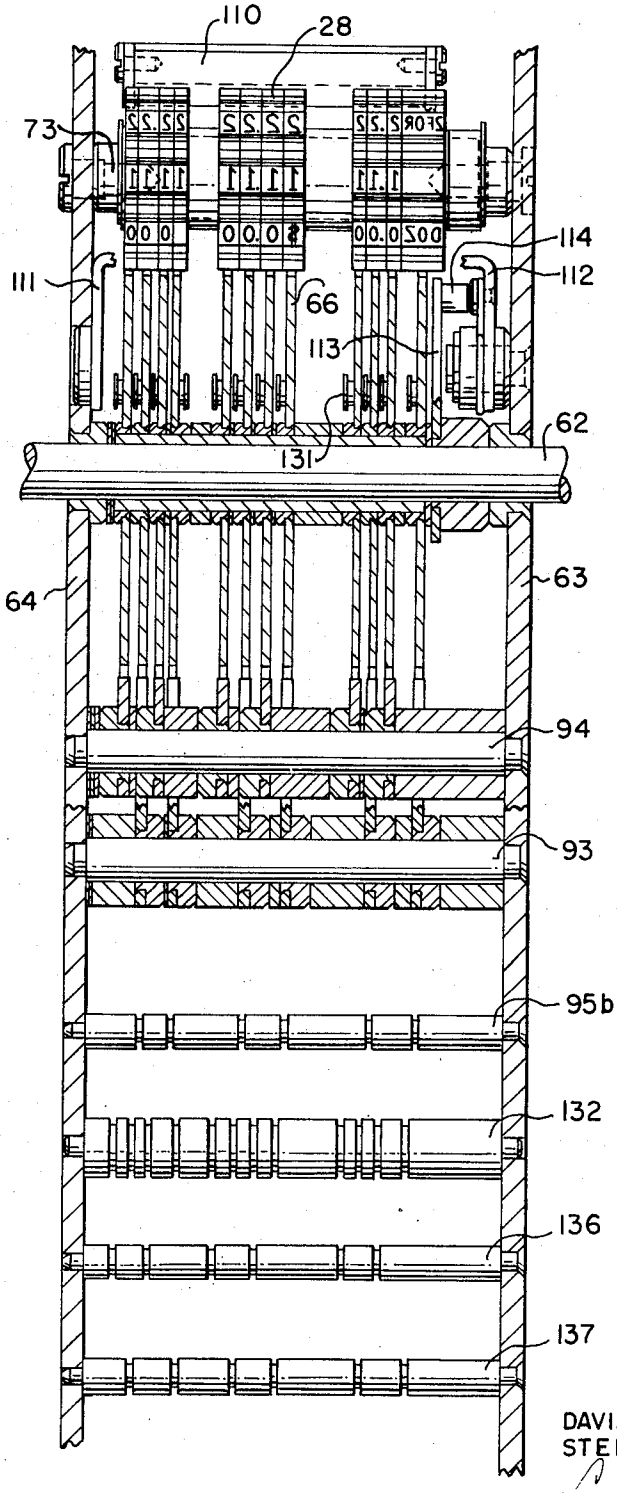


INVENTORS
DAVID F. BREMNER &
STEPHEN B. SMITH

BY Louis A. Klein
Gilbert Sack, Jr.
Geo. J. Muckenthaler

THEIR ATTORNEYS

FIG.8



INVENTORS
DAVID F. BREMNER &
STEPHEN B. SMITH
Louis A Kline
BY Wilbert Hawk, Jr.
Geo. J. Muckenthaler
THEIR ATTORNEYS

COMPACT LABEL PRINTER

BACKGROUND OF THE INVENTION

In the business machine area, improvements are being sought and designed to meet the needs both of higher speeds and of space limitations. The upsurge of remotely controlled business machines in the commodity field has brought about significant changes in the methods and apparatus utilized in this field, wherein it is desired to speed up the operation and to attain greater accuracy in supplying the needs of a competitive enterprise. Included in the commodity field equipment is the need for labeling packaged goods by ways and means and in a manner which produce high output from a predetermined input, which is accurate to the *n*th degree, and which is compact to the extent that such apparatus and equipment, so used, must satisfy the business enterprise where space is limited. Therefore, the many business machines and components therein must be crowded into compact systems to utilize such limited space.

For a number of years, price labeling machines have included the customary roll of record material, means driving and guiding the record material in a path to a printing mechanism, and cutting means positioned to remove the printed record material portion (i. e., label) in singular fashion for depositing on the package. The machines have customarily included a keyboard of well-known type operated by one who must establish or calculate the proper letters or numerals to be printed on the label. The use of such a keyboard is now considered too slow in certain operations and of course is also subject to human error.

While those price labeling machines have been adequate in the majority of business enterprises dealing in packaged goods, the advent of remotely controlled and programmed systems has led to the necessity for improvements in the labeling and packaging areas. In this connection, the design of many machines applicable to the label-printing field has included the use of type wheels controlled in such a manner that selected characters are prepositioned in a cyclic operation for establishing the correct attitude and relationship of the parts in accordance with desired input.

The prior art teaches the selective setting and control of various mechanisms for indicating and counting functions wherein the cyclic operation has included the use of control rack and gear members, pawl and ratchet arrangements, and spring-urged actuating means for accomplishing the positioning of the indicating or counting units — one such mechanism being shown and described in U.S. Pat No. 2,603,702, issued July 15, 1952, on the application of Jack I. Kern. Another example of the prior art relating to a limiter-type counter with automatic reset using spring-loaded pawls, a predetermining wheel, and a counter wheel is disclosed in U.S. Pat. No. 2,858,985, issued Nov. 4, 1958, on the application of Wilfred A. Blaser, and, additionally, U.S. Pat. No. 3,204,869, issued Sept. 7, 1965, on the application of Oskar Zumkeller, teaches the use of register wheel positioning apparatus including a stepping wheel, a spring-loaded locking pawl, and electromagnetic means for operating a shiftable memberfrom one position to another position. While the above-mentioned prior art relates to mechanisms with control means operable on a predetermined register reading, improvements are desired in remotely controlled label printers of the type disclosed herein.

SUMMARY OF THE INVENTION

The present invention relates to a label printer and, more particularly, to a printer utilizing a compact, remotely-controlled print module wherein the module includes an oscillating differential line meshing with cooperating typewheels, in turn selectively and individually positionable to be struck by appropriate print hammers in accordance with predetermined or programmed logic. The print module includes in the drive line a plurality of differential gears aligned on a shaft and fashioned to be driven in an oscillating manner by means of a double-surface box cam and associated linkage arrangement which is responsive to input signals at predetermined intervals. The differential gears are controlled in speed and direction of rotation by a bail shaft which passes through radial slots in the gears, the bail shaft being carried on a line parallel to and spaced from the drive shaft. The differential gears are positioned in meshing relationship with typewheels having appropriate teeth between surface-etched characters, the gears being individually loaded in one direction by means of cables and springs so as to be subjected to positive drive conditions.

Located adjacent and in line with the plane of each differential gear is a spring-loaded indexing pawl actuable by an electromagnetic solenoid, which, on signal from the remote control system, if fired to cause the pawl to engage with its associated differential gear and stop such gear at the desired position during its rotation, so as to present the proper character to the print hammer. The solenoids are mounted in staggered manner to allow close and compact spacing of them and of the pawls which they actuate during the cyclic operation. A typewheel liner, extending the length of the typewheels, is carried on arms pinned to the drive shaft, the liner being wedge-shaped to fit the teeth of the typewheels between the characters to insure that all wheels are aligned prior to being struck by the print hammers. An over-ride spring is wound on one of the liner driver support arms to prevent character distortion in the event that a typewheel is not correctly positioned and aligned for being struck by the print hammer.

In accordance with the above discussion, the principal object of the present invention is to provide a label printer having a compact print module.

Another object of the present invention is to provide a print module for a label printer wherein the typewheel position is controlled remotely from the printer.

A further object of the present invention is to provide an oscillatably-operated print module wherein the differential line is loaded in one direction to insure positive drive.

An additional object of the present invention is to provide a compact and efficient print module for printing labels or receipts and including oscillating-line gears and hence oscillating typewheels.

Additional advantages and features of the present invention will become apparent and fully understood from a reading of the following description taken together with the annexed drawings, in which:

FIG. 1 is a front view of a label printer utilizing the print module of the present invention;

FIG. 1A is a view, partially diagrammatic, showing the printer drive line from a prime mover to the print module drive shaft;

FIG. 2 is an enlarged front view of the compact print module of the present invention, with the front plate thereof being omitted for clarity of certain parts;

FIG. 3 is a top view of the print module shown in FIG. 2;

FIG. 4 is a bottom view of the module shown in FIG. 2;

FIG. 5 is a right side elevational view of the print module shown in FIG. 2, and additionally including a wiring harness and schematic representation of drive and control units therefor;

FIG. 6 is a left side elevational view of the module shown in FIG. 2;

FIG. 7 is a view taken on the side opposite from that shown in FIG. 2, or a rear view of the print module; and

FIG. 8 is an enlarged stretched-out view showing the line-up of the various module shafts as taken on the line 8—8 of FIG. 2.

The present disclosure will be principally confined to the print module of the present invention, as it will be seen that the print module is a complete unit in itself and may thus be applied to any one of a number of business machines where remote control of the type wheels is a desireable feature. The compact print module is particularly applicable in a cash-register-type label printer having other mechanism, as disclosed in U.S. Pat. No. 2,730,038, issued Jan. 10, 1956, on the application of Mayo A. Goodbar and Russell G. Pratt; and also is applicable with feed control mechanism of the type disclosed in U.S. Pat. No. 2,889,769, issued June 9, 1959, on the application of Mayo A. Goodbar, Russell G. Pratt, and Clarence A. Bacher. Although these business machines are provided with keyboards for manual operation, certain of the mechanism is complete in itself and therefore could be used in other designs for automatic operation, such as with the structure of the present invention. Suffice it to say that, in such machines, a supply roll of record material is journaled near the top of the machine, and a strip from the roll is caused to be driven through a chute to a precise position where printing is performed by means of print hammers striking against typewheels bearing characters and where a certain portion of the roll of record material is severed from the strip to be ejected in the form of a printed label. Of course, the severed portion could be in manner and form as a receipt, a ticket, or like record to the transaction. Additionally, the supply roll may have preprinted information thereon, and the function of the label printer is to print further data in certain blank spaces. An example of the latter is the labeling of pre-packaged commodities, where the preprinted data would include the name of the business, the name of the commodity, and the type thereof, while the data to be printed would include the weight, the price per pound, and the total price of the package.

Briefly, the illustrated course of label preparation follows a procedure wherein the label material is fed from a supply roll through a guide chute between a serrated printing cylinder and a rubber tension roller which coacts with the printing cylinder to feed the material past a knife and through a second guide chute connected to the knife, thence into coacting relationship with typewheels and cooperating print hammers, and thereafter to a label-ejecting mechanism comprising two rollers which eject the label from a third chute after it has been severed from the supply material by the knife. Specifically, as shown in FIG. 1 of the drawings, there is shown a framework which includes right and left frame members 10 and 12 secured in properly spaced relationship to each other by a base plate 14 and by various cross frames, rods, and bars, the base plate 14 in turn being secured to a machine sub-base 16. Of course, the framework may be modified from that shown to enclose features and mechanism not considered a part of the present invention. The mechanism for feeding and printing the labels is shown as including a supply roll 17, from which a label strip 18 is fed through an elongated guide chute 19 between a printing cylinder 20 and a rubber tension roller 22, which coacts with the cylinder to feed the strip 18 past a knife 24 and through an intermediate chute 26, connected to the knife, thence into coacting relationship with typewheels 28 and cooperating print hammers 30, and finally to a label-ejecting mechanism comprising rollers 32 and 34, which eject the edge of a label 36 out of a lower chute 38 after it has been severed from the supply strip 18 by the knife 24.

The printing of selected indicia on the label 36 is accomplished by means of a compact module generally designated as 40 (shown enlarged in FIG. 2) and which includes driven differential mechanism controlled from a computer or like processor through control wiring devices. Referring to FIGS. 1 and 1A, a motor 41 is carried in the upper left-hand corner of the machine to provide the driving force for the various components therein, the drive line including various transmission gears, clutches, or the like to impart rotary motion to the gears 42 and 43 in a vicinity near the print module 40. Although the motor 41 supplies power to other machine components, the drive is herein simply shown diagrammatically from the motor to the gears 42 and 43 (FIG. 1A). The gear 43 meshes with a cam-carrying gear 44, one portion 45 of the cam being aligned on a pin-type shaft 46. The cam is of a double-surface box type which includes an irregular path to be followed by a stud 47 attached to a follower bar 48 near one end thereof. The follower bar 48 has an elongated slot 49 for slidingly receiving the shaft 46 therein, there being also a second slot 50 spaced along the bar 48 for receiving a pin 51. With such arrangement, as the gear 44 is rotated by the gear 43, the stud 47 follows the irregular path on the cam and drives the bar 48 in a reciprocating motion through the shaft 46 and the pin 51 riding in the slots 49 and 50. An arm 52, fixed to a further gear 53, has an aperture therein for receipt of a stud 54 secured to the bar 48, the stud forming a pivotal relationship between the arm and the bar. The gear 53 meshes with a small gear secured to a larger gear 55, which, in turn, meshes with a drive gear 56 for driving in oscillating fashion the differentials of the print module 40. As understood from FIGS. 1 and 1A, all of this drive train is supported from the framework, which, in turn, supports a front plate 57, to which the print module 40 is attached. Although other ways and means could be devised and provided for driving the

differential gears of the print module, the disclosed elements are very effective to convert a rotary motion at the gear **43** to a desired clockwise and then counter-clockwise oscillating motion at the differential drive gear **56** (FIGS. **1** and **1A**).

The print module **40** itself includes a mounting plate **58** to which are attached solenoids **59** (FIGS. **2**, **3**, **5**, and **7**), each of which is energized or activated through electrical leads **60** and **61** (FIG. **5**). Since there are a plurality of such solenoids, differential gears, indexing pawls, and typewheels making up the print module, it is apparent that a detailed description of a single line-up of these parts is sufficient to teach the embodiment of the invention. Except for the different locations of the solenoids **59** in a staggered manner (see FIG. **5**) for actuating the closely-spaced indexing pawls and differential gears, the structure is very similar for each of the twelve columns of controlled typewheel printing provided, as shown in FIGS. **4**, **6**, and **8**.

The typewheel-setting mechanism of the module **40** comprises a shaft **62** driven in oscillating fashion through the drive gear **56**, the gear being keyed to the shaft, which extends through and is journaled in a front plate **63** and a rear plate **64**, and which plates are secured to the solenoid mounting plate **58** by suitable screws **65**. The shaft **62** carries a plurality of differential gears **66** spaced thereon (FIGS. **3**, **4**, and **6**), the gears having teeth **68** (see also FIGS. **2** and **7**) for engaging with companion gear slots **70** of the typewheels **28** journaled on a shaft **73** parallel to the shaft **62** and carried by the plates **63** and **64**. Each of the differential gears **66** has a radially-spaced slot **74**, through which a bail **76** extends for urging the gears **66** in one direction and for allowing the gears to rotate independently of the urging thereof, the bail being held parallel to the shaft **62** by means of front and rear arms **78** and **80** (FIG. **6**) pinned to the shaft **62** so as to move therewith. As seen in FIG. **2**, each of the differential gears **66** has a second radially-spaced slot **82**, opposite the slot **74**, for receiving a stop shaft **84** (see also FIG. **7**) secured to the plates **63** and **64** positioned parallel to the main shaft **62** and to the bail **76**. The shaft **84** acts as a stop element against the urging of springs loading the gears **66** in one direction and also as a stop element to limit the amount of travel of the gears in the other direction. As in the case of the bail **76** and the slots **74**, the slots **82** permit the gears **66** to rotate independently of the stop shaft **84** during the oscillating motion.

Referring to FIGS. **2**, **3**, and **7**, a plurality of upper and lower indexing pawls **90***a* and **90***b* are oriented and pivotally supported in a manner compatible and aligned with the solenoids **59** and with the differential gears **66**, each of the upper pawls **90***a* having a body portion pivoted on a pin **94** and loaded in a counter-clockwise direction (FIG. **2**) by a spring **95** secured to a cross shaft **95***a*. Likewise, each of the lower pawls **90***b* is pivoted at the pin **93** and loaded in a clockwise direction (FIG. **2**) by a spring **95** secured to a cross shaft **95***b*. Each of the pawls **90***a* and **90***b* is so positioned for actuation by its associated solenoids **59** that a tip portion **96** thereof is moved to engage the teeth of the associated differential gear **66** and to stop said gear in such a position as to cause a predetermined character on the typewheel **28** controlled by the associated gear to be presented to the print hammer **30**.

As understood from FIG. **2**, two types of solenoids **59** are provided — the pull type and the push type. The op three and the bottom three of such solenoids (FIG. **5**) are of the pull type and include plungers pivotally connected to the associated pawls at points removed from the pawl portions **96**, thereby extending the springs **95** when swinging the tips into engagement with teeth of the gears **66**.

The six remaining solenoids positioned in the central portion of the print module (FIG. **5**, dotted-line showing) are of the push type, wherein the plunger of each is pivotally connected to the pawl adjacent the tip portion **96**, so as to extend the spring **95** when pushing the pawl tip into contact with a selected tooth of the associated differential gear **66** to interrupt rotation of the gear as the proper character on the connected type wheel is moved into print-hammer-aligned position. The springs **95**, being so extended in each instance, are seen to be effective for restoring the interconnected pawl to its normal, differential-gear-non-engaging, position (as illustrated in FIGS. **2** and **7**) immediately upon deenergization of the respective push or pull solenoid **59**. A solenoid plunger restrictor **106** (FIGS. **2** and **7**) is spaced from the solenoid support plate **58** and secured thereto by means of a long stud **107**. Upper and lower pawl stops **108** and **109**, extending substantially between the plates **63** and **64**, are also secured to the support plate **58** to limit the movement of the pawls **90***a* and **90***b* against the action of the springs **95** when engaging with teeth of the differential gears **66**.

A typewheel liner **110** (FIGS. **6** and **8**), of wedge-shaped configuration, so as to fit between the character teeth of the typewheels **28** (FIGS. **2** and **7**), extends the width of the typewheels and is pivotally supported by arms **111** and **112** from the side plates **63** and **64**. Upon being driven during machine operation by an arm **113** secured to the differential shaft **62**, the liner **110** engages the typewheels and aligns them in correct position for being struck by the print hammers **30**. The arm **113** extends radially from the shaft **62** (FIGS. **2**, **4**, and **8**) and has a stud **114** at its end for engaging with a lower end cam portion **115** (FIG. **2**) of a liner-actuating arm **116**, which is pivoted on the same stud as is the support arm **111** of the liner **110**. The actuating arm **116** carries an upper stud **117** (FIGS. **2** and **3**), to which is attached one end of a tension spring **118**, the other end of the spring being connected to a stud **119** in the plate **63**. The spring **118** exerts a force on the actuating arm **116** to maintain the liner **110** in a counter-clockwise direction (FIG. **2**) and out of the path of the typewheel teeth until the typewheels are all positioned and ready for impact by the associated print hammer **30**. The arm **116** has an additional stud **120** engageable by a cam portion of the support arm **111**, and, additionally, the side plate **63** carries a stud **121** to limit movement of the arm **116** in a counter-clockwise direction. A small torsion spring **112** (FIG. **2**) is provided around the liner pivot hub, with one end thereof connected to the stud **120** and the other end connected to a stud on the side of the support arm **111**, the spring thus acting to exert a small force on the liner **110** but in opposition to the tension of the spring **118** to prevent character distortion in the event that one typewheel is not correctly positioned in the line-up ready for printing.

As further seen in FIG. 2, each of the differential gears 66 is spring-loaded in a clockwise direction by means of a cable 130 secured to a gear stud 131 (see also FIG. 8) and trained around a cable-bearing shaft or roller 132 and connected to one end 133 of a spring 134, the other end 135 of said spring being secured to either of two shafts 136, 137 fixed between the side plates 63 and 64, these shafts being spaced to allow for freedom of movement of the springs 134 in a compact assembly.

Referring now to FIG. 5, the print module solenoids 59 of the present invention are connected by the leads 60 and 61 through a terminal block 140 and by a multi-conductor cable 141 to a computer device 142, such device being in the nature of a scale or the like for automatically weighing and pricing each package presented thereto. Connected to the device 142 by means of a cable 143 is a commutator 144, in turn connected to the motor 41 by a cable 145. So that signals can be transmitted from the computer device to the motor, a further cable 146 connects these components to complete the loop of transmitting and receiving signals for operation of the system.

In the operation of the compact label printer, the unit is turned on, with the motor 41 providing motive power for all components of the machine. The supply strip 18 is fed downwardly through the guide chutes 19 and 26, and, when the label is in position for printing, the computer or like remote control device gives the signal to the print module 40 to print a particular line of type thereon. When the system is energized and running, the commutator 144 monitors the positions of each typewheel 28 in the print module 40 and transmits this information to the computer device 142. At the command from the computer device to start a cycle — that is, when the data such as weight and total price is determined for a particular package, the proper line of print is selected through the print module by the computer.

The module main shaft 62 begins its oscillating motion and rotates first clockwise from the position shown in FIG. 2 at a precise speed controlled by the double-surface box cam drive 45, each of the differential gears 66 being then spring-loaded in the clockwise direction by means of its cable 130 and spring 134, so that the gear follows the bail shaft 76 in the shafts control of direction and speed of such gears.

During such clockwise rotation of the shaft 62, the bail 76 is seated at one end of the differential gear slot 74 and thus maintains all the differential gears 66 at the same attitude until one of the solenoids 59 is energized for actuating its associated pawl 90*a* or 90*b* to interrupt the clockwise rotation of the selected gear. The fixed shaft 84 rides in the gear slots 82 and acts as a stop element for those gears not interrupted during the clockwise portion of gear movement. Since each of the differential gears 66 is meshed with an associated typewheel 28, the wheel is driven by such gear but in the opposite, or counter-clockwise, direction, as viewed in FIG. 2. As mentioned above, the position of each typewheel is constantly and continuously communicated to the remote control device 142 by the commutator 144, which interfaces the attitude of each wheel to the computer. As a result of the computer's knowledge of the exact position of each typewheel, when any one typewheel is approaching with a character which is to be printed, the solenoid 59 corresponding to that differential gear 66 is energized by means of capacitor discharge, and the solenoid is held in the energized position by the lower level current.

The firing of the solenoid causes the end tip portion 96 of its associated pawl 90*a* or 90*b* to enter between the teeth of the differential gear to a controlled depth limited in a swingable path by the stop element 108 or 109, which causes the gear 66 and its corresponding typewheel 28 to stop with the proper character presented to the type hammer 30. The firing of one or more of the solenoids 59, as dictated by the desired line of print on the label, thus interrupts the rotation of the selected differential gear 66 and its typewheel 28 at a precise position for printing. Due to the length of the slot 74 in each differential gear 66, the bail 76 is allowed to continue in its clockwise movement and thus leave that particular differential gear in its stopped position. Whichever of the gears 66 are not then stopped or interrupted in their rotation will continue to rotate undisturbed until they are stopped by computer signals in like manner. Of course, those gears which are not called upon to position a typewheel for printing will continue to rotate until the end of the clockwise cycle, where they are positively stopped at a typewheel-non-positioning or blank character position.

The second slot 82 in the differential gears 66, in conjunction with the fixed shaft 84 running therethrough, limits the travel of each gear to the blank character position of the wheel, the shaft becoming seated against the end of the slot.

After all gears 66 have been stopped, with the associated typewheels thus positioned in the above manner, the main shaft 62 continues its clockwise rotation another slight amount and, by reason of the stud 114 contacting the cam portion 115 of the arm 116, causes the typewheel liner 110 to engage the groove between the character teeth in each typewheel to align all the wheels 28 just prior to the printing operation. After the liner has engaged the groove to precisely hold all the type wheels, the main shaft 62 pauses to so maintain all said wheels in their correct printing positions. During the above-described typewheel-setting cycle (clockwise oscillation of the shaft 62), the appropriate mechanism has fed the strip 18 of label material downwardly a predetermined distance, severed a label 36 from the strip, and positioned the label in its correct printing attitude. At this point in time, the print hammer 30, being spring loaded and cocked, is released, and the printing on the label 36 is accomplished.

Simultaneously with the release of the print hammer 30, the commutator 144 allows power to be removed form the solenoids 59; however, the typewheels 28 are held in position because the liner 40 remains in mesh with the wheels. Of course, with power removed form the solenoids, the spring-loaded pawls 90*a* and 90*b* will automatically move out of contact with the teeth of the differential gears 66.

After the print hammer 30 has contacted the typewheels 28 and the printing on the label has been accomplished, the main shaft 62, being controlled by the double-surface box cam 45 and the slotted follower bar 48, starts return rotation counter-clockwise, as

seen in FIG. 2. This motion releases the liner **110** from engagement with the typewheels **28**, and the liner immediately moves back to its rest position under urgence of the spring **118**. The main shaft **62** continues to rotate counter-clockwise, causing the bail **76** to again contact the ends of the slots **74** in the differential gears **66**, which, in turn, rotates them counter-clockwise. The main shaft **62** and the bail **76** continue to move back to their starting positions against the action of the springs **134**, thus causing all gears **66** and wheels **28** to be reset to their original positions and ready for the next cyclic operation.

During the above reset portion of the cycle of the main shaft **62**, the printed label **36** is fed through the guide chute **38** and ejected from the machine through the rollers **32** and **34**. With such ejection and reset completed simultaneously, the machine is now ready to accept the next command from the remote control computer **142**.

It is thus seen that herein shown and described is a compact label printer of the module type for printing in response to commands from a remote control device for setting the typewheels in correct positions. The print module includes a positive differential drive line added by the spring loading of the differential gears to position the type wheels for accurate printing on the labels. While only one embodiment has been disclosed for the construction and operation of the print module, certain variations on the above may occur to those skilled in the art, so it is contemplated that all such variations having these features are within the scope of the invention.

What is claimed is:

1. A compact print mechanism comprising a
plurality of differential gears commonly aligned on a driven shaft,
means for driving the shaft in oscillating manner, a
plurality of type wheels cooperating with and driven by the differential gears, the type wheels having character teeth thereon with grooves therebetween engaging with the gear teeth,
spring means connected to the differential gears for driving the gears in one direction of travel, each of the gears having a radially-spaced slot therein, a
bail shaft positioned along the gears and carried within the slots and secured to and spaced from the driven shaft for controlling direction and movement of the gears, said spring means exerting continuous biasing on said gears and permitting the bail shaft to be driven independently of the gears during the oscillating movement,
pawl means pivotally supported in relation to the differential gears for engagement with selected gears, and a plurality of remotely-energized solenoids for actuating the pawl means to engage with the selected gears at predetermined positions during one portion of their driving cycle to stop the selected gears for presentation of characters on the type wheels in position for printing.

2. A compact print module comprising a
first plate and a second plate space therefrom, a
differential shaft journaled from and extending between the plates, the shaft carrying a plurality of slotted individually-journaled differential gears in aligned fashion,
means for oscillatably driving the shaft,
spring means connected to the differential gears for driving the gears in one direction of travel, a
plurality of type wheels journally supported from the plates and engaged by the differential gears to be rotated thereby, a
bail shaft spaced from the differential shaft and movable therewith along a path in the gear slots for controlling direction and movement of the gears by permitting selected gears to cease movement and allowing other gears to be driven therebeyond in one direction, and for drivingly returning all the gears in the other direction, a
plurality of pawls pivotally supported from the plates and adapted to engage with selected gears at predetermined intervals in said one direction, and
solenoid means for actuating the pawls to engage with the selected gears at predetermined positions during one portion of their oscillating movement in said one direction, thereby stopping the engaged gears for presenting type wheel characters for printing thereof.

3. In a label printer having remotely controlled type wheels, the combination of a
supply of record material,
means for feeding the record material in a path past the type wheels, a
driven shaft, a
plurality of differential gears journaled on the shaft and rotatable independently of each other, each of the gears having a first and a second slot radially spaced therein, a
bail shaft connected to the driven shaft and operable within the first slots for controlling direction and movement of the gears,
means for driving the differential gears in oscillating manner about the shaft, the gears being engaged with the type wheels to position the wheels for printing during one portion of oscillation, said means for driving including a plurality of springs connected to the printer and to the gears for driving said gears in the type wheels setting direction of travel and a pair of arms secured to the driven shaft for moving the bail shaft in a path of controlled movement cooperable with the spring driving of the gears during said one portion of oscillation,
stop means adjacent the driven shaft and operable within the second slots for limiting movement of the gears at the end of said one portion, said bail shaft moving with the driven shaft to collectively return the gears against the urging of the springs during the other portion of oscillation,
pawl means positioned in relation to the differential gears to engage therewith for stopping rotation of the gears at predetermined positions during said one portion of oscillation, and
electromagnetic means for actuating the pawl means to interrupt selected differential gears in response to the remote control.

* * * * *