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Bremner

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[54] **DIFFERENTIALLY POSITIONABLE TYPE WHEELS IN REMOTELY CONTROLLED PRINT MODULES**

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[52] **U.S. Cl.** .....**101/99,** 101/93 C

[51] **Int. Cl.** **B41j 7/48,** B41j 1/46

[58] **Field of Search** .....101/93 C, 93 A, 93 MN, 101/95, 96, 110

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[57] **ABSTRACT**

A remotely-controlled print module for use in printing labels or the like wherein a plurality of differential gears are aligned on a common drive shaft and oscillatably driven to a predetermined position controllable by selective indexing means, the gears meshing with typewheels carried on a shaft parallel to the drive shaft. The gears are independent of each other and are friction driven by means of spring elements for friction loading thereof, wherein during a cycle of operation, the gears are stopped at predetermined positions by means of indexing pawls which are selectively energized through electromagnetic solenoids, the stopped position of the typewheels being compatible for striking by print hammers. The differential gear line-up includes an additional gear and read means for sensing positions of the gears and the typewheels and relaying pulses for commutation effect to a remote computer which directs control of the module printing.

8 Claims, 5 Drawing Figures

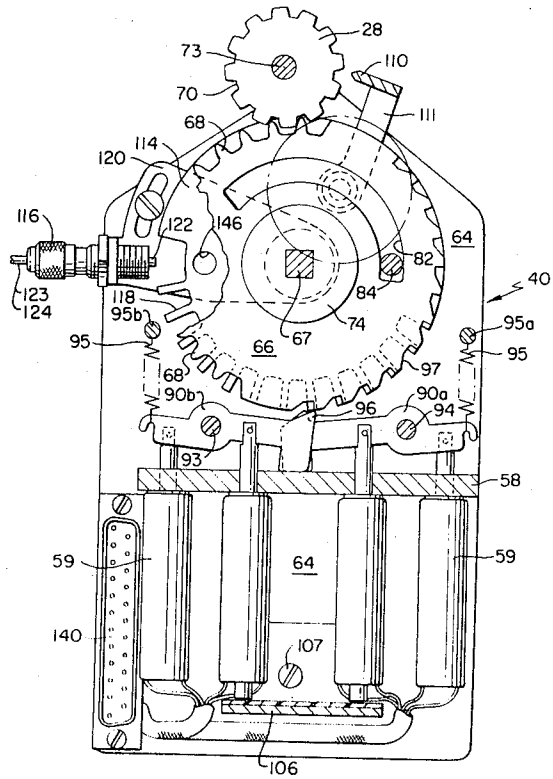


FIG.1

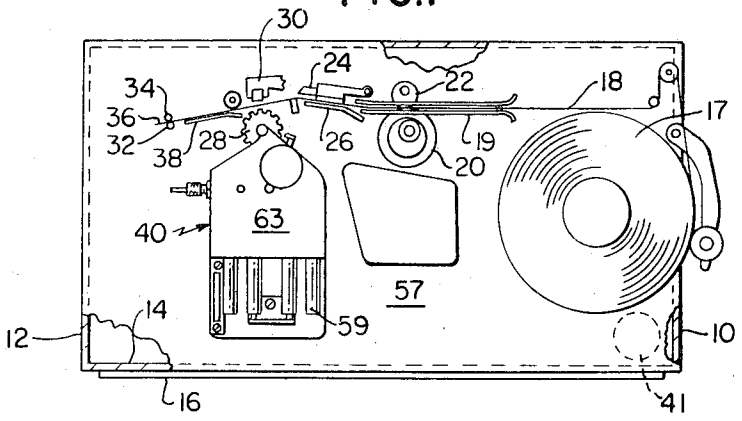
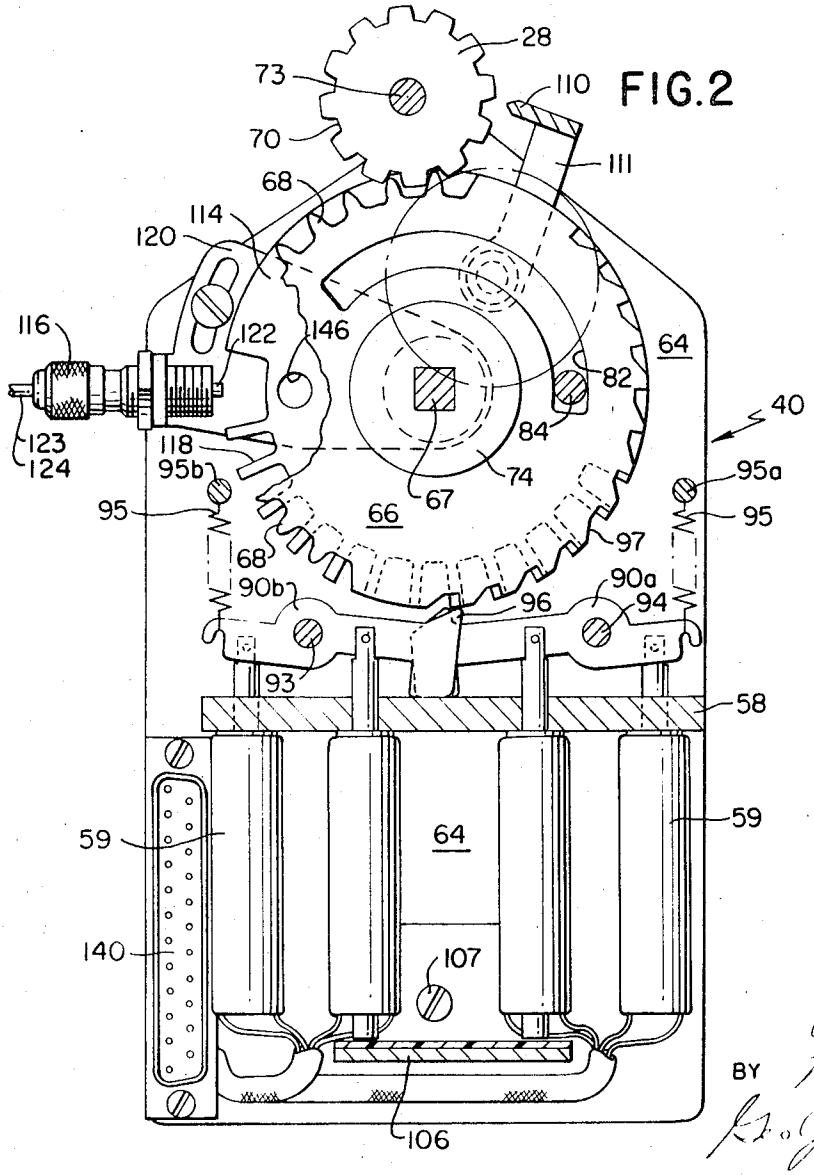


FIG.2



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FIG. 3

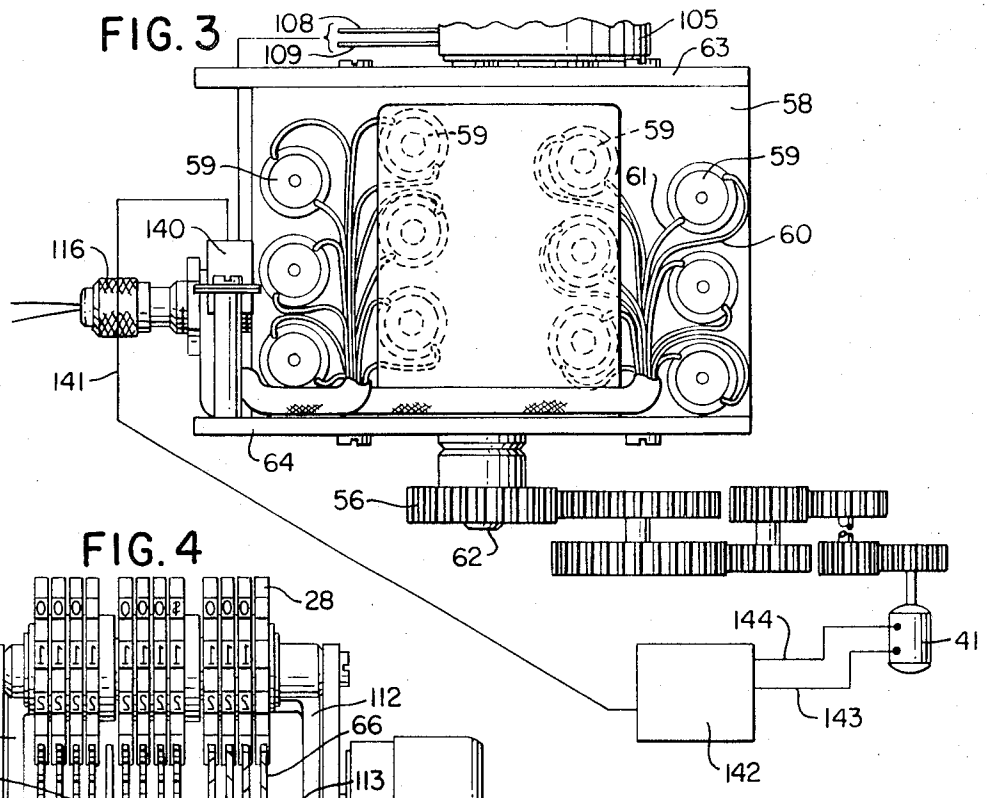


FIG. 4

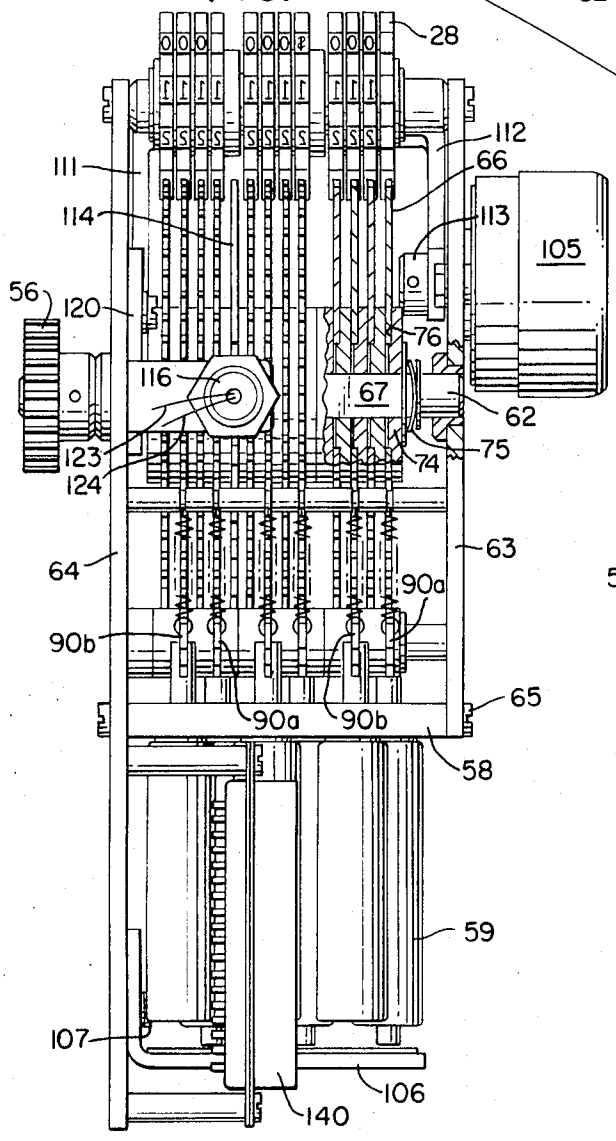
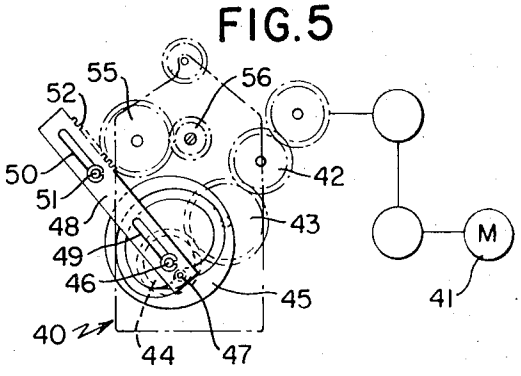


FIG. 5



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DIFFERENTIALLY POSITIONABLE TYPE WHEELS IN REMOTELY CONTROLLED PRINT MODULES

BACKGROUND OF THE INVENTION

In the business machine area, improvements are being sought and are being 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 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 typewheels 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 member from one position to another position. Finally, printing of labels by means of compact mechanism is

disclosed in U.S. application, Ser. No. 55,361, filed on July 16, 1970 in the manes of D. F. Bremner and S. B. Smith, now U.S. Pat. No. 3,690,250 and assigned to the same assignee as the present invention, and wherein this application discloses a remotely-controlled print module having gears individually loaded in one direction by means of cables and springs. However, improvements are desired in label printers of this type.

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 the oscillating drive and are positionable by selective indexing means. The differential gears are positioned in meshing relationship with typewheels having appropriate teeth between surface-etched characters, the gears being collectively driven but permitting individual movement in either direction of rotation by means of friction washer members so as to insure for stable loading and 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, is 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 frame plates and solenoid actuated, 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.

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 frictionally driven in both directions to permit individual drive of the gears.

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.

Another object of the present invention is to provide friction driven gears in the drive line for independent rotational drive of the typewheels of the print module.

And a further object of the present invention is to provide commutation means within the confines of the

print module for remote control of the print operation.

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. 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 bottom view of the print module shown in FIG. 2, and additionally including a schematic representation of drive and control units therefor;

FIG. 4 is a left side elevational view, partially in section, of the module shown in FIG. 2; and

FIG. 5 is a view, partially diagrammatic, showing the printer drive line from a prime mover to the print module drive shaft.

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 typewheels is a desirable 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 of 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 5, a motor 41 is carried in the lower right-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. 5). 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. Follower bar 48 also serves as a drive rack by having teeth 52 engageable with a further gear 55, which, in turn, meshes with a driven gear 56 for driving in rotary oscillating fashion the differentials of the print module 40. As understood from FIGS. 1 and 5, 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 (as viewed in FIGS. 1 and 2).

The print module 40 itself includes a mounting plate 58, to which are attached solenoids 59 (FIGS. 2, 3, and 4), each of which is energized or activated through electrical leads 560 and 61 (FIG. 3). 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. 3) 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 FIG. 4.

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, of course, is round at the ends thereof, however, it has a square portion 67 extending between the round portions for a purpose now to be described. The square portion 67 of the shaft 62 carries a plurality of friction discs or plates 74 fitted thereon for positive driving of the discs in response to the oscillatable rotation of the driven gear 56. The friction discs are contained in close proximity to each other by means of a spring washer 75 urgining the discs in a leftward direction, as viewed in FIG. 4. Each of the friction discs 74 has a cutout or recess 76 for receiving an associated differential gear 66, each gear having a centrally located round bore therein for seating in its respective recess, and the mating surfaces of the gear and the disc thus providing the positive drive area for each gear. The drive contact surfaces of the gear 66 and the disc 74 are specifically designed to drive the gear upon rotation of the shaft 62, however, the rotation of the gear may e stopped at selected points in time during the cycle while permitting continued rotation of its associated friction disc. Each of the differential gears 66 (FIG. 4), has 13 teeth 68 on approximately one-half its periphery (see also FIG. 2) 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. As seen in FIG. 2, each of the differential gears 66 has a radially-spaced slot 82 for receiving a stop shaft 84 secured to the plates 63 and 64 and positioned parallel to the main shaft 62. The shaft 84 acts as a stop element at the end of the drive portion of the oscillating movement in one direction and also as a stop element to limit the amount of travel of the gears in the other direction or at the end of the return portion. The slots 82 permit the gears 66 to rotate independently of the stop shaft 84 during the oscillating motion. Additionally, the engagement of either end of the slot 82 by the stop shaft 84 will carry any non-aligned gears, upon rotation of the drive shaft, to that end position of the oscillation.

Referring to FIGS. 2 and 4, a plurality of 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 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 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 one of the 12 teeth 97 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. The teeth 97 of the differential gears are formed to provide a mating surface for the tip portions 96, while also providing for a camming action upon disengaging therefrom.

As understood from FIG. 2, two types of solenoids 59 are provided — the pull type and the push type. The right hand three and the left hand three of such solenoids (FIG. 3) are of the pull type and include plungers pivotally connected to the associated pawls at points removed from the pawl tip 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. 3, 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 97 of the associated differential gear 66 to interrupt rotation of the gear as the proper character on the connected typewheel 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 FIG. 2) immediately upon deenergization of the respective push or pull solenoid 59. A solenoid plunger restrictor 106 (FIGS. 2 and 4) is supported from the rear support plate 64 and secured thereto by means of a screw 107.

A typewheel liner 110 (FIG. 2), of wedge-shaped configuration, so as to fit between the character teeth of the typewheels 28, 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 by a rotary solenoid 105 and actuated through leads 108 and 109 during machine operation at the time of a final pulse signal from a sensing head which is supported from the print module, the rotary motion being carried through a shaft 113 journaled in front plate 63, the liner 110 engages the typewheels and aligns them in correct position for being struck by the print hammers 30.

A commutator arrangement is built into the print module for continually pulsing the rotational position or location of the differential gears and the typewheels during the driving portion of the oscillating cycle. An additional friction driven member in the form of a commutator wheel 114 is carried on the shaft 62 in line with a sensing head 116 (FIG. 4) of the reluctance type which reads the movement of the teeth 118 as the shaft is rotated. The sensing head 116 is supported in cantilever manner from the rear plate 64 by means of a bracket 120 angularly adjustable on the shaft 62, the sensing head having a tip portion 122 in the nature of a magnet, substantially the same width as one of the teeth 118. The magnet provides a pulse to the remote control equipment each time a successive tooth passes the tip portion 122 to indicate the positions of the typewheel character. Leads 123 and 124 carry the pulse from the reluctance head 116 to the terminal block.

Referring now to FIG. 3, the print module solenoids 59 of the present invention are connected by the leads 60 and 61 through a terminal block 140 having appropriate terminal pins 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. Motor 41 is connected to the device 142 by means of cables 143 and 144 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 wheel 114 through the reluctance head 116 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 home position shown in FIG. 2 (with one end of the slot 82 receiving stop shaft 84) at a precise speed controlled by the double-surface box cam drive 45, each of the differential gears 66 being then friction driven in the clockwise direction by means of its friction disc 74 which, of course, is positively driven by reason of the square shaft portion 67.

During such clockwise rotation of the shaft 62, the slots 82 move equally along stop shaft 84 and the friction discs 74 maintain 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 at the end of the first half cycle 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 wheel 114 and the sensing head 116, which interfaces the attitude of each wheel to the computer. As the typewheel is rotated counterclockwise during the "prepare to print" portion of the cycle, a blank portion of the typewheel appears first at the print hammer position wherein those wheels are stopped in the spaces which require no characters to be printed, the character 9 then appears in printing position at the time the first tooth 118 is pulsed by the magnet 122, then character 8 at the time of the second tooth 118, and so forth to the character 0. These pulses inform the computer of the location of the typewheel characters during the cycle. 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 97 of the differential gear 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 82 in each differential gear 66, the stop shaft 84 has no effect on the intermediate travel of the gear in its clockwise movement and thus leaves 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 by shaft 84 at a typewheel-non-positioning or error character position, however, each of the typewheels 28 contains a character E, adjacent character 0, which is the last character that can be presented to the printing position. This character is never selected by the computer 142 and print solenoids 59, however, in the event that a print solenoid does not fire, that typewheel will be driven to the stop position which will present the character E to the print hammer to indicate an error.

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

After all gears 66 have been stopped, with the associated typewheels thus positioned in the above manner, wherein the friction discs 74 allow any gear to stop and slip without affecting any other gear, the main shaft 62 continues its clockwise rotation another slight amount and, by reason of the last pulse generated from the reluctance head 116, the rotary solenoid 105 is energized which causes the typewheel liner 110 to swing counterclockwise and 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 typewheels, 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 outwardly 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, power is removed from the rotary solenoid 105 and, by reason of the spring return of this solenoid the liner is pulled clockwise to disengage itself from the typewheel grooves. Of course, with power removed from the print solenoids 59, the spring-loaded pawls 90*a* and 90*b* will automatically move out of contact with the teeth of the differential gears 66. As the differential gears 66 are started to be driven in the counterclockwise direction during the second half cycle, the indexing pawls are aided in their disengagement by the ratchet-like construction of the teeth which cams the pawls therefrom.

After the print hammer 30 has contacted the typewheels 28 and the printing on the label has been ac-

complished, 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. Previously the liner 110 has been released from engagement with the typewheels 28, and the liner immediately moves back to its rest position under urgence of the solenoid return spring. The main shaft 62 continues to rotate counter-clockwise, with the shaft 84 positioned to again contact the ends of the slots 82 in the differential gears 66, which, in turn, stops them at the end of the counter-clockwise movement. The main shaft 62 continues to move back to its starting position and to assure that the gears 66 are in the home position, the shaft 67 is overdriven a few degrees which causes some slippage of the friction discs 74, 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. To additionally insure that all differential gears 66 have been returned to the home position, each of the gears has an aperture 146 therein for alignment with an aperture in each of the front 63 and rear 64 plates, when the gears have returned properly. An indication, in the nature of a beam of light passing through the apertures to a photocell or the like, may be realized to show "ready" for the next print command.

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 with a square shaft for driving friction discs, the discs permitting individual rotation of the differential gears to position the typewheels 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 typewheels cooperating with and driven by the differential gears, the typewheels having character teeth thereon with grooves therebetween engaging with the gear teeth,

means including a plurality of spaced friction disks fixed on the shaft for driving thereby and engageable with the gears for rotation thereof, said friction disks tending to resist but permitting individual rotation of the gears,

stop means including a radially-spaced slot in each of said differential gears and a fixed bail shaft for riding in the slots during oscillating movement of the gears and for stopping the gears at one end of oscillation thereof,

pawl means pivotally supported in relation to the differential gears for engagement with selected gears, and

means including 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 typewheels in position for printing.

2. A compact print module comprising a first plate and a second plate spaced 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,

frictional means including a plurality of spaced disks fixed on the shaft for driving thereby and engageable with the gears for rotation thereof, said frictional disks tending to resist but permitting individual rotation of the gears, a

plurality of typewheels journally supported from the plates and engaged by the differential gears to be rotated thereby, a

bail shaft spaced from the differential shaft and receivable 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 stopping rotation of said other gears at the end of travel in said one direction and for stopping rotation of all 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 typewheel characters for printing thereof.

3. The print assembly of claim 2 including an additional differential gear and sensing means adjacent the gear for commutating positions of the typewheels for remote selective energization of the solenoid means.

4. In a label printer having remotely controlled typewheels, the combination of a

supply of record material,

means for feeding the record material in a path past the typewheels, a

drive shaft, a

plurality of friction elements secured to the shaft to be driven thereby, a

plurality of differential gears journaled on the friction elements and rotatable independently of each other, each of the gears having a slot radially spaced therein,

means for driving the differential gears in rotary oscillating manner about the friction elements, the gears being engaged with the typewheels to position the wheels for printing during one portion of oscillation, a

stop shaft spaced from the driven shaft and operable within the slots to permit independent control of the direction and movement of the gears and for stopping movement of certain gears at the end of travel in one direction of oscillation, and for stopping movement of all gears in the other direction,

pawl means including a plurality of spring loaded toothed members 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 solenoid means for actuating the pawl means to interrupt selected differential gears in response to the remote control.

5. The label printer of claim 4 wherein each differential gear includes formed teeth on a portion of the periphery thereof compatible with its associated typewheel, and formed teeth on another portion of the periphery compatible with its associated pawl means.

6. The label printer of claim 4 including an additional differential gear and sensing magnetic means adjacent the gear for commutating positions of the typewheels.

7. The label printer of claim 6 wherein the sensing means comprises a reluctance element for reading positions of the additional differential gear and for generating pulses in response thereto.

8. The label printer of claim 4 wherein each of the differential gears has an aperture therein for permitting passage of light therethrough upon alignment of the apertures to indicate a ready position of the gears.

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