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R. E. BUSCH

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PAPER FEED MECHANISM FOR LISTING CALCULATING-MACHINES

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Sheet 1 of 2

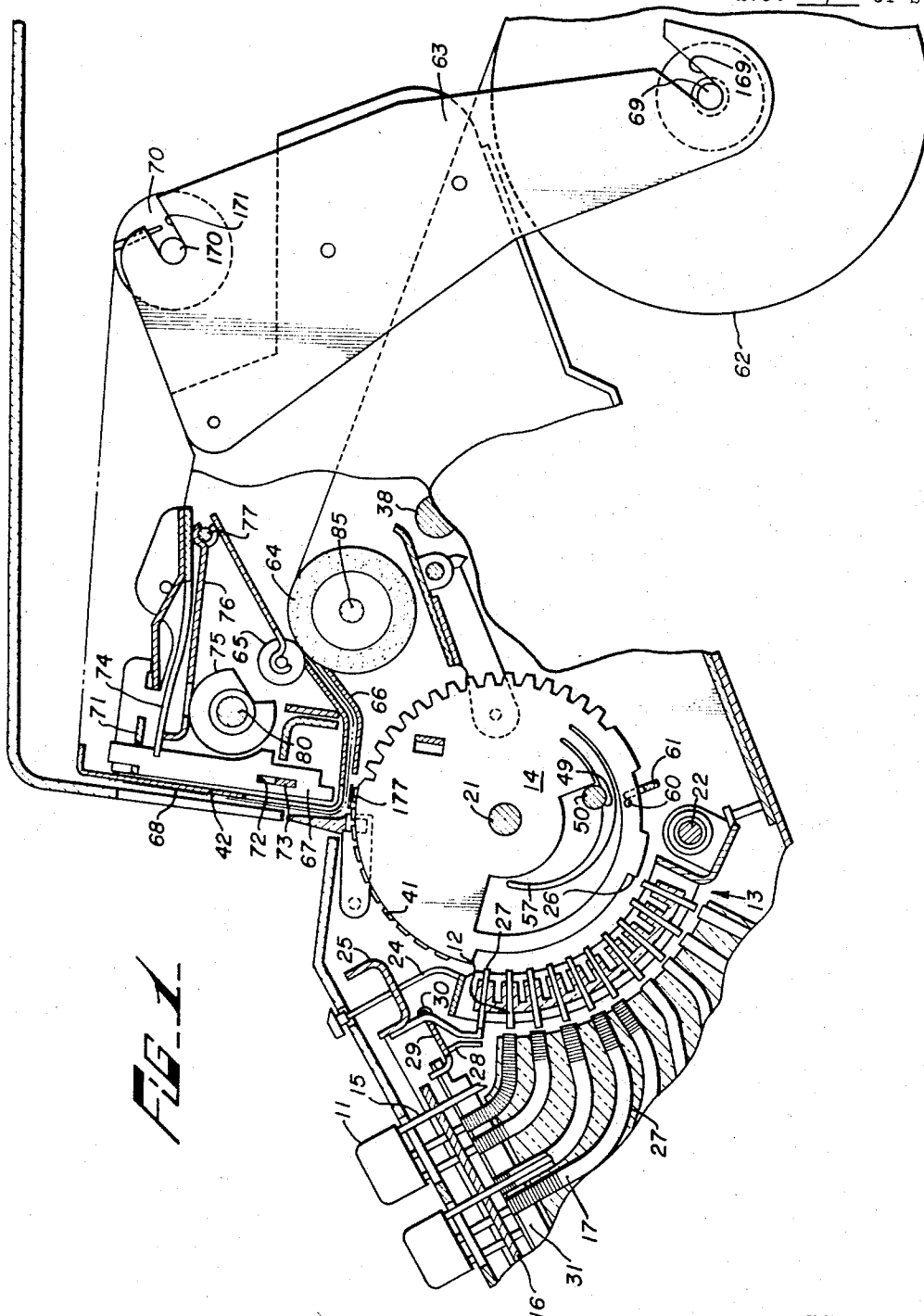


FIG. 1

INVENTOR.
RICHARD E. BUSCH

BY

For 2 Schumann
ATTORNEY.

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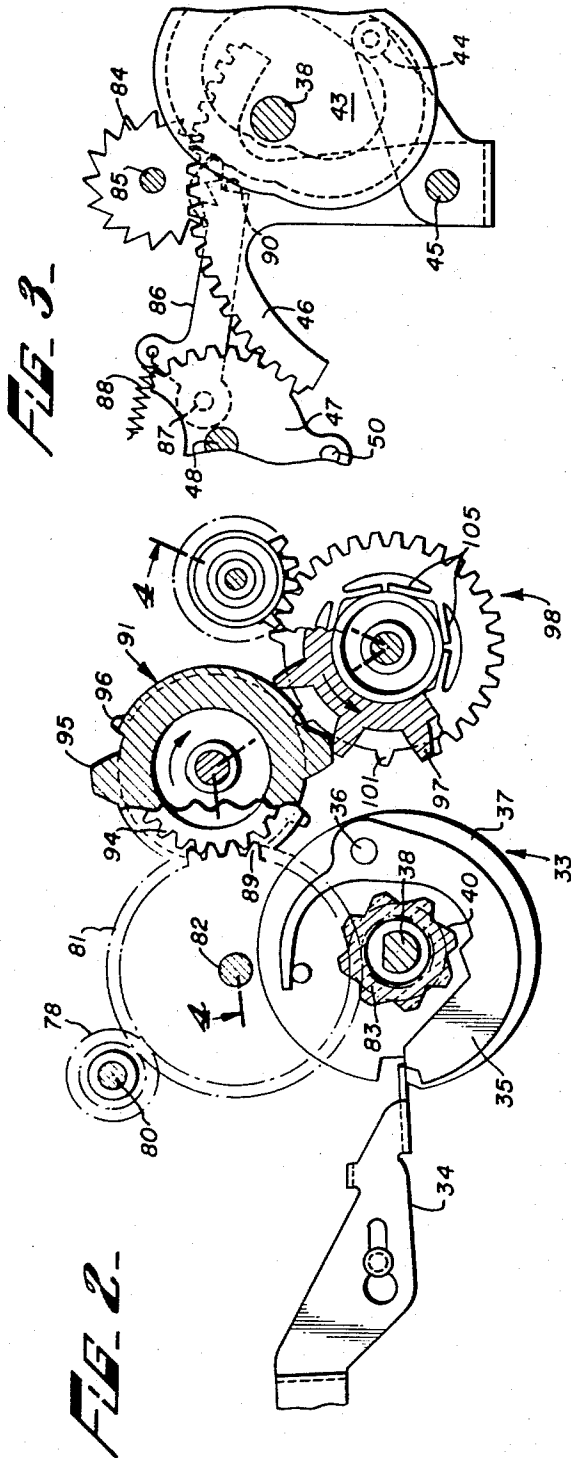
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INVENTOR.
RICHARD E. BUSCH

BY

ATTORNEY.

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PAPER FEED MECHANISM FOR LISTING-CALCULATING MACHINES

Richard E. Busch, La Puente, Calif., assignor to Admaster Corporation, San Gabriel, Calif., a corporation of California

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4 Claims

ABSTRACT OF THE DISCLOSURE

A yieldable gear train drive for the paper takeup roll of a cash register or the like wherein a driving gear has a special tooth thereon engageable with a tooth on a driven gear to hold the paper taut in full cycle position. Prior to the printing operation, the special tooth disengages, permitting the tape to slacken so as to permit printing. After the printing operation, the driving gear advances the driven gear to again render the tape taut.

This invention relates to calculating machines and has particular reference to cash registers and the like capable of listing items, totals, etc.

Such machines embody printing instrumentalities which, in many cases, include printing hammers effective to strike the paper or other record material and to force the same against type elements so as to imprint images of the type elements onto the paper. Particularly in the case of cash registers, the paper is generally rewound onto a takeup roll for future evaluation and storage. The takeup roll is generally yieldably driven in an over-driving condition to continually maintain the paper taut so as to tightly wind the same on the takeup roll. Accordingly, the hammers must pick up the taut paper and force it against the type elements with the result that the hammers tend to lose a considerable amount of their impacting force. This requires the hammer actuating means to be sufficiently strong to overcome the taut condition of the tape. Although such is possible, it tends to apply added strains to all of the parts involved and increases wear and noise of operation.

Therefore, a principal object of the present invention is to overcome the above noted problems.

Another object is to render the tape of a cyclically operable cash register or the like slack during each cycle and to cause the same to become taut at the end of such cycle.

The manner in which the above and other objects of the invention are accomplished will be readily understood on reference to the following specification when read in conjunction with the accompanying drawings, wherein:

FIG. 1 is a longitudinal sectional view through a cash registering machine, partly broken away, embodying a preferred form of the present invention.

FIG. 2 is a sectional view illustrating the gear train for driving various components of the machine, including the takeup roll for the paper tape.

FIG. 3 is a sectional view illustrating the mechanism for advancing the type sectors and the paper tape.

FIG. 4 is an enlarged sectional view taken substantially along the line 4-4 of FIG. 2.

Referring particularly to FIG. 1, the cash registering machine, partly shown therein, incorporates a basic adding and listing mechanism of the type disclosed in the

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patents to R. E. Busch, No. 3,113,719, issued on Dec. 10, 1963; and H. L. Clary et al., No. 3,132,582, issued on May 12, 1964. Reference may be had to these patents for a complete disclosure of mechanism not specifically disclosed herein.

The machine is disclosed as being of the ten key type, in which amounts are entered through ten depressible amount keys ranging in value from 0 to 9. Two of such keys are illustrated at 11. Depression of an amount key sets an appropriate stop element 12 on a pin carriage generally indicated at 13 which shifts laterally in the machine into cooperative relation with combined differential actuators and printing sectors 14 whereby to differentially control the extent of advancement of such sectors during the digitizing phase of a machine cycle.

The amount keys 11 are mounted on keystems 15 which are slideable vertically in slots formed in spaced key frames, one of which is shown at 16. Each keystone has secured thereto a flexible cable 17. The various cables are vertically aligned with each other and are slideably mounted for endwise movement in grooves formed in a guide block 27. The cables terminate in an arcuate pattern concentric with a shaft 21 which independently and rotatably supports the various sectors 14.

The pin carriage 13 is concentric with the shaft 21 and is slideably mounted at its lower end on a stationary rod 22 and has an extension 24 at its upper end which is guided along a slot formed in a channel member 25 forming part of the machine framework.

The pin carriage has a plurality of vertical columns of stop pins 12 which are slideable endwise in slots formed in the pin carriage. Upon depression of a selected amount key, the respective cable 17 is moved endwise to set an aligned stop pin 12 from its normal ineffective position shown in FIG. 1 to a position wherein it forms an abutment in the path of a shoulder 26 formed on an aligned one of the sectors 14.

An additional horizontal row of escapement pins 27 are provided above the remaining pins 12 and are arranged to be set by the finger 28 of a bail 29 which is pivotally supported at 30. The bail 29 is operable by a second bail 31 which is suitably supported by the machine framework and is actuated upon depression of any of the amount keys to depress an aligned escapement pin 27 whereby the pin carriage may escape one column to the left under the pull of a tension spring (not shown).

The machine is driven by a suitable motor, not shown, through a cyclically operable clutch, generally indicated at 33, FIG. 2, under control of a clutch member 34. When the member 34 is drawn to the left against the action of a suitable spring, not shown, a clutch dog 35 pivoted at 36 on a clutch disc 37 secured to a driven shaft 38 is permitted to rock into coupling engagement with a ratchet wheel 40 rotatable by the motor so as to impart one revolution to the shaft 38.

Means are provided to differentially advance the various sectors 14 clockwise under control of set pins in the pin carriage 13 during the first portion of a machine cycle so as to present different type characters 41 thereon to be imprinted on a paper tape 42. For this purpose, a box cam 43 (FIG. 3) is carried by the driven shaft 38 and operates against the cam follower 44 fulcrummed at 45 and carrying a gear sector 46 which meshes with a second gear sector 47 fulcrummed at 48 and carrying a bail rod 50. The rod 50 (FIG. 1) engages detent notches

49 in yieldable tails 57 formed integrally with the sectors 14.

As the bail rod 50 is swung counterclockwise from its home position during the first part of a cycle, it will correspondingly rock the sectors 14 until they strike set stop pins 12 whereupon the tails 57 will yield, permitting the rod to proceed to the limit of its excursion. After the printing phase of the machine cycle, the bail rod 50 will be returned counterclockwise and in doing so the frictional engagement between the bail rod and the tails 57 will return the sectors to their illustrated home positions where pins 60 thereon are arrested by a stationary comb plate 61.

The paper tape 42 is supplied by a tape supply roll 62 rotatably supported by side frames 63 and is guided between feed rolls 64-65, through a guideway 66, past a printing station located between the sectors 14 and respective hammers 67. From the latter station, the tape is guided upward over a writing table 68 and thence rearwardly onto a takeup roll 70. The spindle 69 of the supply roll is removably mounted in slots 169 formed in the side frames 63 and the spindle 170 of the takeup roll is removably mounted in slots 171 formed in the side frames.

The hammers 67 are guided for endwise movement at their upper ends in guide slots formed in a cross brace 71 forming part of the machine framework, while the lower ends of the hammers have slots 72 guided over a guide member 73.

Leaf spring elements 74 urge the hammers downwardly toward contact with the tape 42 but are normally restrained from doing so by a rotatable cam element 75 which operates through a cam follower bail 76 pivotally supported at 77 to normally hold the spring elements and hammers in their upper illustrated positions.

At approximately 190 degrees, in the machine cycle, the cam 75 is rotated to permit the bail 76 and the hammers 67 to be impelled downwardly whereupon they strike the paper tape 42 against an inked ribbon 177 and aligned ones of the type characters 41 on the type sectors to effect an imprint. Immediately thereafter, the cam 75 raises the cam follower 76 to retract the hammers 67 toward their normal upper positions. For this purpose, a gear 78 (FIG. 2) is attached to a shaft 80 supporting the cam 75 and such gear is adapted to be actuated by certain long gear teeth which extend laterally from a full gear 81 rotatably supported at 82 and driven by a gear 83 fastened on the clutch driven shaft 38.

Means are provided for incrementally advancing the tape 42 one line space during the latter part of each machine cycle and after printing has taken place. For this purpose, a ratchet wheel 84 (FIG. 3) is attached to a shaft 85 carrying the tape feed roll 64. The ratchet wheel 84 is incrementally advanced counterclockwise by a pawl 86 pivoted at 87 to the aforementioned gear sector 47. A spring 88 urges the pawl 86 upwardly and during the clockwise return movement of the sector 47 during the latter portion of a machine cycle, a tooth 90 on the pawl 86 engages a tooth on the ratchet wheel to advance the same and consequently the tape 42.

The paper tape 42 is normally held taut between the feed roll 64 and the takeup roll 70 when the machine is in full cycle position, as illustrated, to facilitate writing of items on the portion of the tape located over the writing table 68 and to insure that the tape will be tightly wound on the takeup roll 70. On the other hand, during each machine cycle and prior to the printing operation, the tape is slackened to facilitate operation of the print hammers. For this purpose, the takeup roll 70 is driven by a special gear train shown in FIGS. 2 and 4, driven by the gear 81.

Such train includes a gear member generally indicated at 91 rotatably mounted on a frame stud 92 which is supported by a machine frame plate 93 to which one of the side frames 63 is also secured. The gear member 91 has a full set of gear teeth 94 in mesh with and driven

by the gear 81. A pair of diametrically opposed abnormally wide gear teeth 95 are formed on the gear member 91 and are spaced laterally from the gear teeth 94. A second pair of diametrically opposed gear teeth 96 are also formed on the member 91 and are laterally spaced from the teeth 95. The latter are angularly spaced from the teeth 95.

Gear teeth 95 are aligned with a set of widely spaced gear teeth 97 on a gear member generally indicated at 98 which is rotatably mounted on a frame stud 100. The teeth 96, on the other hand, are aligned with a second set of widely spaced teeth 101 also formed on the gear member 98 and angularly located intermediate the teeth 97.

The gear member 98 is adapted to yieldably drive the takeup roll 70 and for this purpose a gear member 102 is rotatably mounted on a hub 103 formed on the gear member 98 and meshes with a gear 104 attached to the spindle 69 of the takeup roll 70. The gear member 102 is formed with a plurality of yieldable friction fingers 105 which frictionally engage the hub 103 to transmit a yieldable drive to the takeup roll.

In full cycle position, the periphery of one of the special teeth 95 engages a tooth 97 on the gear member 98, as shown in FIG. 2, thus yieldably holding the takeup roll from retrograde rotation. In this condition, the tape 42 is held taut. However, shortly after a new cycle is initiated, the tooth 95 recedes from the engaged tooth 97, thereby freeing the gear 98 to permit the tape to slacken between the takeup roll and the feed roll 64. This will permit the hammers 67 to freely strike the tape against the printing ribbon and type characters 41 during the printing operation.

The wide teeth 95 each presents a relatively long peripheral portion which permits appreciable backlash in the gear train to take place without affecting the blocking function of the gear tooth.

After the printing is effected and the paper is advanced in the guideway 66 by the feed roller 64, the next succeeding tooth 96 on the gear member 91 will engage one of the teeth 101 to advance the gear member 98 a short angular distance. Following this, the following special tooth 95 will engage the next succeeding tooth 97 to further advance the gear member 98 and consequently the takeup roll 70. The ratio of the gears is such that the takeup roll will tend to overdrive the tape and thus cause it to become taut, whereupon the gear member 98 will slip relative to gear 102.

At the completion of the machine cycle, the periphery of the last noted gear tooth 95 will come to rest against the gear tooth 97 which it has advanced so as to hold the tape taut. Thus, the tape will be held tightly wound on the takeup roll and items may be readily written on the portion of the tape laying over the writing table 68.

Having thus described the invention, what is desired to be secured by United States Letters Patent is:

1. In a calculating machine having printing instrumentalities:

a tape supply means,

a tape takeup roll,

means for guiding a tape from said supply means into cooperative relation with said printing instrumentalities and onto said takeup roll, and cyclically operable means for actuating said printing instrumentalities;

the combination comprising a yieldable drive device including a first gear for advancing said takeup roll; means including a second gear driven by said cyclically operable means for actuating said first gear;

an actuating tooth on said second gear engageable with a driven tooth on said first gear when said cyclically operable means is in full cycle position whereby to maintain said tape taut,

said actuating tooth receding from said tooth on said first gear upon actuation of said cyclically operable

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means and prior to operation of said printing instrumentalities whereby to permit said tape to slacken, and

another tooth on said second gear effective to engage a tooth on said first gear after operation of said printing instrumentalities whereby to advance said takeup roll to render said tape taut.

2. The combination according to claim 1 wherein said yieldable drive device further includes a friction clutch.

3. The combination according to claim 1 wherein the periphery of said actuating tooth engages said driven tooth when said cyclically operable means is in full cycle position.

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4. The combination according to claim 1 wherein said actuating tooth is wider than said driven tooth.

References Cited

UNITED STATES PATENTS

884,721	4/1908	Davidson	242—67.3
911,236	2/1909	Groebli	242—56.8
1,131,849	3/1915	Magnus	242—67.3
2,062,570	12/1936	Fuller	242—67.2
2,686,013	8/1954	Christian	242—67.3

WILLIAM S. BURDEN, *Primary Examiner.*