United States Patent

[11] 3,613,857

[72] Inventors **Paul Thevis**
Oberndorf;
Artur Frobel, Oberndorf; Oskar Stoll,
Aistaig, all of Germany

[21] Appl. No. **840,809**
[22] Filed **July 10, 1969**
[45] Patented **Oct. 19, 1971**

[73] Assignee **Olympia Werke Aktiengesellschaft**
Wilhelmshaven, Germany

[32] Priority **July 13, 1968**
[33] **Germany**
[31] **P 17 61 847.2**

[54] **RIBBON TRANSPORTING AND SHIFTING MECHANISM**
9 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **197/151,** 197/158, 74/84
[51] **Int. Cl.** **B41j 33/14,** B41j 33/58
[50] **Field of Search** 197/151, 157–159; 74/84

[56] **References Cited**

UNITED STATES PATENTS

1,064,703	6/1913	Brown	197/158 X
2,161,856	6/1939	Coxhead	197/151
3,237,747	3/1966	Frechette et al.	197/157 X
3,348,650	10/1967	Meinherz et al.	197/151
3,349,888	10/1967	Page	197/158
3,401,783	9/1968	Norwood et al.	197/151

Primary Examiner—Robert E. Pulfrey
Assistant Examiner—Stephen C. Pellegrino
Attorney—Michael S. Striker

ABSTRACT: The carbon ribbon of a calculator having a line printer, is mounted on a carrier and stepwise transported in longitudinal direction past the line printer, while a multiple cam cyclically moves the carrier with the ribbon in transverse direction between three positions since three times the height of the types of the line printer correspond to the width of the ribbon. In order to fully utilize the ribbon, it is longitudinally advanced in connection with each printing operation, a distance which is substantially equal to the length of the line printer divided by three.

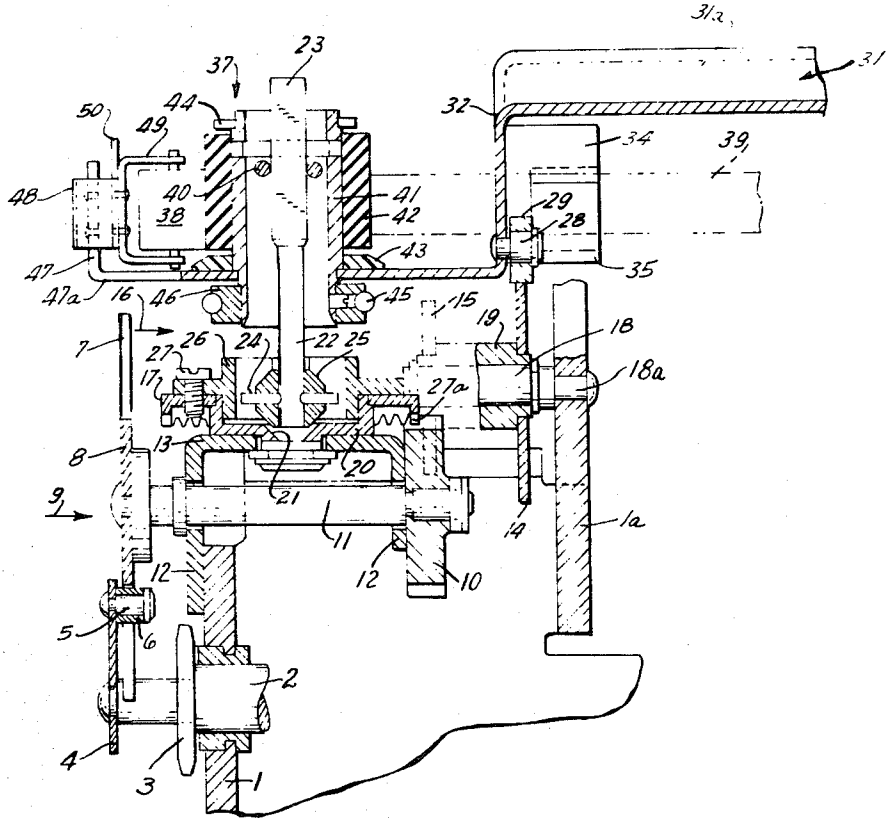
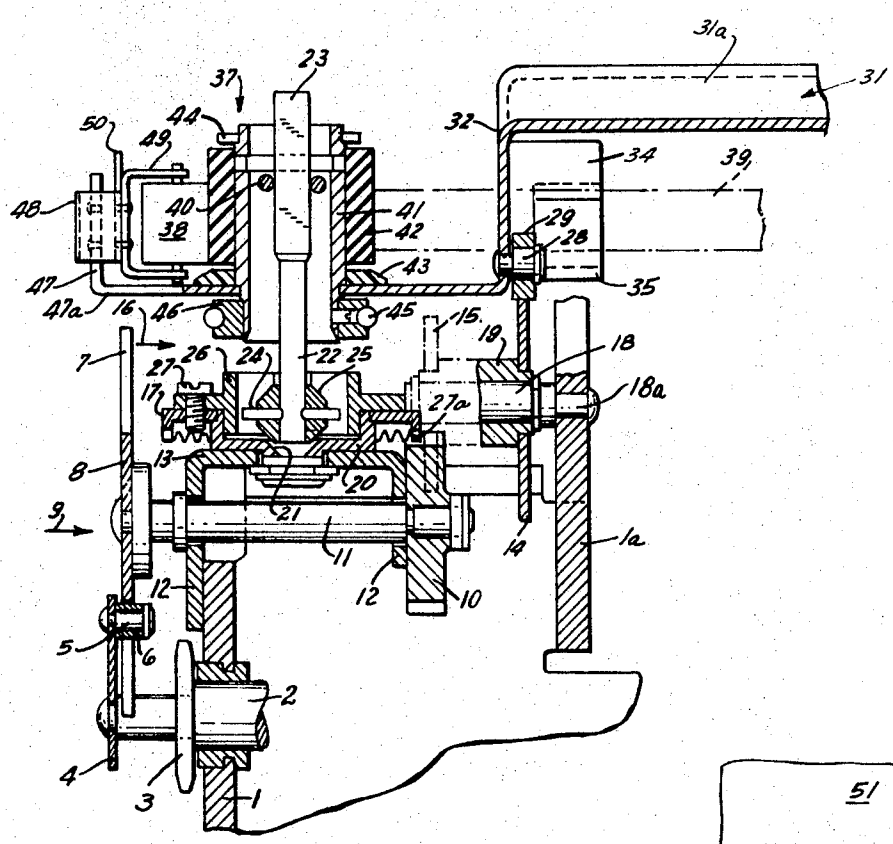


FIG. 1



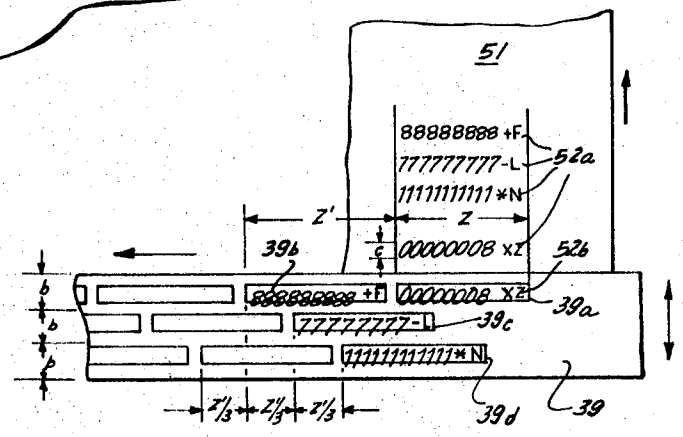
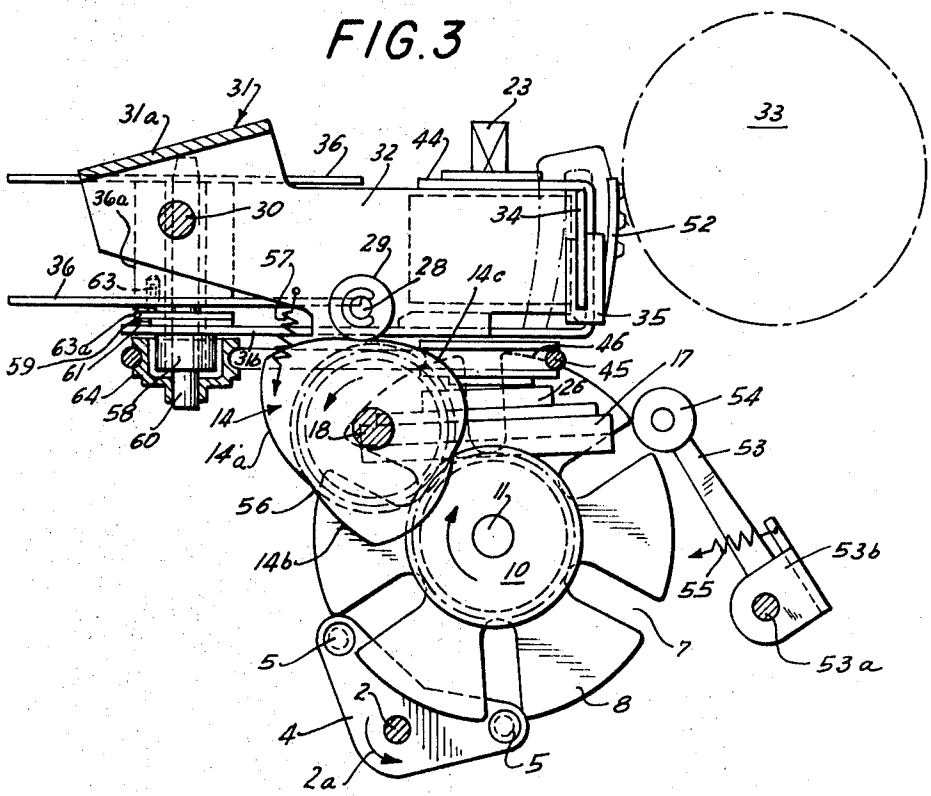


FIG. 2

INVENTORS
Paul Thevis, Arthur Fröbel, Oskar Stoll
BY Michael S. Striker
ATTORNEY

FIG.3



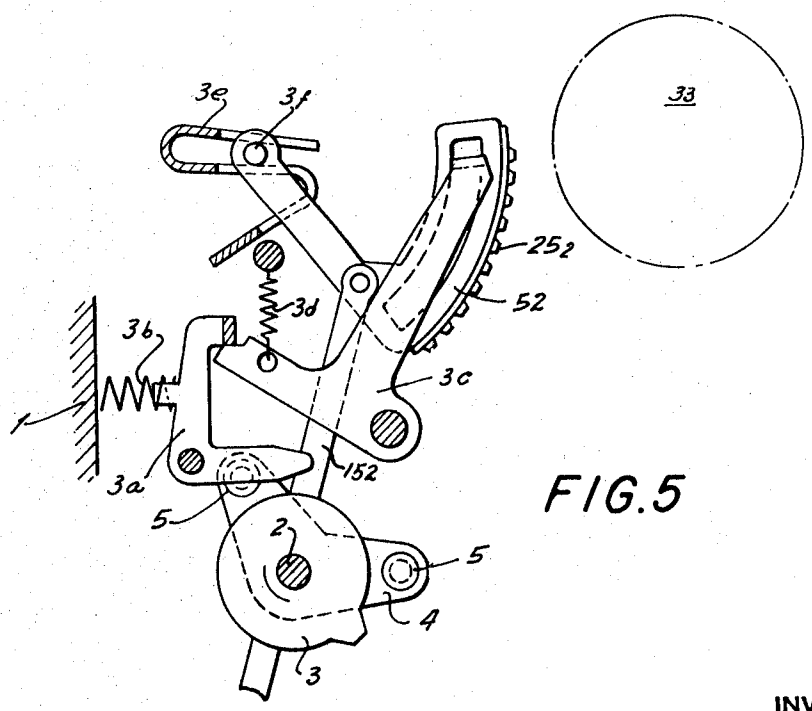
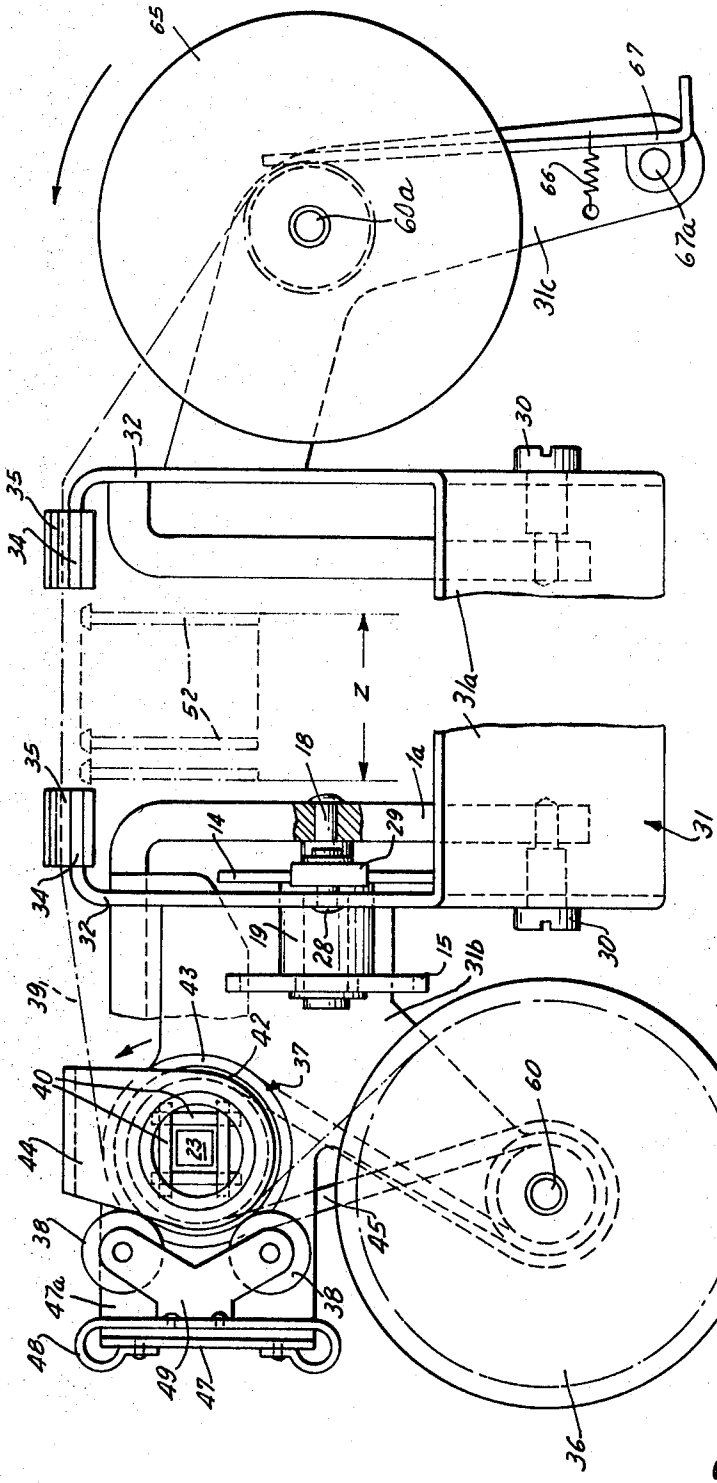


FIG.5

INVENTORS
Paul Thevis, Arthur Fröbel, Oskar Stoll
BY
Michael S. Striker
ATTORNEY

FIG. 4



INVENTOR
Paul Thevis, Arthur Fröbel, Oskar Stoll
BY
Michael S. Striker
ATTORNEY

RIBBON TRANSPORTING AND SHIFTING MECHANISM

BACKGROUND OF THE INVENTION

The present invention relates to an apparatus by which an ink ribbon or carbon ribbon of a calculator is fully utilized, under consideration of the fact that the width of the ribbon is greater than the height of the types of the printer of the calculator.

The U.S. Pat. No. 3,348,650, and the U.S. Pat. No. 3,349,888 disclose apparatus serving the purpose of better utilizing the width of a ribbon. However, the apparatus according to the prior art is complicated, and does not permit a full utilization of all kinds of ribbons.

SUMMARY OF THE INVENTION

It is one object of the invention to overcome disadvantages of the prior art, and to provide a ribbon transporting and shifting mechanism of simple construction capable of fully utilizing the entire surface of a ribbon for imprints of a line printer.

In accordance with the invention, a ribbon carrier is movable out of a position of rest, cyclically to one of several printing positions, which is effected by a stepwise driven cam which has a plurality of cam recesses of equal height, and intermediate cam lobes of different height, corresponding to the different printing positions of the carrier and ribbon. The cam is operatively connected with the means by which the ribbon is transported in longitudinal direction, so that the ribbon is transported in synchronism with printing operations, a distance which is at least equal to the length of the line printer divided by the number of operative positions of the carrier and ribbon.

An embodiment of the invention comprises printing means having a predetermined length for making a maximum number of imprints of types which are arranged in a line and simultaneously moved toward the ribbon and a printing surface; carrier means including guide means for guiding the ribbon in longitudinal direction past the printing means; supporting means mounting the carrier means for transverse movement with the ribbon relative to the printing means between a predetermined number of printing positions in which different longitudinal strip portions of the ribbon are located opposite the printing means; drive means, preferably including a stepwise operating transmission, for actuating the printing means to engage the ribbon during printing operations; shifting means, preferably including a cam having a predetermined number of lobes, connected with the carrier means and driven to move the carrier means in synchronism with the printing operations cyclically between the printing positions; and transporting means connected with the ribbon and driven to transport the ribbon in longitudinal direction in synchronism with the printing operations a distance at least equal to the length of the printing means divided by the predetermined number of cam lobes and printing positions. Due to the stepwise movement of the ribbon in longitudinal and transverse directions, longitudinally and transversely staggered areas of the ribbon are successively engaged by the printing means and the surface of the ribbon is fully used.

In the preferred embodiment of the invention, the shifting means and the transporting means are driven by a stepwise operating transmission, and the ribbon is transported half the above-mentioned distance before each printing operation, and the other half of the distance after each printing operation.

The two half steps of the ribbon are obtained by a pin and wheel Geneva transmission, whose drive member has two pins cooperating with slots of the wheel twice during each revolution of the drive member.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims.

The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary elevation, partially in section, illustrating an embodiment of the invention located on the left side of the printing means of a calculator;

FIG. 2 is a fragmentary schematic view illustrating imprints made on a record carrier, and corresponding used areas of a carbon ribbon;

FIG. 3 is a fragmentary side elevation, partially in section, of the embodiment of FIG. 1;

FIG. 4 is a fragmentary plan view illustrating the embodiment of FIG. 1, and including the portion of the apparatus located on the right side of the printing means; and

FIG. 5 is a fragmentary elevation illustrating the drive of the printing means. DESCRIPTION OF THE PREFERRED EMBODIMENT

As best seen in FIG. 1, a drive shaft 2 is mounted on a supporting frame 1 and carries a cam 3 having one cam lobe, as best seen in FIG. 5. Drive shaft 2 also carries a drive member 4 whose function will be described hereinafter. A locking member 3*a* is pivotally mounted on the supporting frame 1 and biased by a spring 3*b* to assume a position engaging and locking a drive member 3*c* which is pivotally mounted and has a portion located in a curved slot of each printing element of the printing means 52. At the end of each printing element, a guide pin 3*f* is provided which is located in a slot of a guide means 3*e*. The ordinal printing members of printing means 52 are respectively connected with differential elements 152 by which each printing element is placed in a digital position so that a line of aligned types 252 is located opposite the printing line of the platen 33.

When drive shaft 2 makes one revolution under the control of the main drive of the calculator, the lobe of cam 3 engages locking member 3*a* after turning about 180°, so that drive member 3*c* is released and drives under the action of spring 3*d*, all printing elements and thereby the printing means 52 to a position for engaging the platen and a record carrier tape on the same. The drive of the printing means 52 is not an object of the invention and is disclosed in U.S. Pat. No. 2,832,283. In the illustrated embodiment, printing means 52 has 12 printing elements which can be shifted to digital positions for printing a 10-order number and two additional symbols. The total length of a line printed by printing means 52 is Z.

The drive means of the mechanism include, in addition to drive shaft 2, a stepwise operating transmission 9 which has a drive member 4 secured to shaft 2 and having two pins 5 provided with rollers 6 and cooperating with slots 7 of a wheel 8, as best seen in FIG. 3. During rotation of drive shaft 2 and drive member 4, wheel 8 will perform two angular steps since two slots 8*a* of the six slots 7 are engaged by the two pins 5 during each revolution of drive shaft 2 during which a printing operation of printing means 52 takes place.

The slotted wheel 8 is connected by a shaft 11, mounted in a support bracket 13 having legs 12 provided with bearings for shaft 11. A gear 10 is mounted on the other end of shaft 11 and turns stepwise together with slotted wheel 8. Gear 10 meshes with a narrow spur gear 15 which is fixed on a hub portion 19 secured to a cam 14. A shaft 18, secured by a rivet 18*a* to a support wall 1*a*, passes through hub portion 19 and rotatably supports spur gear 15 and cam 14 which is stepwise turned by transmission 9.

A carrier 31 has a U-shaped portion including a yoke 31*a* and two legs 32, one of which carries on a riveted pin 28, a turnable cam follower roller 29 cooperating with cam 14, see also FIG. 4.

Two pivot screws 30 have threaded portions secured to support walls 1*a*, and journal portions passing through bores in legs 32 for pivotally supporting carrier 31. Legs 32 have bent end portions 34 located on opposite sides of printing means 52 and supporting two guide means 35 for a carbon ribbon 39 so that a portion of the ribbon extends between printing means 52, and a record carrier tape 51 see FIG. 2, on platen 33.

When the stepwise operating transmission 9 is driven by drive shaft 2, the three cam lobes 14*a*, 14*b*, and 14*c* succes-

sively cooperate with cam follower roller 29 and shift carrier 31 between three printing positions in which three different longitudinal strip-shaped portions of ribbon 39, each having the width *b*, are respectively located opposite the line of operative printing types of printing means 52. As shown in FIG. 2, the printing types produce imprints having a height *c*.

When cam follower roller 29 engages the recessed portion 56 between two cam lobes, carrier 31 assumes the same position of rest, since recesses 56 are spaced the same radial distance from the axis of shaft 18. In this position of rest of carrier 31, guide means 35 hold the ribbon 39 in a low inoperative position.

The top plate of supporting bracket 13 carries a thrust bearing 20 which has a central recessed seat 21. A shaft 22 has a ball-shaped end portion 25 which is mounted in the seat 21 for turning movement. A pin 24 passes through shaft 22 and ball 25 and has end portions located in a slot of a turnable member 26 having a flange to which a crown gear 17 is secured by screws 27. The gear teeth 27*a* of gear 17 are narrow and project downward into meshing engagement with the second half of the stepwise movable gear 10 whose first half is in meshing engagement with spur gear 15.

The upper portion 23 of shaft 22 has a square cross section 23 and is coupled by crossing pins 40, see also FIG. 4, with a bushing 41. Shaft 22, 23 is driven from gear 10 through crown gear 27 and coupling member 26, but is angularly displaceable. A transporting roller 42 in the form of a rubber sleeve on sleeve 41, cooperates with two pressure rollers 38 mounted on a fork-shaped member 49 which is secured to a leaf spring 48 carried by a portion 47 on an arm 47*a* projecting from one leg 32 of carrier 31. The ribbon 39 passes about transporting roller 42 and is pressed by pressure roller 38 against the same. Sleeve 41 is pressed into rubber sleeve 42, and turns with the same and shaft 22. The lower end portion of sleeve 41 passes through a corresponding opening in carrier portion 47*a* and is pressed into a pulley 46 which has an annular peripheral recess for a rope 45 which forms an endless crossing loop and is also laid about another pulley 64 to which a journal pin 60 is secured, as best seen in FIGS. 3 and 4. Sleeve 41 is also pressed into a frustoconical ring 43 which, together with pulley 46, prevents any axial movement of the transporting roller 37 which includes sleeves 41 and 42, and is held by a portion 44 of carrier 31 engaging a groove in sleeve 41. A projection 50 on the leaf spring 48 on carrier portion 47, permits retraction of pressure rollers 38 from transporting roller 37 by finger pressure on projection 50.

When carrier 31 is shifted by the cam 14 and follower roller 29 between three printing positions and a position of rest, transporting roller 37 and pressure roller 38 move with carrier 31, while transporting roller 37 remains in driving connection with shaft 22 and 23 since coupling pins 40 move relative to the end portion 23 of shaft 22. The universal bearing 25, 24, 21 permits also angular movement of carrier 31 relative to shaft 22, 23.

As shown in FIG. 3, the slotted wheel 8 cooperates with an arresting means which has a lever portion 53 carrying an arresting roller 54 at one end, and is mounted on its other end on a shaft 53*a* which is mounted on supporting means 1, not shown in FIG. 3. A spring 55 is secured to the supporting means and to an arm portion 53*b* of lever 53 so that arresting roller 54 is urged against the periphery of the slotted wheel 8 and engages one of the slots 7 to secure wheel 8 in one of six operative positions. As explained above, three alternate positions of the slotted wheel 8 correspond to three operative positions of carrier 31 and ribbon 39, while the other three alternate positions place the carrier 31 and the ribbon 39 in a lower position of rest since cam follower roller 29 is located at the bottom of one of the three recesses 56 of cam 14. Since FIG. 3 shows cam 14 in a position in which one of the three recesses 56 is engaged by cam follower 29, the position of carrier 31 shown in FIG. 3 is the position of rest so that the guide means 35 and the ribbon 39 are located below the printing line formed by the selected types of printing means 52 when engaging the platen 33. Carrier 31 tends to assume the low position of rest due to its weight, and also under the action of a spring 57 secured to carrier 31 and to supporting means 1, not shown in FIG. 3.

An arm 31*b* of carrier 31 fixedly carries a bushing 58 serving as a bearing for the journal shaft 60 to which pulley 64 is secured. A spool 36 having a hub 36*a* is placed on journal shaft 60 and has a central bore of greater diameter than the diameter of journal shaft 60. Spool 36 has an axial coupling recess 63 into which a coupling pin 63*a*, secured to a flange 59 of journal shaft 60, projects. Flange 59 slidably abuts the top surface of a flange 61 of bearing bushing 58 which is inserted with a press fit into a corresponding opening in carrier portion 31*b*. When pulley 64 is rotated from pulley 46 by rope 45, journal shaft 60 rotates and drives through coupling means 63, 63*a* the takeup spool 36. Since the diameter of the wound-up portion of ribbon 39 on the hub 36*a* of spool 36 is gradually increased, while transporting roller means 37, 38 transport the ribbon 39 at a uniform speed, although stepwise, rope 45 is designed to slip on pulleys 64 and 46 when the diameter of the wound-up ribbon is so great that the ribbon is faster wound up on spool 36 than transported by the transporting roller means 37, 38.

As shown in FIG. 4, a journal shaft 60*a* is mounted on the other side of carrier 31 and printing means 52, and supports a letoff spool 65 on which a new ribbon 39 is wound up. Shaft 60*a* is mounted on another arm 31*c* of carrier 31 so that letoff spool 65 is raised and lowered together with takeup spool 36 and transporting roller means 37, 38 when cam 14 moves carrier 31 between three printing positions, and a lower position of rest.

A brake lever 67 is turnably mounted on a pivot 67*a* on carrier portion 31*c*, and is urged by spring 66 to abut the coil formed by ribbon 39 on the hub of letoff spool 65 so that the same is braked.

OPERATION

When drive shaft 2 is rotated by the calculator mechanism one revolution in the counterclockwise direction of the arrow 2*a* in FIG. 3, the printing means 52 are operated by the mechanism, shown in FIG. 5, to move toward and away from platen 33 to print a line of numbers and symbols 52*b* by pressing the ribbon 39 against the record carrier tape 51. The maximal length of the imprint is Z as shown in FIG. 2. An area 39*a* of ribbon 39 is used for the imprint which has also the length Z, and a height *c* corresponding to the height of the types of printing means 52.

At the beginning of the revolution of drive shaft 2 with drive member 4, one pin 5 enters the corresponding slot 7 and turns slotted wheel 8 an angle of 60° so that cam 14 is turned through gears 10 and 15 and sleeve 19 a corresponding angle of 60° in counterclockwise direction, so that the highest point of the lowest cam lobe 14*c* engages cam follower roller 29 and moves carrier 31 to its lowest printing position in which ribbon 39 is also in its lowest printing position in which the uppermost longitudinal strip-shaped portion of ribbon 39, having the width *b*, is located opposite the operative line of types of printing means 52. At this moment, shaft 2 has turned 180° and printing means 52 is operated under control of cam 3 to make the imprint, using the area 39*a* of ribbon 39.

When drive shaft 2 with drive member 4 continues its first revolution, the second pin 5 engages the next slot 7 of wheel 8 and turns the same further 60° so that cam 14 turns 60° to the end of cam lobe 14*c*, and cam follower roller 29 engages the recessed cam portion between lobes 14*b* and 14*c*. The carrier 31 is again in the position of rest in which it is shown in FIG. 3, and the ribbon 39 is in the low inoperative position, but, as compared with FIG. 3, cam 14 has turned an angle of 120°.

During the same revolution of drive shaft 2, the meshing gears 10 and 17 turn with wheel 8 two steps of 60°. The motion is transmitted by coupling means 24, 26, shaft 22, coupling means 23, 40 to sleeves 41 and 42 so that transport-

ing roller 37 turns 60° before the printing operation, and 60° after the printing operation, transporting ribbon 39 altogether a certain distance in longitudinal direction. During the next-following revolution of the drive shaft 2 with drive member 4, the cam lobe 14*b* is operative to raise carrier 31 to a printing position in which the central strip portion of ribbon 39 is located opposite the line of types of printing means 52, and during the third revolution, the highest cam lobe 14*a* is effective to raise carrier 31 with ribbon 39 to the highest position in which the lowest strip-shaped portion of ribbon 39 is located between the line or printing types and the record carrier tape 51. Every time a recess 56 is engaged by follower roller 29, the ribbon is lowered to an inoperative position, not shown. Due to the faCt that the stepwise operating transmission 4 to 8 performs two steps during each revolution of drive shaft 2, respectively preceding and following the printing operation which is controlled by drive shaft 2 in synchronism with the angular displacement of the slotted wheel 8, the printing is always carried out when the ribbon is held by the carrier 31 in a printing position, and the ribbon is transported before and after the printing operation. Spring 57 and the weight of carrier 31 assure a continuous engagement of cam follower roller 29 with the peripheral cam track of cam 14.

FIG. 2 illustrates four previously made imprints 52*a* on record carrier tape 51. The oldest imprint with digits 8 was followed by an imprint with digits 7, another imprint with digits 1, and finally an imprint with digit 8 in the lowest order. Corresponding areas 39*b*, 39*c*, 39*d* and 39*a* of ribbon 39 were used for making the imprints 52*a*, respectively. In view of the height *c* of the printing types a corresponding strip-shaped portion of ribbon 39 having the width *b* is used for each imprint. If the ribbon would have a width 4*b*, four cam lobes would have to be provided for moving the carrier 31 to four printing positions.

In regard to the longitudinal shifting of the ribbon, obtained by transporting roller means 37, 38, the distance between longitudinally adjacent spaced print areas of ribbon 39, for example the distance between areas 39*a* and 39*b* must be at least equal to the length Z of a line of printed characters. However, it is preferred to use the distance Z′ which is greater than the length of imprints Z by one unit corresponding to the area of a type so that overlapping of areas 39*a* and 39*b*, for example, is reliably prevented.

Since the ribbon must be shifted a distance Z, or a distance Z′ in three displacements, each displacement is Z′/3 since three transversely adjacent areas of ribbon 39 are used.

If a predetermined number of cam lobes is provided for using the same predetermined number of longitudinal strip-shaped portions of the ribbon 39, each longitudinal distance of displacement of ribbon 39 corresponding to a printing operation, must be at least the length of a line of types divided by the predetermined number. However, as explained above, the distance which ribbon 39 is displaced in longitudinal direction corresponding to each printing operation, is covered in a half step before the printing operation, and in a half step after the printing operation.

As the printing of lines 52*a* is continued, substantially the entire surface of ribbon 39 is utilized by areas staggered in longitudinal and transverse directions of ribbon 39, the transverse width *b* being slightly greater than the transverse width *c*, and the distance Z′ being slightly greater than the length Z so that overlapping of used areas of ribbon 39 is reliably prevented.

As the diameter of the coil wound up on the takeup spool 36 increases, the rope 45 slips in pulleys 46, 64 since the ribbon is stepwise transported at a constant speed by transporting roller 37. While carrier 31 moves up and down between three printing positions and a position of rest, transporting roller 37 moves with carrier 31 relative to shaft 22, but the driving connection is maintained since coupling pins 40 slide on the planar faces of the square end portion 23 of shaft 22.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of ribbon transporting and shifting apparatus differing from the types described above.

While the invention has been illustrated and described as embodied in a ribbon transporting and shifting mechanism which is moved relative to a line of printing types in transverse and longitudinal directions so that the ribbon is fully used, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

We claim:

1. Ribbon transporting and shifting mechanism, comprising, in combination, printing means having a predetermined length for making a maximum number of imprints; carrier means including guide means for guiding the ribbon in longitudinal direction past said printing means; supporting means mounting said carrier means for transverse movement with the ribbon relative to said printing means between a predetermined number of printing positions in which different longitudinal strip portions of the ribbon are located opposite said printing means; drive means for actuating said printing means to engage the ribbon during said printing operations, said drive means including a drive shaft and a stepwise operating transmission means operating in synchronism with said printing operations to transport the ribbon half said distance before each printing operation, and half said distance after each printing operation, said transmission means including a driven wheel having angularly spaced slots and a rotary drive member driven from said drive shaft and having two spaced pins cooperating with said slots to angularly displace said wheel twice during each revolution of said drive shaft; shifting means connected with said carrier means and stepwise driven from said transmission means to move said carrier means intermittently in synchronism with said printing operations cyclically between said printing positions; and transporting means connected with the ribbon and stepwise driven from said transmission means to transport the ribbon in said longitudinal direction in synchronism with said printing operations a distance at least equal to said predetermined length divided by said predetermined number whereby longitudinally and transversely staggered areas of the ribbon are successively engaged by said printing means and the surface of the ribbon is fully utilized, and movement of said carrier means between said printing positions is synchronized with longitudinal stepwise movements of said ribbon.

2. Mechanism as claimed in claim 1 wherein said shifting means include rotary cam means driven stepwise from said transmission means and cam follower means mounted on said carrier means and cooperating with said cam means so that said carrier means is stepwise moved between said printing positions.

3. Mechanism as claimed in claim 1 wherein said shifting means include cam follower means mounted on said carrier means, a rotary cam means engaged by said cam follower means and having a predetermined number of cam lobes of different radial height and a predetermined number of cam recesses between said cam lobes, said cam recesses having the same radial height, said cam means being connected with said drive shaft for rotation so that said cam lobes cyclically act on said cam follower means to move said carrier means cyclically between said predetermined number of printing positions, and so that said carrier means moves to a position of rest when said cam follower means engages one of said cam recesses.

4. Mechanism as claimed in claim 3 wherein said stepwise operating transmission means is connected with said cam means for stepwise rotating the same.

5. Mechanism as claimed in claim 4 wherein said transmission means include a driven wheel and a drive member for stepwise driving said wheel and driven by said drive shaft to angularly displace said wheel and said cam means during each revolution of said drive shaft before and after a printing operation.

6. Ribbon transporting and shifting mechanism, comprising, in combination, printing means having a predetermined length for making a maximum number of imprints; carrier means in-

cluding guide means for guiding the ribbon in longitudinal direction past said printing means; supporting means mounting said carrier means for transverse movement with the ribbon relative to said printing means between a predetermined number of printing positions in which different longitudinal strip portions of the ribbon are located opposite said printing means; drive means for aCtuating said printing means to engage the ribbon during printing operations, said drive means included stepwise operating transmission means; shifting means connected with said carrier means and driven stepwise from said transmission means to move said carrier means in synchronism with said printing operations cyclically between said printing positions; and transporting means connected with the ribbon and driven from said transmission means to stepwise transport the ribbon in said longitudinal direction in synchronism with said printing operations a distance at least equal to said predetermined length divided by said predetermined number whereby longitudinally and transversely staggered areas of the ribbon are successively engaged by said printing means and the surface of the ribbon is fully utilized, said transporting means including a transporting roller mounted on said carrier means for rotation and for movement with the same, pressure roller means for pressing the ribbon against said transporting roller means, a shaft in the interior of said transporting roller, coupling means coupling said shaft with said roller for rotation and permitting relative axial movement between said shaft and said carrier means with said transporting roller, means mounting said shaft for universal movement, and a transmission connecting said shaft with said stepwise operating transmission means.

7. Mechanism as claimed in claim 6 including journal means on said carrier means; a spool on which the ribbon is wound up, mounted on said journal means; and friction coupling means connecting said transporting roller with said spool.

8. Mechanism as claimed in claim 7 wherein said friction coupling means includes a pulley secured to said transporting roller, a pulley secured to said spool, and an endless rope loop passing about said pulleys and frictionally connecting the same.

9. Ribbon transporting and shifting mechanism, comprising, in combination, printing means having a predetermined length for making a maximum number of imprints; carrier means including guide means for guiding the ribbon in longitudinal direction past said printing means; supporting means mounting said carrier means for transverse movement with the ribbon relative to said printing means between a predetermined number of printing positions in which different longitudinal strip portions of the ribbon are located opposite said printing means; drive means including a drive shaft for actuating said printing means to engage the ribbon during printing operations, and stepwise operating transmission means operating in synchronism with said printing operations; shifting means connected with said carrier means and including cam means for moving said carrier means in synchronism with said printing operations cyclically between said printing positions, said transmission means including a driven wheel, and a drive member for stepwise driving said wheel, and driven by said drive shaft to angularly displace said wheel and said cam means during each revolution of said drive shaft before and after a printing operation; and transporting means connected with the ribbon and driven from said drive means to transport the ribbon in said longitudinal direction in synchronism with said printing operations a distance at least equal to said predetermined length divided by said predetermined number whereby longitudinally and transversely staggered areas of the ribbon are successively engaged by said printing means and the surface of the ribbon is fully utilized.