

[54] MECHANISM FOR POSITIONING SINGLE ELEMENT TYPE CARRIERS

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- [51] Int. Cl.B41J 23/02
- [58] Field of Search197/16, 17, 18, 49, 48, 55;
178/34

[57] ABSTRACT

Mechanism is provided to selectively rotate and tilt a single element type carrier to position a character in a selected row and column location for printing. Rotation and tilt from a rest position is effected by spring biased cranks normally held in a rest position by a fixed stop on one of a pair of cyclically operable bails. The rest position defining stop is located farthest from the bail pivot in the path of contact surfaces on the cranks. Other stops on the bails are located at various distances from the bail pivots and are selectively positionable for cooperation with contact surfaces located at various distances from the crank pivots where-by the degree and direction of rotational movement of the cranks are controlled according to the distance of positioned stops on the bails from their pivots as the bails are oscillated or, if no stop is positioned then by the fixed stop.

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10 Claims, 14 Drawing Figures

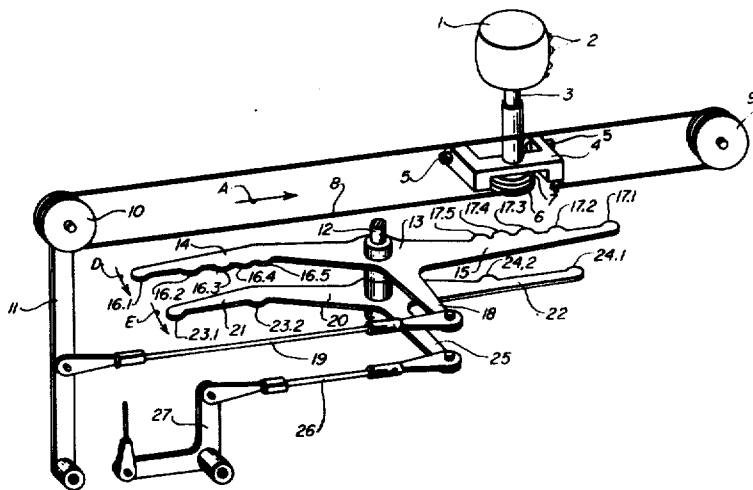


Fig-1

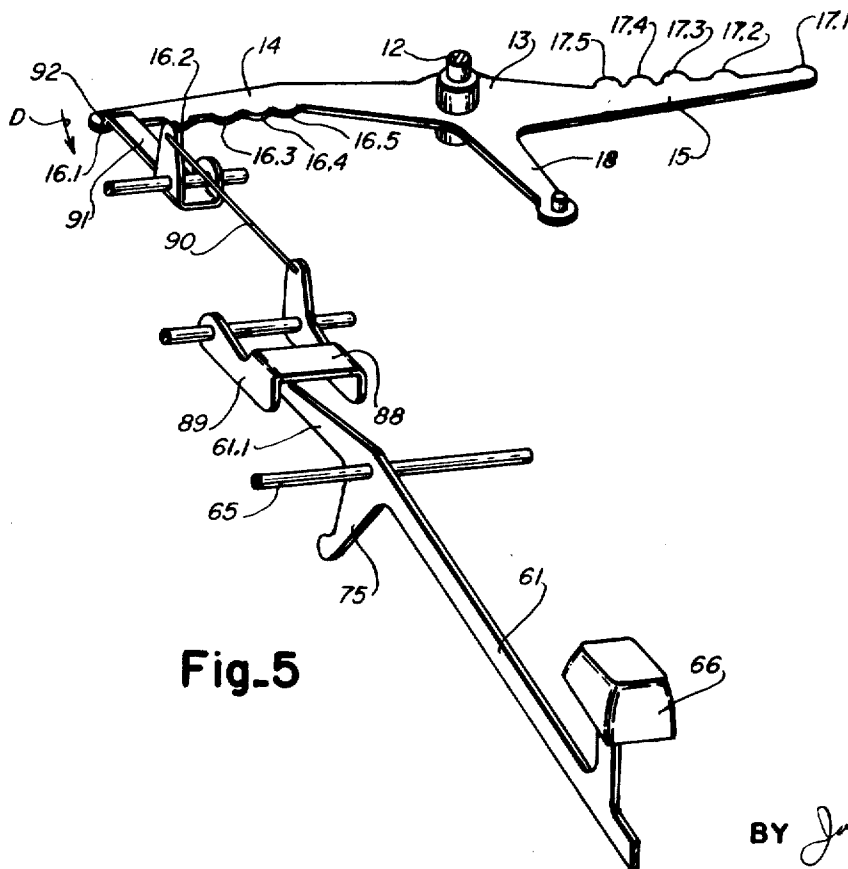
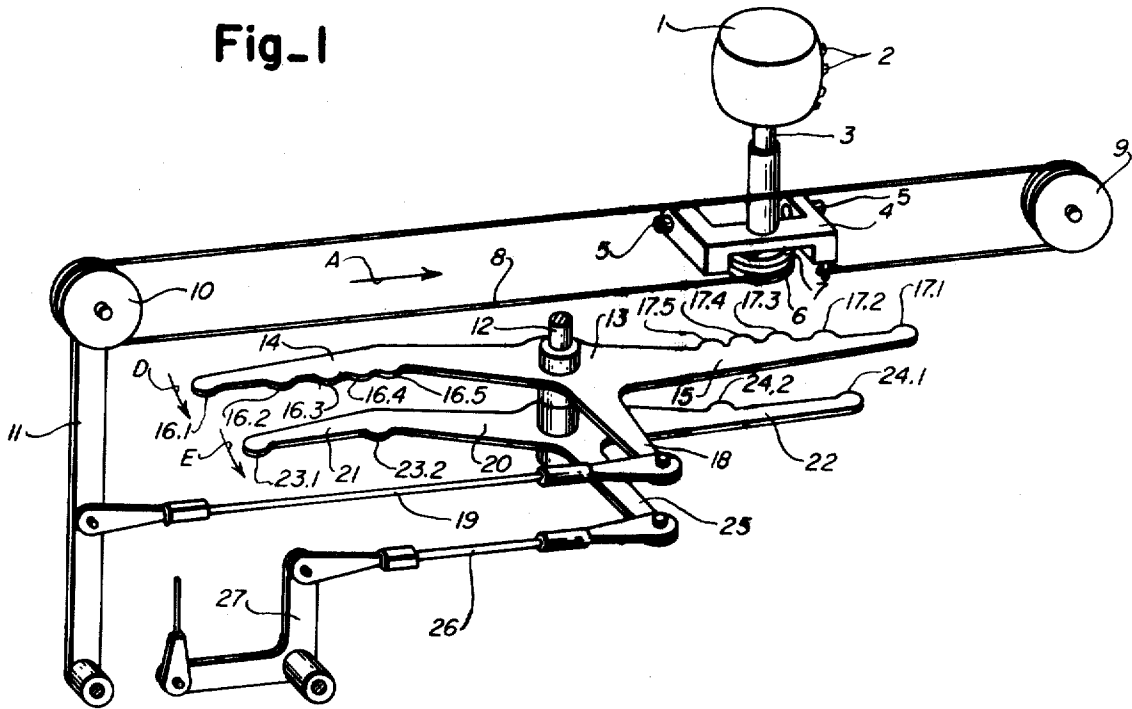


Fig-5

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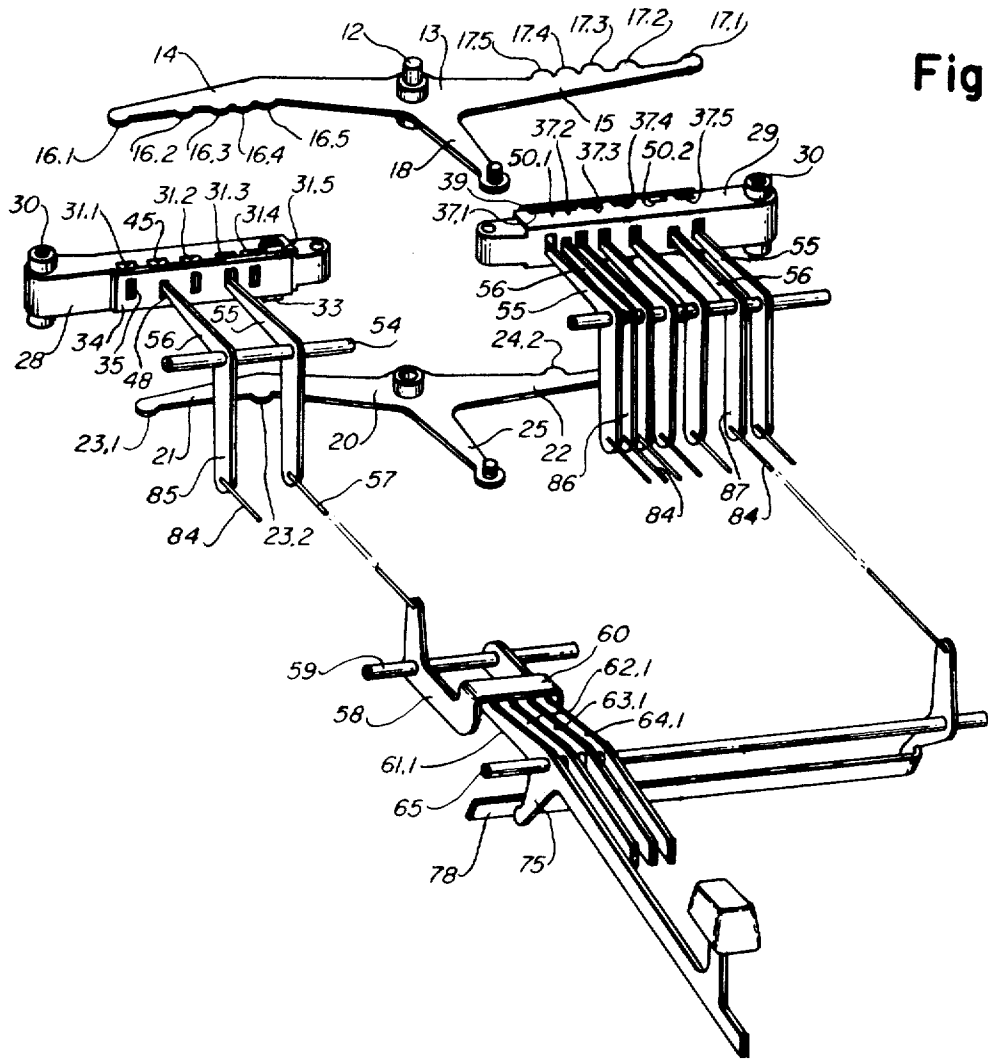


Fig-2

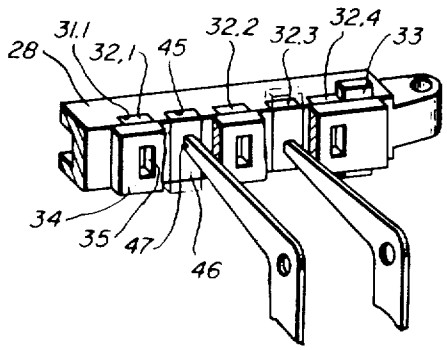


Fig-3

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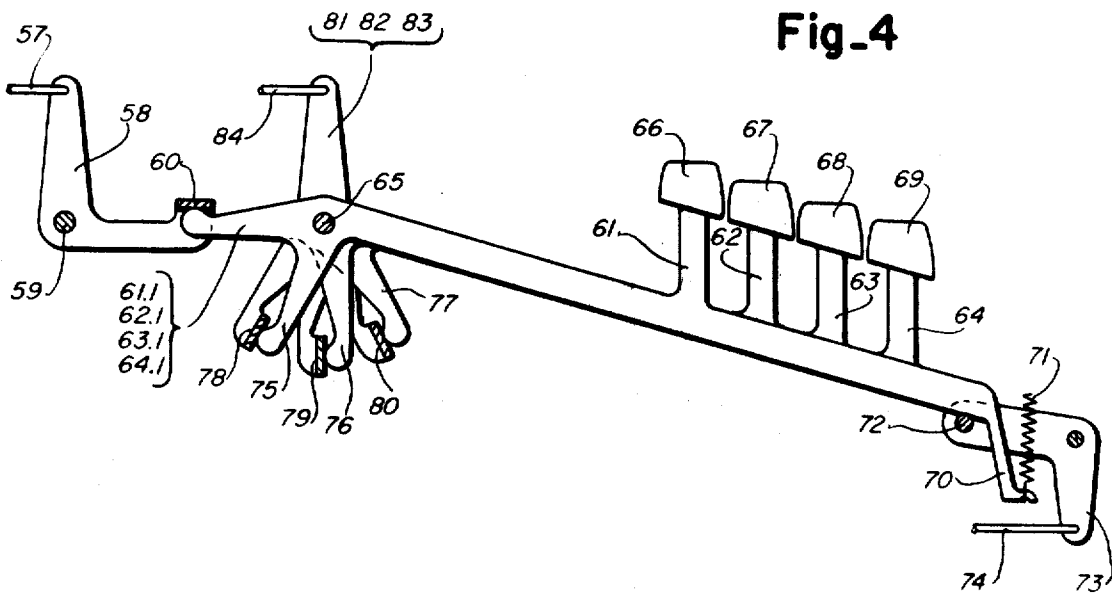


Fig. 4a

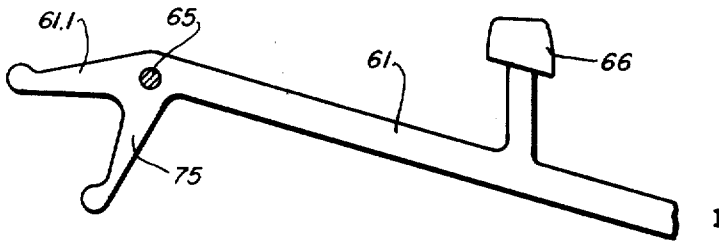


Fig. 4b

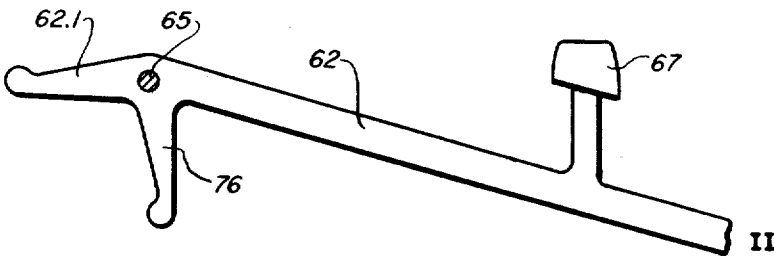


Fig. 4c

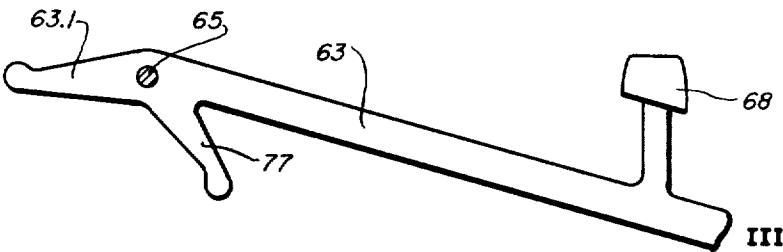
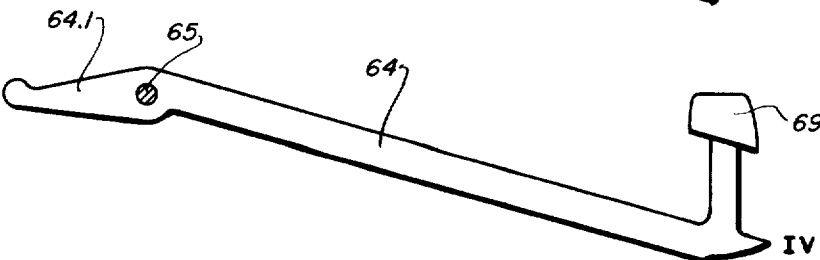


Fig. 4d



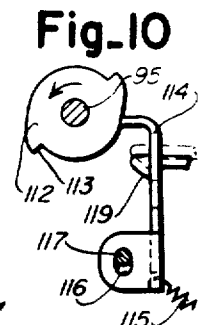
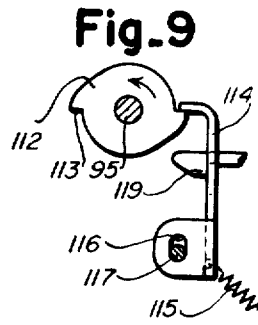
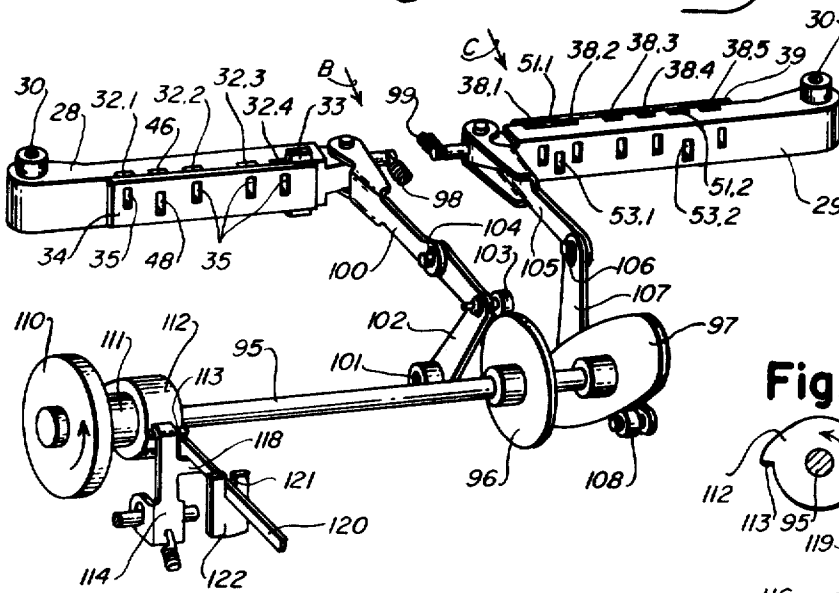
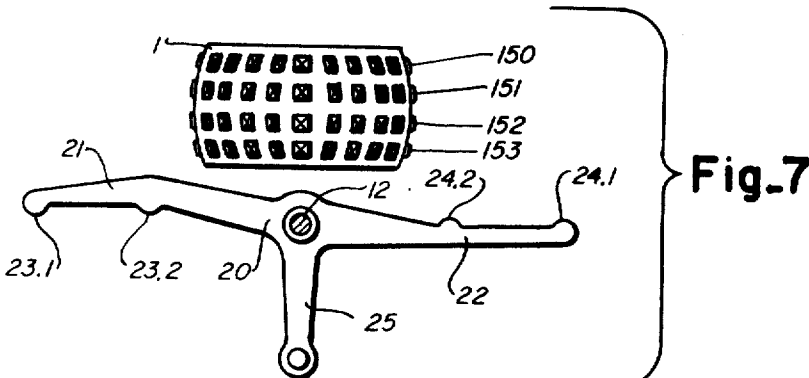
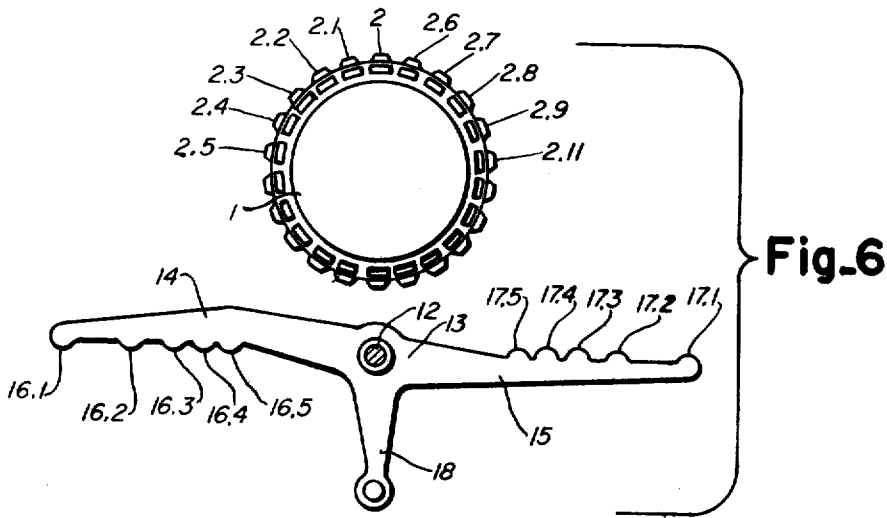


Fig. 8

Fig. 9

Fig. 10

MECHANISM FOR POSITIONING SINGLE ELEMENT TYPE CARRIERS

BACKGROUND OF THE INVENTION

The invention relates to mechanism for positioning single element type carriers shaped as rotational bodies which can be rotated or translated in different planes to present characters arranged on its surface in one or more vertical columns and horizontal rows for printing.

On typewriters with a single element type carrier on the surface of which characters are arranged in horizontal rows and vertical columns, mechanism is required to position any desired character in its printing position relative to a rest position. Generally speaking, three different motions are required, for instance, in a cylindrical type carrier, the type carrier has to be rotated, has to be axially moved up or down and has to perform a swinging motion in the direction of the writing surface. The number of characters available for printing, as letters, numerals and special characters is given as a fixed number and determines the dimensions of the type carrier.

In order to position the numbers of characters as are required in typewriters, different ways have been employed in typewriters, teletypers, and similar equipment. The best known form of mechanism is the so-called pulling band or differential pulley system, as, for instance, described in German Pat. No. 1,078,591. In order to achieve the rotational positioning of the type carrier a band is used which is threaded around several rollers or pulleys. Through the motion of one, or more pulleys in combination, different increments of rotation can be imparted to the type carrier. Generally the pulling band device has several inputs and one output. By depression of a key or activation of a positioning solenoid a certain combination of the positioning members or pulleys is selected and causes a certain rotation of the head. These pulling band devices have the disadvantage that every pulley is mounted individually and as a result of play at their mounting points, lateral motions occur which accumulate and which affect the positioning of the type head. Furthermore, the design of devices of this kind are especially costly and consist of a large amount of individual parts.

Other forms of differential linkages in use, e.g., U.S. Pat. No. 2,919,002 are characterized by several input and one output member. The addition of several motions is achieved by the use of levers characterized by three pivot points. Input members are connected to two outer pivot points of a lever and an output member, from which the motion addition is derived, is connected to an intermediate pivot of the lever. By addition of several of these mechanisms as described above a certain number of incremental movements can be provided at the output of the device when the required amount of input members are provided. Like the differential pulley strand, such lever devices have play at the various pivot points which reflects on the accuracy of the motion addition at the output. These lever mechanisms are employed to control movement in one plane as well as movement of a type carrier in an additional plane rotated 90°, the latter movement also requiring several inputs and having one output.

The differential pulley strand system and the additive lever systems present variable loads to the power source, depending on the numbers of input members to be activated. This fact is of great disadvantage in regards to the printing speeds attainable and furthermore requires a large enough dimensioning of the translating members and the power input sufficient to activate the maximum of input members. Also, when key levers are employed to directly select input members the different forces required for calling various numbers of input members is especially disadvantageous as the key pressure changes greatly. An even and fast writing without a power transformer between input key lever and differential mechanism is therefore impracticable. Thus, facile operation of such differential mechanisms of necessity requires the addition of a power transformer between key levers and the differential mechanism to operate a variable number of members.

Another device for positioning characters on a single element type carrier employs a constantly rotating type carrier e.g., U.S. Pat. No. 3,286,806. In order to print a particular character, stopping solenoids are activated by key levers which interpose a stop in the rotational path of the type carrier which thus is stopped for a short time. At the same time at which the type carrier is stopped its tilting motion must be completed and furthermore the print motion has to be performed at the same time. A device of this kind has the disadvantage that the stops activated by the stopping solenoids have to absorb high forces, because the time available for the stopping has to be held very short. Another disadvantage results in that the masses to be moved in the writing line direction, e.g., stops and stopping magnets, are very large. As a result, any advantage over a moving, platen supporting, carriage is minimized.

Another positioning device known, e.g., U.S. Pat. No. 3,256,969, proposed to reach high printing speeds, employs a type carrier comprising a horizontally positioned prism on the surface of which the characters are arranged in particular horizontal and vertical rows. In order to position a particular character the type carrier has to make a rotational motion and a lateral motion in the direction of the line of write. Both the rotational and the lateral motion are achieved by two identical differential mechanisms. The differential mechanisms consists of a constantly rotating power source which constantly moves two pushers back and forth. Next to these pushers several cranks are connected with each other which can be selectively connected with one or the other pusher causing one or a combination of several cranks to be driven. From the cranks a link chain is moved which is connected to a rack at its end with which the output motion of the link chain is transferred to the type head to cause the rotational or lateral motion. Such a device, because of the multitude of solenoids required and the different cranks which are linked together, is very expensive and, because of their camming motions, subject to great wear.

SUMMARY OF THE INVENTION

In accordance with the invention the amount of parts necessary in positioning mechanism, and especially the amount of individual parts necessary to translate input into output motions are substantially constant with the result that translating members can be made in the smallest possible dimensions, making it possible to activate the mechanism directly by hand without the use of a power transformer yet achieve constant key forces. The above desiderata are achieved by the use of a drive system comprising cyclic mechanism for controlling movement of positioning bails provided with selectable stops which in turn cooperate with and control the movement of cranks connected to position the type carrier according to the distances from bail and crank pivots of the contact point of the crank with selected stops.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the cranks to rotatably and tiltably position a type carrier which can be moved in the direction of line of write;

FIG. 2 is a perspective view of positioning bails with the selection of slides by keylevers;

FIG. 3 is a partial perspective view of a selector bail with slidable stops that can be connected with a crank;

FIG. 4 is a side elevational view of a keyboard with pulling members which provide the connection to the slidable stops in the selector bails;

FIG. 4a is a keylever of the first bank;

FIG. 4b is a keylever of the second bank;

FIG. 4c is a keylever of the third bank;

FIG. 4d is a keylever of the fourth bank;

FIG. 5 is a perspective view of a connection to limit rotation of the rotational positioning crank when a character in a home column on the type carrier is selected;

FIG. 6 is a plan view of the type carrier and rotational crank showing the assignment of character locations on the type carrier corresponding to the different contact points on the arms of the rotational crank for positioning the type carrier rotationally;

FIG. 7 is a view of the type carrier and tilt crank showing the assignment of the character locations on the type carrier corresponding to the different contact points on the arms of the tilt crank for tiltably positioning the type carrier; FIG. 8 is a perspective view of the cyclic power source for the selector bails;

FIG. 9 is a side elevational view of the cycle clutch in normal condition; and

FIG. 10 is a side elevational view of the clutch in the activated condition.

DESCRIPTION OF EMBODIMENT OF THE INVENTION

Referring now to the drawings wherein like or corresponding parts are designated by like or corresponding reference numerals throughout the several views, there is shown in FIG. 1 a single element type carrier on the surface of which all characters 2 are arranged in the known way in horizontal rows and vertical columns. The type carrier 1 is mounted on a rotating shaft 3 and has on its inside a movable or universal joint (not shown) which allows the positioning of the different rows by tilting the type head in the known way as described in German Pat No. 1,078,591. A carriage 4 serves to carry the type head 1 and, in order to perform a print motion, is mounted rotationally on pivots 5. Furthermore, a pulley 6 is mounted on the carriage which is connected with a clockspring 7 which exerts a force on a band 8 in the direction of the arrow A. The band 8 runs around a pulley 9 which is either mounted solidly in the machine or on a crank which can be rotated a given amount. A second pulley 10 is mounted on a pivotable arm 11 on the other side of the typewriter. In order to move the type carrier 1 in the direction of the line of write an escapement of any of the known designs may be utilized. It is also possible to mount the type carrier solidly in the machine and move a carriage supported platen relative to the type carrier as is done in type bar type machines.

In the frame of the machine a shaft 12 is mounted solidly carrying a rotate crank 13 which has a left arm 14 and a forwardly offset right arm 15. On these arms there are rounded contact surfaces; on the left, forwardly facing surfaces 16.1, 16.2, 16.3, 16.4 and 16.5 and, on the right, rearwardly facing surfaces 17.1, 17.2, 17.3, 17.4 and 17.5. Furthermore, a transmission arm 18 is part of the crank 13 which is connected to the crank 11 by a connecting link 19. The crank 13 serves to impart rotational motion to the type carrier 1.

Also mounted on the shaft 12 is another crank 20 which has a left arm 21 and a forwardly offset right arm 22. These arms have rounded surfaces; on the left arm, forwardly facing surfaces 23.1 and 23.2 and on the right arm, rearwardly facing surfaces 24.1 and 24.2. The crank 20 serves to create the tilting motion of the type carrier 1 and has a transmitting arm 25 which is connected with the type head through a link 26 and a crank 27 in a manner not shown.

With reference to FIG. 2, within the area of motion of the two cranks 13 and 20, i.e., the crank arms 14, 15 and 21, 22, left and right selector bails 28 and 29 are mounted pivotally on the sides of the machine at their bearings 30. The selector bail 28 has notches 31.1, 31.2, 31.3 and 31.4 in which four slides or stops 32.1, 32.2, 32.3 and 32.4 (FIG. 3) are guided laterally. In another notch 31.5 a fixed slide or stop 33 (FIG. 3) is mounted solidly. A cover plate 34 covers the notches so that with exception of the fixed stop 33, there is only one degree of freedom for the stops 32.1, 32.2, 32.3 and 32.4 which are held by cover plate 34. In the cover plate 34 there are openings 35 (FIG. 8) and the stops 32.1, 32.2, 32.3 and 32.4 have holes. The same arrangement is provided at the selector bail 29 which also has notches 37.1, 37.2, 37.3, 37.4 and 37.5 in which movable stops 38.1, 38.2, 38.3, 38.4 and

38.5 are mounted. Here also there is a cover plate 39 with openings (not visible) and the slides 38.1, 38.2, 38.3, 38.4 and 38.5 have holes (not visible). Located opposite the stops described above are the rounded contact surfaces 16.1, 16.2, 16.3, 16.4 and 16.5 and 17.1, 17.2, 17.3, 17.4 and 17.5 respectively on the arms 14 and 15 of the crank 13 which serves to create the rotational motion of the type carrier.

In the left selector bail 28 another notch 45 (FIG. 3) is provided for mounting a stop 46 also provided with a hole 47. To activate the stop 46 to dotted line position there is another hole 48 (FIG. 2) in the cover plate 34. At the right, selector bail 29 is provided with further notches 50.1 and 50.2 in which stops 51.1 and 51.2 are mounted. The stops 51 also have holes (not visible). Again two additional through openings 53.1 and 53.2 (FIG. 8) are provided in the bail 29.

In the side plates of the machine (not shown) a straight shaft 54 (FIG. 2) is mounted carrying cranks 55 which serve to call for the rotational motion of the crank 13 by the assigned stops 32.1, 32.2, 32.3, 32.4 and 33 as well as the stops 38.1, 38.2, 38.3, 38.4 and 38.5. Furthermore, there are mounted on the shaft 54 additional cranks 56, which serve to create the tilt motion by controlling the crank 20 through the assigned stops 46, 51.1 and 51.2.

Links 57 connect the stops 32 as well as 38 with the swinging bridges 58 which are mounted on a shaft 59. The swinging bridges 58, one of which is always assigned to four keylevers, consists of a bridge 60 under which, with reference to FIG. 4, 4a, 4b, 4c, and 4d, the arms 61.1, 62.1, 63.1 and 64.1 of the keylevers 61, 62, 63 and 64 from banks I-IV rest. In a known fashion the keylevers are mounted on another shaft 65 and carry the keytops 66, 67, 68 and 69 (FIG. 4). As shown in FIG. 4, the right hand end of the keylevers are all shaped the same way and have arms 70 onto which springs 71 are hooked, the other ends of which are hooked to a fixed part of the machine. Furthermore, a release bail 72 is positioned below all keylevers and connected through a crank 73 to a link 74.

The keylevers 61, 62 and 63 of the first (I), second (II), and third (III) bank (as seen from top to bottom from the viewpoint of the operator) have lever arms 75, 76, 77 which have different angular attitudes from bank to bank. The keylever 64 of the fourth (IV) bank is not provided with an arm. Within the area of contact of the lever arms 75, 76 and 77 are located swinging bridges 78, 79 and 80 which are mounted on the shaft 65 and which extend across the width of the keyboard. Every one of the swinging bridges 78, 79 and 80 has on one side respectively, an arm 81, 82 and 83 into each of which a pulling link 84 is hooked. The three pulling links 84 are connected to arms 85, 86 and 87 of cranks 56. With this the arm 85 is connected with tilt stop 46, the arm 86 with the tilt stop 51.1 and the arm 87 with the tilt stop 51.2. These stops lie opposite the rounded surfaces 23.1 and 24.1, 24.2 of the crank 20. As described earlier, the crank 20 serves to create the tilting motion of the type carrier 1. Stop 33 will always extend into the plane of motion of crank surface 23.2 and is effective when no other slide is selected.

In the embodiment shown in FIG. 7 of the drawings, four rows of characters 2 are provided on the type carrier 1. In order to set any of these rows it is essential to move or tilt the type carrier 1 out of its rest position into any of the four different positions. For this reason only the keylevers 61, 62 and 63 have lever arms 75, 76 and 77 while the keylevers 64 in the fourth bank do not have lever arms. This means that the depression of keylever 69 does not cause a stop 46, 51.1 or 51.2 to be selected and stop 33 is effective to cause the type carrier 1 to tilt to row 150.

FIG. 5 shows a key 66 and a keylever 61 of the first bank of the keyboard which can rotate around the shaft 65. As described before the keylevers of the first, second, third and fourth bank are arranged side by side and also rest with their lever arms 61.1, 62.1, 63.1 and 64.1 against a cross member 88 of a swinging bridge 89. This swinging bridge 89 is connected to a blocking lever 91 by a pulling link 90. The blocking lever has a bent locking arm 92. With reference to FIG. 8, the selec-

tor bails 28 and 29 are rotated around the bearings 30 by means of a cam 96 and a cam 97 driven by a drive shaft 95 which is activated by a clutch for partial revolution. For this reason on both selector bails 28 and 29 a spring 98 and 99 is hooked on to provide solid contact with the cams 96 and 97. The connection between the selector bail 28 and the cam 96 is provided by a guider 100 and a cam follower 102 which pivots around a stud 101 and has a roller 103 mounted on it. In order to transfer the motion from the cam follower 102 to the guider 100 an elongated hole 104 is required in the guider. The selector bail 29 is also connected with the cam 97 through a guider 105 with an elongated hole 106 and a cam follower 107 with a roller 108. Because of the arrangement of the cams 96 and 97, rotated by 90° toward each other, the drive shaft 95 transmits to the drive bails 28 and 29 a motion which runs in the same direction. The drive shaft 95 is connected to the constantly rotating drive wheel 110 through a well known spring clutch arrangement 111. The not moving part of the spring clutch 111 is connected with the guide disc 112 which is equipped with two locking surfaces 113 which are arranged 180° apart. To contact the locking surface 113 a locking lever 114 is provided which is under the influence of a spring 115 and which is mounted with an elongated hole 116 on the mounting stud 117. On the locking lever a sideways extension 118 is arranged onto which a hook 119, part of a slide 120, grips. The slide 120 is positioned in a slot 121 in a guide 122 and is connected to the link 74 (FIG. 4).

FIG. 6 shows the arrangement of the characters 2 on the type carrier 1 where they are equally distributed and their assignments to the curved surfaces 16.1, 16.2, 16.3, 16.4 and 16.5 and 17.1, 17.2, 17.3, 17.4 and 17.5 of the crank 13. According to this the curved surface 16.1 is assigned to the character 2.1 and the contact surface 17.2 to the character 2.7 etc. Furthermore, it is the assumption that within an area of rotation of 180° the lower case characters are arranged and within a second area of rotation of 180° the upper case characters are arranged. The first area of rotation contains within a row 11 columns of characters, the one designated 2 in FIG. 6 is the basic or rest position and is the column position to which the type carrier will always return after printing a character. In order to position characters which are in the second area of rotation, like for instance, capital letters, the type carrier is rotated 180° so that the column of characters in the center of this area of rotation, which also is 180° from 2 becomes the basic position.

FIG. 7 shows the crank 20 which creates the tilt motion at the type carrier 1 and the assignments of the rounded surfaces 23.1, 23.2 and 24.1, 24.2 to the four rows of characters 151, 150, 152, and 153 on the type carrier.

OPERATION OF THE MECHANISM

The depression of a key 67 in bank II for instance will cause the keylever 62 to swing around the shaft 65. This turns the arm 62.1 clockwise and it acts on the bridge 60 of one of the swinging bridges 58. On the shaft 59 ten swinging bridges are arranged, each one having four keylevers assigned to it. If the swinging bridge 58 is turned counterclockwise the link 57 will push against one of the arms of a crank 55 and in this manner shifts upwardly one of the stops 32.1, 32.2, 32.3 and 32.4 or 38.1, 38.2, 38.3, 38.4 and 38.5. The stop shifted in this way therefore gets into the area of action of the rounded surfaces 16.1, 16.2, 16.3 and 16.4 or 17.1, 17.2, 17.3, 17.4 and 17.5. If not stop is selected stop 33 is in the area of action of rounded surface 16.5.

Simultaneously, one of the lever arms 75, 76, 77 will rotate one of the swinging bridges 78, 79, 80; if a keylever 64 of the fourth bank IV is depressed, no swinging bridge is activated. The rotation of a swinging bridge 80, for instance, acts on one of the links 84 connected with one of the arms 85, 86 and 87 of cranks 56. At the selector bails 28 or 29 this causes one of the slides 46, 51.1 or 51.2 (FIG. 2) to move downward in the notches and arrive in the area of rotational action of the

rounded surfaces 23.1, or 24.2, 24.1 of the crank 20. Stop 33 will always be in the area of rounded surface 23.2 and control crank movement if no other stop is selected.

By turning the keylever against the action of the spring 71 the crank 73 (FIG. 4) is moved counterclockwise, causing the link 74 to act on the slide 120 (FIG. 8). In this way the locking latch 114 is moved from the position shown in FIG. 9 into the position shown in FIG. 10 and releases the locking surface 113 at the guide disc 112. The constantly rotating drive wheel 110 will in this way through the spring clutch 111 be connected to the drive shaft 95 and will perform half a revolution.

Following the motions of the cams 96 and 97 the guides 100 and 105 are moved in the direction of the arrows B and C through the two cam followers 102 and 107, causing the selector bails 28 and 29 to move in the same direction; bail 28 under the influence of spring 98, and bail 29 under power from cam 97, respectively. The cranks 13 and 20 are under the constant influence of springs which try to move the cranks in the direction of the arrows D and E (FIG. 1). If now a stop 32 on the left hand side of the crank 13 (FIG. 2) is positioned and the selector bail 28 moves in the direction of the arrow B the cranks 13 and 20 will follow this motion and rotate depending on the distance of the selected stop 32 or 46 on the selector bail 28 and the rounded surfaces 16 or 23 on the cranks 13 and 20. If no positionable stop 32 or 46 is selected fixed stop 33 controls cranks 13 and 20. Following the motion of the cranks 13 and 20 the links 19 and 26 are moved. This motion is transmitted to the type carrier 1. Because of the motion of the link 19 the type carrier 1 is rotated around the rotating shaft to a selected column. The link 26 causes the tilting of the type carrier 1 which is connected by a universal joint mounting on the rotating shaft 3, bringing a given row in the selected column into the print position.

After the type carrier has been positioned in this manner by rotating and tilting, it is also rotated around the pivots 5 by means not shown in the drawings causing the actual printing action of a character onto the cylinder which is also not shown.

As both cranks 13 and 20 are constantly exposed to the action of springs, and therefore would follow the motion of the selector bail 28 in the direction of the arrow B, as in the case where no stop has been set, it is possible to use this fact for a simple input into the cranks 13 and 20 by, as shown in FIG. 2 and 3, the use of the solidly mounted or fixed stop 33 in notch 31.5. This stop 33 is arranged in the selector bail 28 at a point where the selector bail 28 has its greatest swinging motion i.e., farthest from pivot 30. In order to position the character assigned to this stop 33 in its rotational as well as in its tilting position, it is superfluous to go through intermediate members, as for instance the crank 56 acting on the selector bail 28 input from the keytop. At the left hand side therefore only those input members are required which are necessary to call for a motion which is smaller than the largest motion. On the right hand side, as selector bail 29 (FIG. 2) has to overcome the force of the springs acting on the cranks 13 and 20 this fact cannot be used and five movable stops 38 are necessary.

In order to position a center or rest column character 2, as shown in FIG. 6, which appears four times according to the rows in each of the two shift areas, it is only necessary that crank 20 moves and, as no rotational positioning motion of the type carrier is necessary, rotation of crank 13 has to be prevented. This is achieved with the arrangement shown in FIG. 5. One keylever of the first, second, third and fourth bank are assigned to a swinging bridge 89 which has a connector 88. These keylevers belong to characters which on the type carrier as shown in FIG. 6 are in the center or rest column position. The depression of a rest column key 66 causes the keylever 61 to rotate around the shaft 65, which in turn rotates the locking lever 91 through the link 90, so that the locking arm 92 enters into the area of rotation of the crank 13. In this way any motion of the crank 13 is prevented and the type head remains in its original position during tilt positioning. Only the lever arms 75, 76 and 77 which are also assigned

to the home column keylevers together with stop 33 influence the crank 20 which serves to position the tilt of the type carrier.

The advantages gained by the invention reside in the fact that instead of having to select and drive a variable number of pulleys or lever systems, always almost, the same amount of stops are selected to produce the different output motions necessary. In this way it is possible without the addition of a power transformer in between to select a rotate and tilt stop for controlling the positioning of the type carrier by hand with equal key pressure on all keytops. By calling the positioning control stops by solenoids or similar members which are activated by a storage device, it is possible to keep those parts which are essential for the transfer of forces to the type carrier as light and simple as possible without special requirements as far as stability is concerned. In the device for the creation of the different sums of motion at the output there are at all times only one stop for the creation of a lateral or rotational motion and one stop for the creation of the tilting motion associated with the cranks. The connection is in every case, without exception, closed, causing no changes in the output movements of the device to occur. Furthermore, the input members for the rotating motion as well as for the tilting and lateral motion always consist of one stop only, independent from the size of the desired motion at the output. This makes it clear, that with the invention a device for type carriers has been accomplished, which through the use of simple parts can be easily produced and which furthermore guarantees a great amount of accuracy at the output side of the device for any degree of motion.

The invention claimed is:

- 1. In a typewriter having a single element type carrier positionable about coordinate axes to locate a character thereon opposite a printing station, means to position said carrier about at least one of said axes comprising,
 - a pivotally mounted bail,
 - a plurality of selectable stops slidably mounted on said bail at spaced distances outwardly of the bail pivot,
 - cyclic means for oscillating said bail about its pivot from and to a rest position,
 - a pivotally mounted crank,
 - means connecting said crank to said type carrier to position said carrier about one of its said axes as said crank rocks about its pivot through variable angular increments,
 - means biasing said crank in one direction,
 - said crank having an arm provided with a plurality of contact surfaces in juxtaposition to the positions of and for control by said stops on said bail,
 - said stops when individually positioned in the path of associated contact surfaces controlling the rocking movement of said crank through lesser or greater angular increments according to the distance of a selected stop from said pivot,
 - and means for selecting and positioning the stop on said bail to control the angular movement of said crank when the bail is oscillated, and to cycle said cyclic means incident to said stop selection.
- 2. In a typewriter having a single element carrier positionable about coordinate axes to locate a character thereon opposite a printing station, means to position said carrier about at least one of said axes comprising,
 - a pivotally mounted bail,
 - a rest stop supported on said bail farthest from its pivot,
 - a plurality of other stops slidably mounted on said bail at spaced distances between said rest stop and bail pivot,
 - cyclic means for oscillating said bail about its pivot from and to a rest position,
 - a pivotally mounted crank,
 - means connecting said crank to said type carrier to position said carrier about a said one of its axes as said crank rocks about its pivot through variable angular increments,
 - means biasing said crank in one direction,
 - said crank having a first arm provided with a plurality of

contact surfaces in juxtaposition to the positions of said stops on said bail, said rest stop normally being positioned in the path of an associated contact surface to hold said crank against movement by said bias means but when said bail is oscillated to allow said crank to follow and rock through the maximum number of angular increments, said other stops when individually positioned in the path of associated contact surfaces preferentially controlling the movement of said crank through lesser increments, and input means for selecting the stop on said bail to determine the incremental movement of said crank when the bail is oscillated, and to cycle said cyclic means incident to said stop selection.

- 3. In a typewriter as recited in claim 2 wherein said crank has a second arm extending in a direction opposite said first arm and further comprises a pivotally supported second bail under control of said cyclic means, stops slidably mounted on said second bail along its length for movement into the plane of motion of said second arm whereby movement of said crank may be controlled in the direction opposite to that controlled by said first arm.
- 4. A typewriter as recited in claim 3 wherein said bails are pivotally mounted with their free ends facing one another and wherein said cyclic means comprises spring means connected to bias said bails in opposite directions, cam means, cam follower means connected to the free ends of said bails, said cam means being oriented to allow one bail to move under urge of its spring while moving the other against its spring and vice versa in each cycle, and a cycle clutch for cycling said cams when engaged by said input means.
- 5. In a typewriter as recited in claim 4 wherein said second arm has contact surfaces in the direction opposite the direction of said contact surfaces on said first arm, a said stop on said second bail, when positioned, operating to move said crank against its bias means, when said bail is oscillated, to angularly position said crank in said opposite direction and then allow its return to rest position.
- 6. In a typewriter as recited in claim 2 further comprising a second crank having a first arm, means connecting said second crank to said type carrier to position it about the other of its said coordinate axes, and means for biasing said second crank arm in the direction for control by said rest and selected stops on said bail to control movement incident to oscillation of said bail.
- 7. In a typewriter as recited in 6 wherein said second crank is mounted on the same axes as said first crank.
- 8. In a typewriter as recited in claim 6 wherein stops on said bails associated with one of said cranks and stops associated with the other of said cranks are supported for slidable positioning movement in opposite directions.
- 9. In a typewriter as recited in claim 6 wherein said first and second cranks each have a second arm extending in a direction opposite its said first arm and further comprises a pivotally supported second bail under control of said cyclic means, stops slidably mounted on said second bail along its length for movement into the plane of motion of said second arms whereby movement of said cranks may be controlled in the direction opposite to that controlled by said first arms.
- 10. A typewriter as recited in claim 9 wherein said bails are pivotally mounted with their free ends facing one another and wherein said cyclic means comprises spring means connected to bias said bails in opposite direction, cam means, cam follower means connected to the free ends of said bails, said cam means being oriented to allow one bail to move under urge of its spring while moving the other against its spring and vice versa in each cycle, and a cycle clutch for cycling said cams when coupled to power by said input means.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,677,384
DATED : July 18, 1972
INVENTOR(S) : Manfred Link

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In The Heading:

After item [21], insert --Foreign Application Priority Data
December 31, 1969 Germany....1965692.9--.

Signed and sealed this 6th day of May 1975.

(SEAL)

Attest:

RUTH C. MASON
Attesting Officer

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