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E. E. KLEINSCHMIDT

2,805,749

TABULATING MECHANISM FOR RECORDING APPARATUS

Original Filed Aug. 20, 1947

3 Sheets-Sheet 1

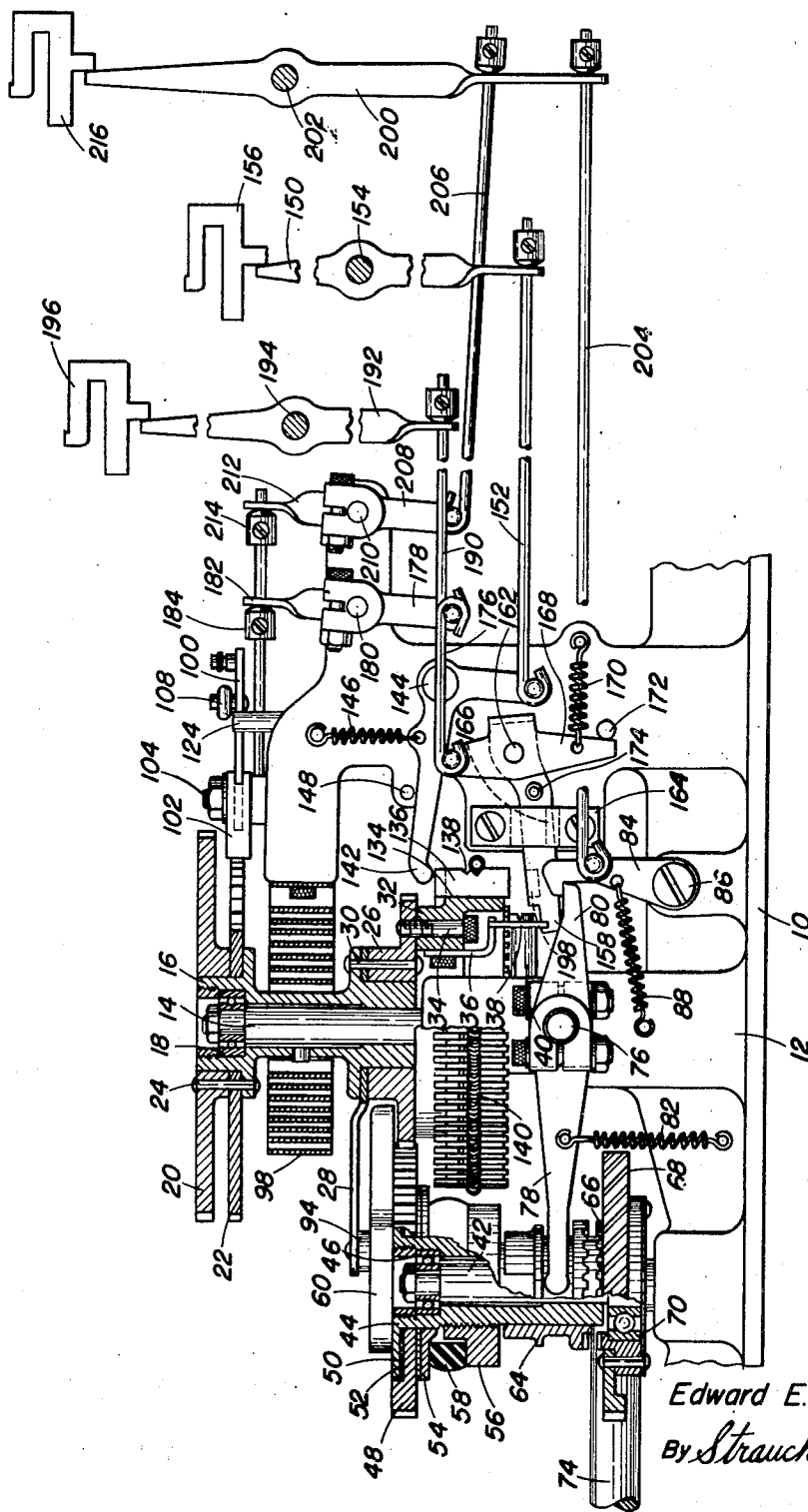


Fig. 1

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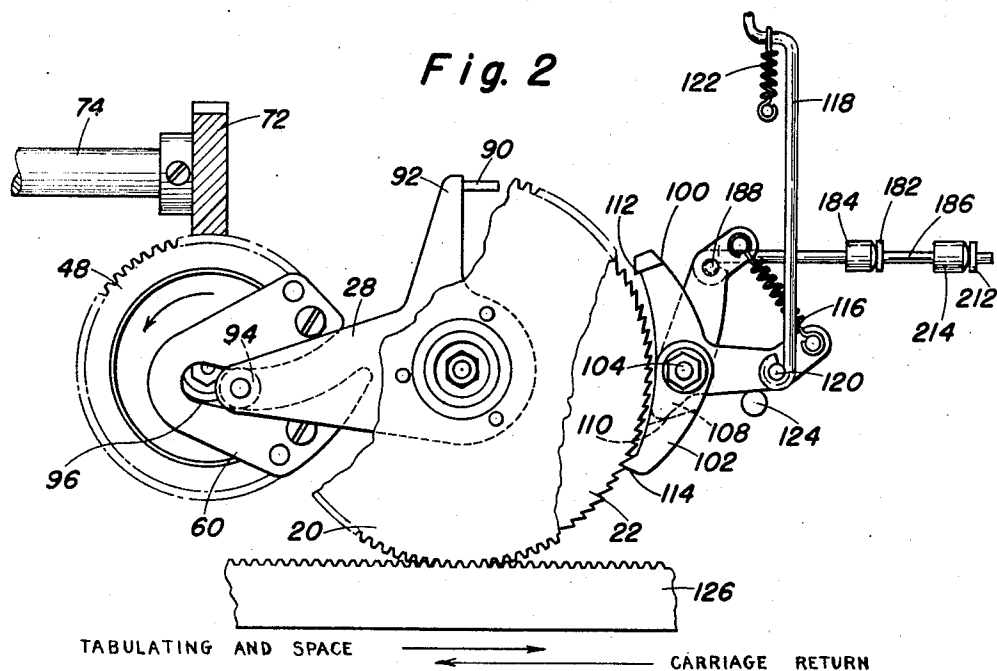
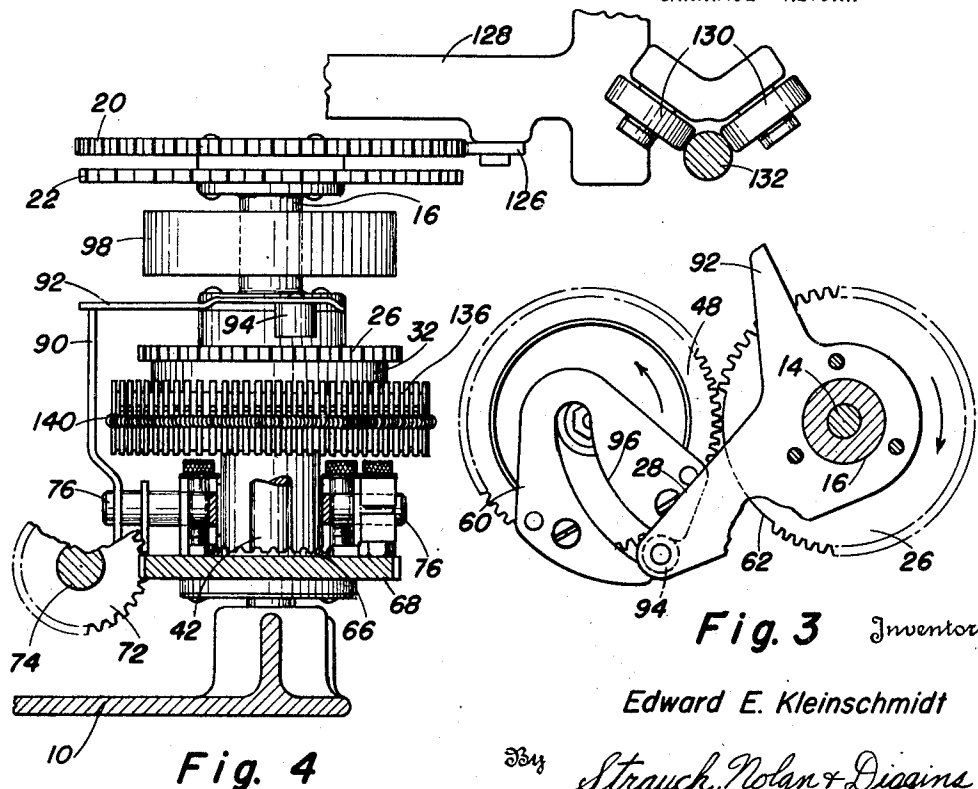
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Original Filed Aug. 20, 1947

3 Sheets-Sheet 2

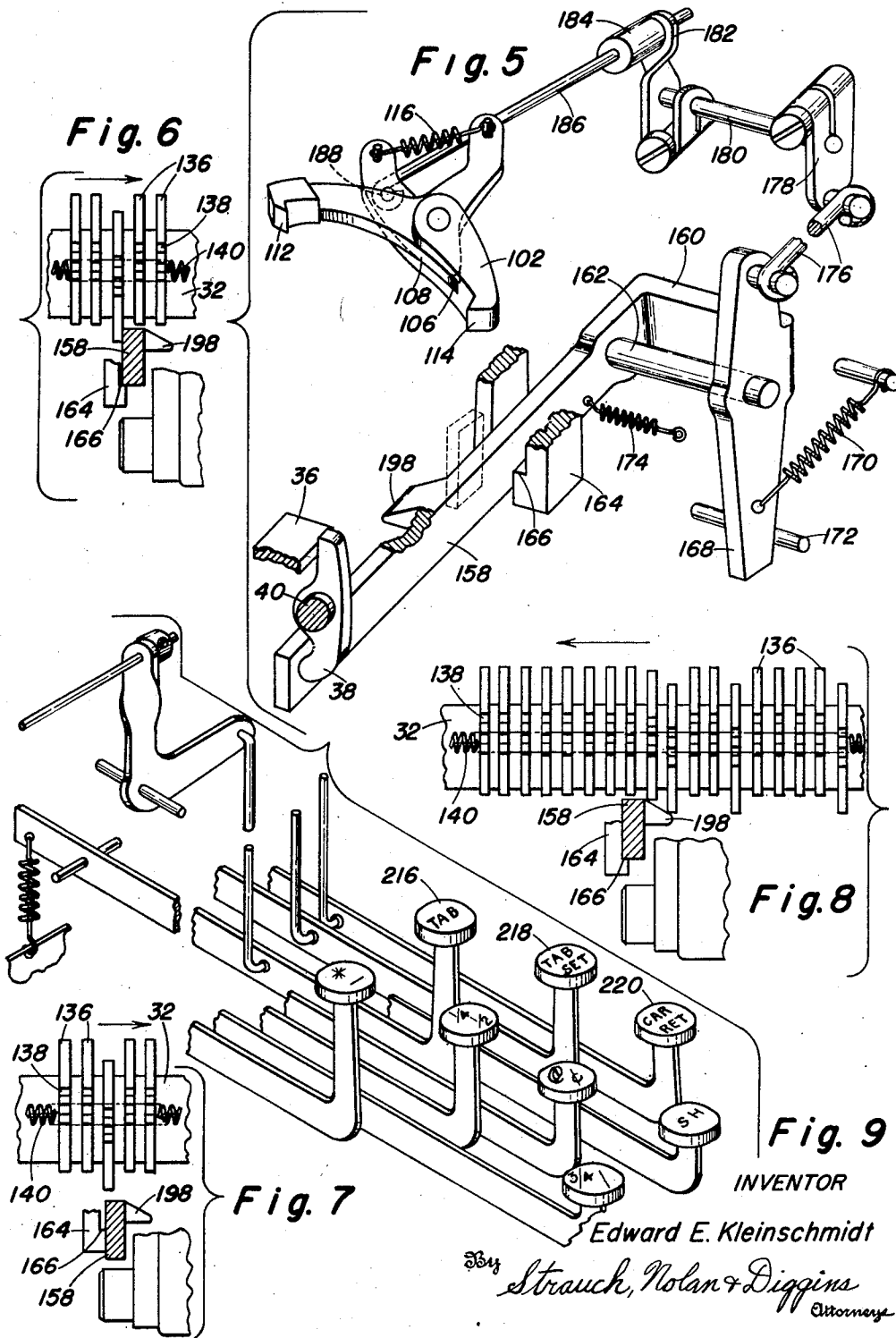


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TABULATING MECHANISM FOR RECORDING APPARATUS

Original Filed Aug. 20, 1947

3 Sheets-Sheet 3



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2,805,749

TABULATING MECHANISM FOR RECORDING APPARATUS

Edward E. Kleinschmidt, Miami Beach, Fla.

Original application August 20, 1947, Serial No. 769,664.
Divided and this application August 7, 1951, Serial No. 240,730

22 Claims. (Cl. 197—179)

This invention relates to tabulating mechanism for typewriters and telegraph printing apparatus, in which the operation of the printing unit is selectively controlled in response to different combinations of electrical signal impulses. The instant application constitutes a division of my copending application Serial No. 769,664, filed August 20, 1947, now U. S. Patent No. 2,606,641.

It is the general object and purpose of the present invention to provide a simple and compact assembly of a tabulating stop carrier with motor operated carriage actuating mechanism of the printing or recording apparatus whereby lost motion will be practically eliminated and said carriage and stop carrier operated in exact synchronism to accurately space the tabular columns of printed characters on the record sheet.

Another object resides in the provision of a stop carrying drum mounted in rigidly assembled concentric relation with a power operated shaft of the carriage actuating mechanism for rotation as a unit therewith.

It is a more particular object of the invention to provide a very compact mounting of the tabulating stops in the rotating drum, which admits of infinite variation in the spacing of the tabular columns, together with means common to all of said stops for yieldingly retaining the same in their set or unset positions relative to said drum.

It is also an additional object of the invention to provide means responsive to signal controlled function operating means of a telegraph printer for setting the individual stops in operative position relative to the drum, and means responsive to other signal controlled function operating means of the printer to coast with said stops and to restore the stops to unset position in the return movement of the carriage.

It is also the aim and purpose of the present invention to provide tabulating mechanism as above characterized embodying a relatively small number of cooperating elements of rugged and durable structural form in a space conserving assembly which is particularly designed for use in automatic high speed telegraph printers.

With the above and other subordinate objects in view, the invention comprises the improved tabulating mechanism and the construction and relative arrangement of its several parts, as will hereinafter be more fully described, illustrated in the accompanying drawings and subsequently incorporated in the subjoined claims.

In the drawings wherein I have disclosed one simple and practical embodiment of my present invention and in which similar reference characters designate corresponding parts throughout the several views:

Figure 1 is an elevation, partly in section, showing the carriage return and spacing and tabulating mechanisms, the several parts of the latter being illustrated in normal unoperated position, and the carriage return mechanism disconnected from the power driven shaft;

Figure 2 is a fragmentary top plan view showing the spacing escapement mechanism and the carriage decelerating means, with the parts of the latter in relative posi-

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tions at the final stop position of the carriage when said mechanism is disconnected from the power source;

Figure 3 is a similar view showing the relative positions of said parts at the start of deceleration prior to disconnection of the mechanism from the power source;

Figure 4 is a fragmentary side elevation, certain parts of the carriage return mechanism being omitted;

Figure 5 is a perspective view, illustrating certain of the parts of the tabulating and escapement mechanisms;

Figure 6 is a fragmentary elevation showing one of the tabulating stops in its set position and engaging the cooperating stop lever latched in its operated position;

Figure 7 is a similar view showing the stop lever in its unoperated position out of the path of movement of the set tabulating stop;

Figure 8 is a similar view showing the means for wiping out or restoring the set up tabulating stops in the return movement of the carriage; and

Figure 9 is a fragmentary perspective view showing an arrangement of key levers controlling the operation of the tabulating and carriage return mechanisms, embodied in a standard typewriter keyboard.

Referring in further detail to the drawings, a part of the machine frame, indicated at 10, is formed with a standard 12 in which the lower end of a fixed shaft or spindle 14 is suitably secured. A sleeve 16 having an anti-friction bearing 18 in the upper end thereof is mounted upon the spindle 14 for free rotation relative thereto. To said upper end of the sleeve 16, the carriage drive gear 20 and a spacing ratchet 22 are securely fixed by rivets or screws as at 24. To the lower end of sleeve 16, the carriage return gear 26 and decelerating arm 28 suitably spaced above said gear are rigidly secured by the rivets 30.

To the underside of the gear 26 a drum 32 is secured by screws 34 in concentric relation with said gear, said drum carrying a trip arm indicated at 36. This trip arm is adapted to coast with the upper end of a trip finger 38 pivotally mounted on the stud 40 formed on pedestal 12.

In laterally spaced relation from the fixed shaft or spindle 14, a second vertically disposed shaft 42, is suitably fixed at its lower end in the frame 10, and upon this shaft a sleeve 44 is supported by anti-friction bearing 46 for free rotation. A gear 48 loosely surrounds the upper end of the sleeve 44 between the flange 50 thereof, having friction material 52 on its lower face, and a friction disc 54, loosely surrounding the sleeve 44. Between the disc 54 and an adjusting nut 56 threaded on the sleeve 44, an annular elastic member 58 is interposed. By the adjustment of this nut, frictional resistance to the unitary rotation of gear 48 with the sleeve 44 may be properly regulated.

To the upper surface of the gear 48 a decelerating cam plate 60 is rigidly secured and projects laterally beyond the periphery of said gear. Gear 26 is provided with a blank or untoothed portion, as shown at 62 in Figure 3 of the drawings, so that the transmission of rotation from gear 48 to said gear 26 and the parts connected therewith is interrupted, during which time rotation is transmitted to sleeve 16 through cam plate 60 and decelerating arm 28, in the manner to be later explained.

A clutch collar 64 is splined or non-rotatably keyed on the lower end of sleeve 44 for sliding movement relative thereto, and is adapted to cooperate with complementary clutch member 66 carried by gear 68 rotatably supported by anti-friction bearing 70 on the shaft 42. Gear 72 fixed to motor driven shaft 74 is in constant mesh with the gear 68.

In the frame standard 12, a rock shaft 76 is mounted and to this shaft, the operating arm 78 for clutch collar

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64 and latch arm 80 are adjustably fastened at one of their ends, said arms projecting from the relatively opposite sides of said shaft. A spring 82 connected to arm 78 yieldingly urges clutch collar 64 into power transmitting engagement with the clutch member 66. The clutch collar is retained in its disengaged position by the latch dog 84 pivoted on the frame at 86 at one end and yieldingly held by spring 88 in latching engagement with the end of arm 80 on the shaft 76.

To the opposite end of shaft 76, an upwardly extending, de-clutching lever 90 is fixed, and has its upper end disposed in the path of movement of an angular extension 92 on the decelerating arm 28 for engagement thereby in the final return movement of the carriage to its starting position.

A roller 94 is suitably mounted on the outer end of arm 28 for movement into the cam slot 96 in the plate 60 on gear 48, as the carriage approaches its starting position, and it will be noted that the inner closed end of this slot is located closely adjacent to the axis of gear 48.

The carriage spacing spring 98 has one of its ends suitably fixed to the sleeve 16, and at its other end is attached to a part of the machine frame, as clearly shown in Figure 1 of the drawings. This spring tends to rotate the sleeve 16 against the retaining or holding action of two spacing pawls 100 and 102 respectively, pivotally mounted upon the common supporting stud 104 fixed in the machine frame. The pawl 102 has a bifurcated portion 106 on one side of the pivot, which receives a cam lug 108 on the pawl 100 for cooperation with the obliquely inclined end wall 110 of said bifurcation. The toothed ends 112 and 114 of the respective pawls are normally biased into engagement with the teeth of the spacing ratchet 22 by a spring 116 connecting the other spaced ends of said pawls, as shown in Figure 2 of the drawings.

A link 118 is operatively connected with means actuated by the space bar and key levers of a typewriter or other machine, and is pivotally connected with the pawl 100 as indicated at 120. A spring 122 connected to said link normally holds the pawl 100 in contact with stop pin 124 fixed in the machine frame. When said link is moved against the resistance of spring 122, pawl 100 is moved away from stop 124 and its toothed end 112 engaged with a tooth of the spacing ratchet 22. At the same time, cam lug 108 on said pawl coacts with inclined surface 110 to move pawl 102 out of engagement with the spacing ratchet 22, thus allowing said ratchet to move a partial distance of one tooth, when the tooth on pawl 100 is then engaged by a ratchet tooth to hold the ratchet against further rotation. On the return movement of link 118, pawl 100 is moved into the position shown in Figure 2 of the drawings while pawl 102 engages a succeeding tooth on the ratchet. In this manner, the spacing ratchet 22 will escape one tooth for each cycle of movement of the link 118. Thus rack 126 and the carriage to which it is attached will assume positions corresponding to movements of the spacing ratchet 22 and gear 20, which is in constant engagement with the teeth of rack 126.

In Figure 4 of the drawings, I have shown a portion of a type carriage 128 which may be mounted in conventional manner in the machine frame for horizontal movement, as by means of the angularly related rollers 130 in supporting contact with a fixed cylindrical rail 132. However, in certain types of telegraph printing apparatus, the type bars remain stationary while the platen is mounted in a movable carriage, and it will be understood as this description proceeds that the novel features of the present invention are applicable as well to this type of printing or recording machine.

From reference to Figures 1 and 4 of the drawings, it will be noted that the cylindrical wall of the drum 32 is provided in the outer side thereof with circumferentially spaced, vertical slots 134, corresponding in number with the number of character spacing positions of the carriage 128. A tabulating stop or detent member 136

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is frictionally mounted in each of these slots for movement to either one of two vertical positions relative to the drum wall. Each of said stop members is provided in its outer edge with adjacent notches indicated at 138, with which an annular coiled wire spring 140, common to all of said members coacts to yieldingly retain the individual stop members in set or unset position. A tabulator stop-setting lever 142 is pivoted on stud 144 fixed in frame 10, and has a horizontally disposed arm, the free end of which is positioned above the series of tabulator stops 136. This lever is normally held in unoperated position by spring 146 connected to said horizontal arm and holding the same in contact with stop pin 148 on the frame. To a second arm of lever 142 extending downwardly from a pivot 144, the tabulator stop-setting lever 150 is connected by means of link 152. This lever is pivotally supported intermediate of its ends as at 154, and at its upper end is adapted to be engaged by actuating element 156 operated by the function operating means of a telegraph printer.

To selectively set up the tabulating stop members in the drum 32, the carriage is first spaced to the desired position in accordance with the predetermined spacing of columns to be printed on the record sheet. Upon actuation of the tabulator stop-setting lever 150, lever 142 will then be operated to move the selected stop member 136 downwardly against the resistance of spring 140 and into the path of a stop lever 158, when the latter is moved to operated position as will be presently described. This lever, as seen in Figure 5 of the drawings, has a substantially U-shaped end portion 160 pivotally mounted upon a stud 162 fixed in the machine frame. Lever 158 extends inwardly beneath the drum 32 and has vertical movement in a guide bracket 164 fixed to the frame, said bracket having a shoulder 166 for latching the lever in its operated position. The end portion 160 of lever 158 is formed with an arm 168 extending vertically above and below the pivot stud 162 and a spring 170 connected to the lower end of said arm holds the same against stop 172 in its unoperated position, as shown in Figures 1 and 5. The stop lever 158 may have a slight movement axially of the pivot stud 162 and a spring 174 connected to said lever and to a part of the frame is under tension in the normal position of said lever and acts to yieldingly hold the lower edge of the lever in contact upon the shoulder 166 of bracket 164 when the lever is moved to its operated position relative to the set stop members 136 in the drum 32.

The upper end of arm 168 is connected by link 176 with the lower end of depending arm 178 suitably fixed at its upper end to one end of a rock shaft 180 mounted in an extension of the frame 10. To the other end of said shaft an upwardly extending arm 182 is suitably fixed and has contact with the collar 184 fixed upon rod 186 extending through the end of said arm. One end of this rod is pivotally connected as at 188 to the pawl 102 of the escapement mechanism.

Arm 178 is also connected by link rod 190 to the lower end of the tabulating lever 192 mounted upon the fixed pivot 194 and engaged at its upper end by actuating element 196, operated by the function operating means of a telegraph printer.

As shown in Figure 1 of the drawings, the lever 158 is disposed substantially radially of the drum 32 and has a cam lug 198 projecting from one side thereof with which the lower ends of the set tabulating stops 136 engage in the return movement of the carriage to push up or restore said tabulator stops to their non-operated positions in the drum. With the opposite side of said lever, the lower end of the pivoted finger 38 is adapted to engage, as seen most clearly in Figure 5 of the drawings.

Carriage return lever 200 mounted on fixed pivot 202 is operatively connected at its lower end by link rod 204 with the pivoted latch lever 84. Link rod 206 also connects lever 200 to depending arm 208 on one end of a second

rock shaft 210 mounted in the machine frame, the other end of which is provided with an upwardly extending arm 212 in bearing contact with a second collar 214 fixed on the operating rod 186 for escapement pawl 102. Actuating element 216 engaged with the upper end of lever 200, is operated by a typewriter key lever or function operating means of a telegraph printer.

Assuming that all desired tabulating stops 136 have been set in the drum 32, and it is desired to use the same for filling in a form or grouping the printed characters in variably spaced columns, the tabulating lever 192 is then operated to space the carriage into proper position for printing in the next column. Stop lever 158 is thus operated by link 190 against resistance of the spring 170 and moves upwardly into the path of the set tabulating stops and is held upon latch shoulder 166 by the spring 174. Pawl 102 is also actuated by arm 182 and rod 186 and moved out of engagement with the spacing ratchet 22, whereupon said ratchet, gear 20, drum 32 and all other parts connected to sleeve 16 are free to rotate in a counterclockwise direction under the influence of spring 98. As seen in Figure 2 of the drawings, the gear 20 thus moves the rack and the type carriage connected thereto to the right until a set tabulating stop 136 carried by the drum 32 strikes the stop lever 158. Since this lever was latched by shoulder 166 in its operated position, and is connected through link 176 to the actuating arm 182 for pawl 102, said pawl is held out of engagement with the ratchet 22 until the depressed stop member 136 strikes said lever and moves the same off of the shoulder 166. Spring 170 then returns said lever to its normal, unoperated position against stop 172, and the spring 116 moves pawl 102 into engagement with ratchet 22, thus stopping the carriage in this position and completing the tabulating operation. It will therefore be understood that after the printing of each group of characters, the tabulating lever 192 is operated to properly space the carriage in accordance with the pre-selected setting of the tabulating stops 136 for printing the next succeeding group of characters.

In order to restore or wipe out the tabulating stops set up on drum 32, it is necessary to first space the carriage to a point near its extreme right hand position or beyond the last set up tabulating stop, and then operate tabulating lever 192 before the carriage return lever 200 is operated.

When the carriage return lever 200 is operated, latch dog 84 is disengaged from arm 80 on the shaft 76, thus permitting spring 82 to move clutch collar 64 into engagement with clutch member 66 on gear 68, thereby operatively connecting power driven shaft 74 with gear 26 and gear 20 on sleeve 16 and rotating gear 20 in a clockwise direction to move rack 126 and the type carriage to the left towards its starting position. The friction means between sleeve 44 and gear 48 is so adjusted as to permit of a certain amount of slippage, and thereby eliminate shock or jerk in starting the carriage on its return movement. The major portion of this return movement of the carriage is effected by the toothed engagement of gear 48 with gear 26. However, as the carriage nears its ultimate left hand or starting position, roller 94 on decelerating arm 28 will enter slot 96 on cam 60 at approximately the same time as the teeth of gear 48 move out of mesh with the teeth on gear 26 at one end of the untoothed or interrupted section 62 of the latter gear as seen in Figure 2. Continued rotation at a decelerated speed will then be transmitted to sleeve 16 and gear 20 as roller 94 progressively moves inwardly in slot 96 towards the axis of gear 48. This produces a variable leverage between cam 60 and arm 28 which changes rapidly as the roller 94 moves toward the axis of gear 48, as shown in Figure 2, thereby effectively decelerating or slowing the final return movement of the carriage to its starting position, and eliminating the shock or jar.

Of course, in this power return movement of the car-

riage, energy is stored in the spring 98, and as the carriage reaches the final starting position, trip arm 36 on drum 32 strikes the upper end of pivoted finger 38 which moves stop lever 158 off of the latch shoulder 166, whereupon said lever is return to unoperated position by the spring 170. At approximately the same time, the extension 92 of decelerating arm 28 strikes the declutching lever 90, thus rocking shaft 76 and disengaging clutch collar 64 from clutch member 66, said collar being retained in such disengaged position by the latching engagement of dog 84 with the arm 80 on shaft 76.

Carriage return lever 200 is also connected through rod 206 and arm 212 with actuating rod 186 for the escapement pawl 102. Escapement pawl 102 is by this means held out of engagement with spacing ratchet 22 during the carriage return movement.

In Figure 9 of the drawings, I have illustrated one arrangement of a tabulating key 216, a tabulating stop setting key 218, and a carriage return key 220 in a conventional typewriter keyboard. Any suitable motion transmitting connections (not shown) may be provided between these keys and the parts 178, 142 and 84, respectively.

From the above description and the accompanying drawings, it is believed that the construction, operation, and several advantages of the present invention will be clearly and fully understood. It will be seen that I have provided, in a simple and compact machine organization, a novel assembly, in which the spacing movements of the carriage for tabulator printing are effected by an energy storing device, while the return movement of the carriage to its starting position is effected by power operated means, during the operation of which energy is stored in said device. The simple and novel means which I provide for decelerating the return movement of the carriage by said power operated means, whereby destructive shock or jar to the parts of the mechanism is avoided, is also an important feature of my invention. Further, it will be noted that I have materially simplified the tabulating mechanism and embodied therein means which automatically operates to restore the selectively settable tabulating stops to their unoperated positions in the return movement of the carriage. Also, the large number of the selectively operable tabulating stops mounted in the rotating drum of minimum diameter is a distinctively novel feature of the present improvements. It will be noted that the power operated carriage return mechanism will function to positively and quickly return the carriage to starting position under all conditions of use of the machine, and will operate with equal efficiency when the machine is mounted on a horizontally fixed support or is operated on shipboard, in airplanes, or other moving vehicles, which may from time to time assume various angular positions with respect to the horizontal.

Finally, it will be seen that the several cooperating parts of the tabulating and escapement spacing mechanisms for the carriage as well as the power return mechanism are of very simple and durable structural form, whereby the production cost of recording machines of this type is materially reduced, and maximum high speed operating efficiency with minimum maintenance expense is assured.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. In printing apparatus having a carriage and means for effecting character spacing movements of said car-

riage: tabulating mechanism including a control means to disable the character spacing movement and permit tabular spacing operation of the carriage, a movable stop means engaged with said control means and movable between two limit positions, a series of tabulating stops collectively movable in unison with a part of said carriage spacing means, means for selectively setting said stops to a position wherein they are adapted to coast with said movable stop means when in one of said limit positions to predeterminedly limit the tabulating movements of said carriage and restore the character spacing function of said carriage spacing means, and means included in and positioned with said movable stop means and operable during return movement of said carriage to restore said stops to their unset positions.

2. Printing apparatus as defined in claim 1 including a support frame and in which the tabulating stops are arranged in an annular series and connected with said part of the carriage spacing means for rotation about a stationary axis with respect to said support frame.

3. Printing apparatus as defined in claim 1, wherein the means for effecting character spacing movements of the carriage includes a rack on said carriage and a gear meshed with said rack and said tabulating mechanism includes a drum carrying said tabulating stops in fixed coaxial relation with said gear.

4. In recording apparatus having a carriage and means for effecting character spacing movements of the carriage including a member rotatable about a fixed axis; tabulating mechanism comprising an annular series of individually movable stops mounted on said member for unitary rotation therewith in the carriage movement, means for selectively setting said stops in tabular spacing position, and a coiled spring circumscribing said annular series of stops to retain the individual stops in set and unset position.

5. In recording apparatus having a carriage and means for effecting character spacing movements of the carriage including a member rotatable about a fixed axis; tabulating mechanism comprising an annular series of individually movable stops of equal number to the character spacing positions of the carriage mounted on said member for unitary rotation therewith in the carriage movement, means for selectively setting said stops in tabular spacing position, and a coiled spring circumscribing said annular series of stops to retain the individual stops in set and unset position.

6. In recording apparatus having a carriage, a spiral spring and means operated thereby to move the carriage in one direction, escapement means controlling character spacing movements of the carriage under the action of said spring, and tabulating mechanism comprising a plurality of settable tabulating stops and a fixed stop under control of said spring for collective synchronous movement with the carriage, means for selectively setting said stops in predetermined tabular spacing position, a movable member operatively connected with said escapement means, a tabulating lever connected to said member to position the same in the path of movement of the set stops and release control of the carriage by said escapement means to permit movement of the carriage until arrested by contact of a set tabulating stop with said member, means engaging said member and responsive to said positioning by said tabulating lever to automatically latch said member in that position and further responsive to said member contacting a set tabulating stop or said fixed stop to unlatch said member and permit its return to its original position, and means operable during return movement of said carriage to restore said stops to unset position.

7. Recording apparatus as defined in claim 6, wherein said tabulating stops are mounted and arranged in an annular series for rotation about the axis of said spring.

8. In a telegraph printer having a carriage and means for imparting character spacing movements to said car-

riage including a member rotatable about a vertical axis and escapement mechanism operatively connected with the carriage; a tabulating mechanism comprising an annular series of tabulating stops mounted on said member and individually movable relative thereto, means responsive to function operating means of the printer for selectively setting said stops in operative position, and additional means responsive to other function operating means of the printer operatively connected to the escapement mechanism to release the carriage and including a stop lever movable into the path of movement of the set tabulating stops to limit movement of the carriage to tabular printing position.

9. A telegraph printer as defined in claim 8, wherein said lever is provided with means to operatively engage and restore the set tabulating stops to normal position in the return movement of the carriage to starting position.

10. In recording apparatus having a carriage and means for effecting character spacing movements of the carriage including a member rotatable about a fixed axis; tabulating mechanism comprising an annular series of individually movable stops of equal number to the character spacing positions of the carriage mounted on said member for unitary rotation therewith in the carriage movement, means for selectively setting said stops in tabular spacing position, a yieldable member circumscribing said annular series of stops to retain the individual stops in set and unset position, and means independent of the carriage operable to restore the selected stops to unset position in the return movement of the carriage to starting position.

11. In recording apparatus having a carriage and means for effecting character spacing movements of the carriage including a member rotatable about a fixed axis; tabulating mechanism comprising an annular series of individually movable stops of equal number to the character spacing positions of the carriage and mounted on said member for unitary rotation therewith in the carriage movement, means for selectively setting said stops in tabular spacing position, and a yieldable member circumscribing said annular series of stops to retain the individual stops in set and unset position.

12. In recording apparatus having a carriage, a spiral spring and means operated thereby to move the carriage in one direction, escapement means controlling character spacing movements of the carriage under the action of said spring, and tabulating mechanism comprising a plurality of tabulating stops corresponding in number to the number of character spacing movements of the carriage and under control of said spring for collective synchronous movement with the carriage, means for selectively setting said stops at predetermined tabular spacing position, a movable member operatively connected with said escapement means, a tabulating lever connected to said member to position the same in the path of movement of the said stops and release control of the carriage by said escapement means to permit movement of the carriage until arrested by contact of a set tabulating stop with said member, means releasably latching said movable member in operated position, means operable upon release of said member by impact of a selected tabulating stop therewith or by a carriage return movement to return said member to unoperated position and restore the escapement means to operative condition and means carried by said member and operable when said member is in said operated position to reset all set tabulating stops during a return movement of said carriage.

13. In recording apparatus having a carriage, a spiral spring and means operated thereby to move the carriage in one direction, escapement means controlling character spacing movements of the carriage under the action of said spring, and tabulating mechanism comprising a plurality of tabulating stops corresponding in number to the number of character spacing movements of the carriage and under control of said spring for collective synchro-

nous movement with the carriage, means for selectively setting said stops in predetermined tabular spacing positions, a movable member operatively connected with said escapement means, a tabulating lever connected to said member to position the same in the path of movement of the set stops and release control of the carriage by said escapement means to permit movement of the carriage until arrested by contact of a set tabulating stop with the member, said tabulating stops being mounted and arranged in an annular series for rotation about the axis of said spring, and means common to all of said tabulating stops for yieldingly retaining the individual stops in set and unset positions.

14. In a recording apparatus having a carriage and means for imparting character spacing and tabulating movements thereto, a plurality of tabulating stops connected to said means and collectively movable in synchronism with the carriage, means for selectively setting said stops in tabulating position, a tabulating lever, means actuated by said lever to condition said carriage spacing means to impart tabulating movement to the carriage, a member connected to said latter means and movable by operation thereof into the path of movement of a set tabulating stop to arrest movement of the carriage to a predetermined tabulating position, means engaging said member and operative upon movement thereof to hold the member in operated position, and means responsive to completion of a carriage return movement to restore said member and lever actuated means to unoperated position and condition said carriage spacing means to impart character spacing movements to the carriage.

15. In a recording apparatus having a carriage and means for imparting character spacing and tabulating movements thereto, a plurality of tabulating stops connected to said means and collectively movable in synchronism with the carriage, means for selectively setting said stops in tabulating position, a tabulating lever, means actuated by said lever to condition said carriage spacing means to impart tabulating movement to the carriage, a member connected to said latter means and movable by operation thereof into the path of movement of a set tabulating stop to arrest movement of the carriage to a predetermined tabulating position and during return movement of said carriage to return all set tabulating stops to the unset position, said tabulating stops being mounted in a rotating drum for selective movement axially thereof, and means yieldingly retaining said stops in set and unset positions.

16. In a recording apparatus having a carriage and means for imparting character spacing and tabulating movements thereto, a plurality of tabulating stops connected to said means and collectively movable in synchronism with the carriage, means for selectively setting said stops in tabulating position, a tabulating lever, means actuated by said lever to condition said carriage spacing means to impart tabulating movement to the carriage, a member connected to said latter means and movable by operation thereof into the path of movement of a set tabulating stop to arrest movement of the carriage to a predetermined tabulating position, means for releasably holding said member in operated position, said member having means operable to restore the tabulating stops to unset position in the return movement of the carriage to starting position, and means operable at the end of a carriage return movement to release said holding means and permit said member, lever and carriage spacing means to return to original positions.

17. In a telegraph printer, a movable carriage, a movable support, motion transmitting means connecting said support and said carriage for synchronous movement, a series of tabulating stops shiftably disposed in said support whereby said stops are collectively movable in unison with the movement of said carriage and positionable transversely of their path of movement in one of two alternative positions, means responsive to function operat-

ing means of the printer for individually transversely displacing said stops to one of said positions, a stop member mounted adjacent the path of movement of said stops and movable into the path of movement of the stops in said one transverse position, and additional means responsive to other function operating means of the printer for moving said member into the path of movement of the stops said member having an abutment face on one side and an inclined cam face on the opposite side whereby said member is effective to arrest movement of said carriage upon engagement with a stop displaced to said one position when said carriage is moving in one direction and when said carriage is moving in the opposite direction is effective upon engagement with a stop in said one position to shift the engaged stop to the other of said positions.

18. In a recording apparatus having a carriage and means for imparting character spacing and tabulating movements thereto, a plurality of tabulating stops mounted and arranged in an annular series to rotate about a fixed axis relative to the carriage connected to said means and collectively movable in synchronism with said carriage, means for selectively setting said stops in tabulating position, a resilient member common to at least two of said stops for retaining the associated stops in set and unset positions, a tabulating lever, means actuated by said lever to condition said carriage spacing means to impart tabulating movement to the carriage, and a member connected to said latter means and movable by operation thereof into the path of movement of a set tabulating stop to arrest movement of the carriage to a predetermined tabulating position.

19. In a recording apparatus having a carriage and means for imparting character spacing and tabulating movements thereto, a plurality of tabulating stops connected to said means and collectively movable in synchronism with the carriage, means for selectively setting said stops in tabulating position, a tabulating lever, means actuated by said lever to condition said character spacing means to impart tabulating movement to the carriage, a member connected to said latter means and movable by operation thereof into the path of movement of a set tabulating stop to arrest movement of the carriage to a predetermined tabulating position, said member having means operable to restore the tabulating stops to unset position in the return movement of the carriage to starting position, means for releasably holding said member in operated position, and additional means operative at the end of the return movement of the carriage to disengage said member from said holding means.

20. In a telegraph printer having a carriage and means for imparting character spacing movements to said carriage comprising an escapement mechanism and motion transmitting means operatively connecting the escapement mechanism with the carriage; a tabulating mechanism comprising a movable support, including a plurality of individually movable tabulating stops, connected to said motion transmitting means and collectively movable in synchronism with but in a path distinct from the carriage, means responsive to function operating means of the printer for selectively setting said stops in operative position, and additional means responsive to other function operating means of the printer operatively connected to the escapement mechanism to release the carriage and including a member movable into the path of movement of the set tabulating stops to limit movement of the carriage to tabular printing position.

21. A telegraph printer as defined in claim 20, wherein said member is provided with means to operatively engage and restore the set tabulating stops to normal position in the return movement of the carriage to starting position.

22. In a recording apparatus having a carriage and means for imparting character spacing and tabulating movements thereto, a plurality of tabulating stops con-

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nected to said means and collectively movable in synchro-
 nism with the carriage, means for selectively setting said
 stops in tabulating position, a resilient member common
 to at least two of said stops for retaining the associated
 stops in set and unset positions, a tabulating lever, means
 actuated by said lever to condition said carriage spacing
 means to impart tabulating movement to the carriage,
 and a means for latching said lever in actuated position
 and including a member connected to said means actu-
 ated by the lever and movable by operation thereof into
 the path of movement of a set tabulating stop to arrest
 movement of the carriage to a predetermined tabulating
 position and simultaneously unlatch said lever.

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