

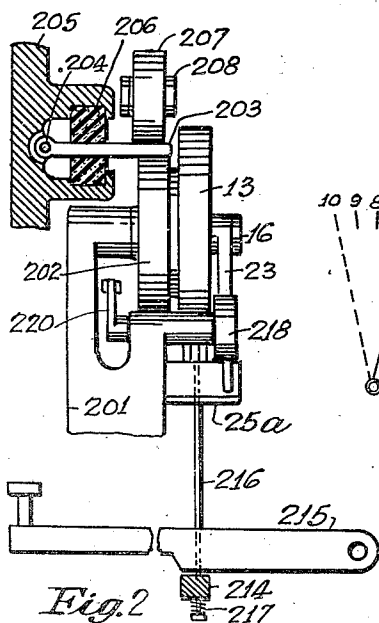
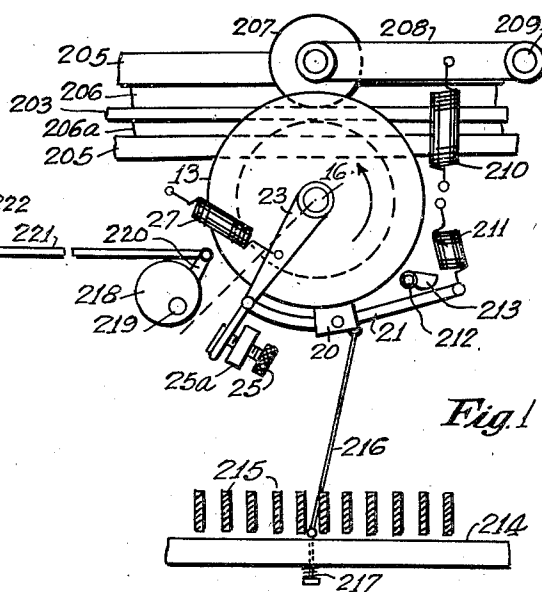
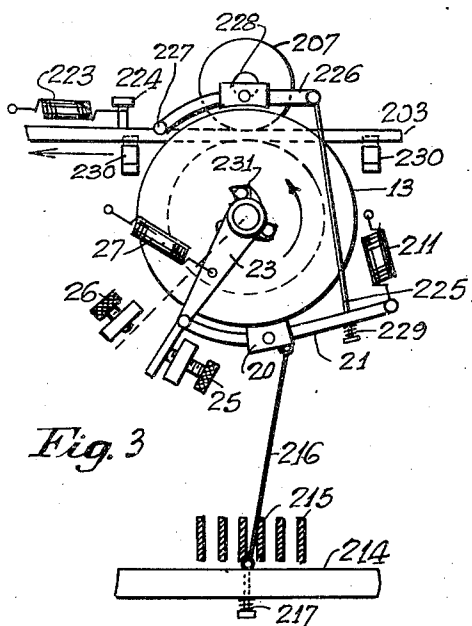
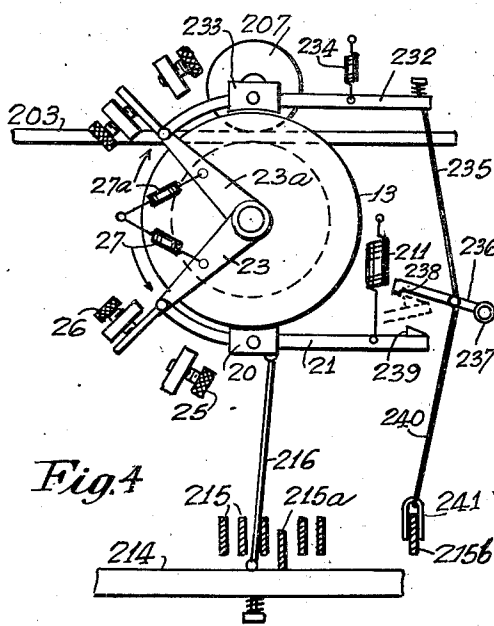
April 8, 1947.

M. H. LOUGHRIDGE

2,418,474

VARIABLE LETTER-SPACING DEVICE FOR TYPEWRITERS

Original Filed May 15, 1940



Matthew H. Loughridge INVENTOR.

UNITED STATES PATENT OFFICE

2,418,474

VARIABLE LETTER-SPACING DEVICE FOR
TYPEWRITERS

Matthew H. Loughridge, Bogota, N. J.; William R.
Lockridge administrator of said Matthew H.
Loughridge, deceased

Original application May 15, 1940, Serial No.
335,391, now Patent No. 2,283,680, dated May 19,
1942. Divided and this application May 20,
1942, Serial No. 435,594

13 Claims. (Cl. 197—84)

1

This invention relates to a stepping and justifying mechanism and is shown in connection with the carriage feed of a typewriter for letter and word spacing. An object of the invention is to provide an escapement for typewriters in which the steps of the stepping mechanism can be varied as desired; another object is to provide an escapement for a typewriter carriage in which the steps are adjustable and which may be operated in opposite directions and another object of the invention is to provide a stepping motion for the carriage of a typewriter operated by a friction wheel. These and other objects of the invention will be more particularly understood from the following specification and the accompanying drawings in which

Fig. 1 is a front elevation of the invention applied as a justifying mechanism to control the linear motion of a typewriter carriage;

Fig. 2 is an end elevation, partly sectioned, corresponding to Fig. 1;

Fig. 3 is a front elevation of the mechanism applied to an escapement, and

Fig. 4 is a front elevation of the adaption of the invention for front and back spacing of the typewriter carriage.

This application is a division of application Serial No. 335,391, filed May 15, 1940, now Patent No. 2,283,680, issued May 19, 1942, relating to a justifying mechanism.

In this invention a member of the typewriter carriage is held in frictional engagement with a roller of the stepping mechanism. This roller is released for a limited movement by each operation of the typewriter keys. The extent of the movement is adjustable by a cam and index lever so that this adjustment may be made to justify the typewritten lines so that they will end evenly one below the other. The adjustment is obtained by an arm which frictionally engages the roller and has an angular movement about the roller that is readily adjusted to limit the steps produced by this arm as the keys are operated. In the application of the invention to a typewriter carriage it is necessary to release the carriage for one step after the key is operated and for this purpose the stepping action is produced by a spring which moves the lever against the action of the keys.

The movement of the typewriter carriage may be obtained by the movement of the lever engaging the friction roller and the power for obtaining this operation may be obtained from the operation of the keys, or may be operated pneumatically and controlled by the keys as in the above referred to application.

2

When the typewriter carriage is biased to the return position as by a spring the invention is applied as an escapement in which a lever engages the roller and holds it in position while the stepping lever is restored to the starting position so that it may release the carriage for one step when the key is released.

When the mechanism is to be applied as a back-spacer to space the carriage backwards as well as forwards, a first lever is provided operated by the ordinary keys for stepping the carriage in the normal direction and a second lever is provided reversed with respect to the first lever so that it rotates the friction roller in the opposite direction. This second lever is operated by the back spacing key and the operation of this key holds the normal spacing lever inactive so that the back spacing is operated without releasing the forward spacing.

The mechanism is applied for operating a sheet feeding mechanism through a roller in which one, or preferably a pair, of magnets may be used in which the circuit of these magnets is intermittently controlled to produce a stepping movement of the roller to the extent desired. When automatic control is required in this form of sheet feeder a system using a photo-electric cell influenced by the movement of the sheet, may be used to control the circuit of the magnets and to stop their action when the desired position is reached.

Adjusting an object having linear motion

A common form of linear motion to which justifying mechanisms have been adapted is found in the letter spacing of a typewriter. An adaptation of this invention for this purpose is shown in Figs. 1 to 4 inclusive. The letter spacing of the carriage of a typewriter is a relatively small movement and when the carriage is mounted on antifriction bearings this movement may be obtained by relatively little energy, as for instance, by the return of a spring after it has been expanded. In one application the letter spacing of the carriage is obtained by the energy applied to the writing keys; the carriage makes one step upon the return of each key after writing a character or by the operation of the spacer bar. In this application the retracting spring for the carriage is not required. When applied to a carriage with a retracting spring the justifying mechanism operates like an escapement, releasing the carriage for a linear movement corresponding to letter spacing for the operation of each key.

Normally, the letter spacing is uniform, but

when it is desired to increase or decrease spacing the movement of the drum is adjusted by a cam which is set for the spacing desired. In application, if the normal spacing provides for ten characters to the inch and the end of a line is approached which will be justified if eight characters are spaced in one inch, the adjusting cam is set for eight spaces and the linear movement of the carriage is controlled accordingly. As this mechanism does not use a ratchet but instead uses a friction wheel to control the adjusted object, the variation in the control can be introduced at any point.

In the drawings, 201 is the supporting frame of the justifying mechanism which is suitably secured to the body of the typewriter, 202 is a friction wheel mounted on shaft 16, supported by frame 201 and frictionally engaging the rib 203 which is pivoted at 204 in the frame 205 of the carriage. This rib is supported between a soft rubber cushion 206 on the top and a corresponding cushion 206a on the bottom which provides for its vertical movement on the pivot 204. The rib is held in frictional engagement with wheel 202 by the roller 207, mounted on arm 208, pivoted at 209 and held under tension by spring 210. In this construction the carriage is moved by a corresponding movement of the friction wheel. The rib 203 is an integral part of the carriage.

The drum 13 is rigidly secured to the friction wheel 202 and rotates therewith. This drum is engaged by the shoe 20, controlled by lever 21, pivoted to arm 23 and normally held in engagement with the drum by the spring 211. The universal bar 214 is depressed when each of the keys 215 is depressed. This applies tension to the connection 216, connecting to shoe 20 to release the shoe from the drum against the tension of spring 211. When the shoe is released spring 27 returns arm 23 to the position as determined by the cam 218, and when the operated key 215 releases the universal bar 214 the spring 211 brings the shoe into engagement with the drum and rotates the drum to correspond with the free movement of arm 23. The connection to 216 is made through an equalizing spring 217 so that the movement of bar 214 may not retard the normal operation of the keys. When it is desired to release the adjusting mechanism and permit the free movement of the carriage the cam 213, through shaft 12, is brought into engagement with the lever 21 to release the shoe from the drum.

The movement of arm 23 is limited by the stop screw 25 in the lug 25a and by the cam 218, mounted on shaft 219, which is rotated by arm 220 and connected by rod 221 to the adjusting lever 222. This lever is graduated to indicate in its various positions of adjustment the letter spacing that is provided by the movement of cam 218 to restrict the movement of arm 23 and it may be brought into operation at any position in writing a line so that the line will justify. For instance, if it is known that eight normal spaces are required to complete a line and only six letters are available, the stepping of the carriage is increased by adjusting lever 222 so that the eight spaces will be reduced to six by increasing the length of each space. The diameter of the drum 13 is larger than the diameter of the friction wheel 202 so that a close adjustment can be obtained in the operation of the system. The leverage of 222 can be increased to provide for close adjustment. Friction roller 202

and operating drum or roller 13 are an integral construction.

The application in Fig. 3 performs the function of an escapement in which the spring 223 connecting to stud 224 normally retracts the rib 203. The drum 13 is provided with a lever 21 and a shoe 20 which is operated by the keys 215, corresponding to the mechanism in Fig. 1. In addition, the drum is provided with the lever 226, secured to a fixed pivot 227 and having the shoe 228, which engages the drum 13, through connection 225 and 229 to the lever 21, when lever 21 is moved to the released position by the operation of the universal bar 214. In operation, when a key is depressed, lever 21 is lowered to release brake shoe 20 and to permit spring 27 to restore arm 23 to the position fixed by stop 26. At the same time lever 226 is lowered to bring shoe 228 into engagement with the drum and to hold the drum against rotation when the writing impression is made. When the key is released spring 211 moves lever 21 to bring shoe 20 into engagement with the drum and, at the same time, shoe 228 is released and the drum is free to rotate corresponding to the free movement of arm 23, which released space is taken up by spring 223. When this position is reached, shoe 20 holds the drum until the next operation of bar 214. The friction wheel 202 connects with the drum 13 by the ball ratchet 231 to permit the carriage to be moved against the action of spring 223. When it is desired to release the carriage from the justifying mechanism, the wedges 230 are forced under rib 203 to release it from engagement by the friction wheel 202.

The mechanism shown in Fig. 4 corresponds with the mechanism in Fig. 1 with the addition of a back spacer. This comprises the arm 23a, normally held in the starting position by spring 27a and pivotally supporting the end of lever 232 which applies shoe 233 to the drum 13 against the action of spring 234, to rotate the drum in the opposite direction to that produced by lever 21. The back spacing is produced by back spacing key 215b, connecting by 241 and 240 to the arm 236, pivoted at 237 and connecting by 235 with lever 232. Arm 236 is provided with a hook 238 which engages a complementary hook 239 on lever 21 when this lever is in position to engage the drum.

As shown in the drawing, key 215a is depressed and the lever 21 is released from the drum and arm 23 is restored to the position at stop 26, and during the operation of the universal bar 214 the lever 232 remains inactive. When the back spacing key 215b is operated arm 238 engages lever 21 and releases shoe 20 but does not permit the arm 23 to be moved to the position against stop 26 because of the engagement of hooks 238, 239. At the same time lever 232 is depressed to apply shoe 233 to rotate drum 13 in the reverse direction. Back spacing is thus provided for while the forward spacing is suspended.

Having thus described my invention, I claim:

1. A justifying mechanism comprising a carriage to be adjusted in a linear direction, a driving connection to move said carriage step by step comprising a drum engaging said driving connection, a friction shoe for said drum, a lever movable with said drum and for applying said shoe to the drum, means for adjusting the rotational movement of said lever, to alter the distance of said steps to justify a line, and means for operating said lever to rotate the drum.

2. A justifying mechanism comprising a car-

5

riage to be adjusted in a linear direction, a rotatable drum operatively connected with the carriage, an arm pivoted to rotate about the axis of said drum, means for adjusting the rotational movement of said arm, a lever pivoted at one end to said arm and carrying a friction shoe engaging said drum, means for disengaging said lever from said drum, and a spring engaging said lever for rotating said drum and for restoring said arm to the starting position.

3. A justifying mechanism for a typewriter carriage comprising a roller operatively connected with said carriage, a lever having a limited movement about the axis of said roller and frictionally engaging said roller, a cam for adjusting the movement of said lever, means for releasing and moving said lever to the extent of said movement, and means for engaging said lever with said roller and restoring said lever to the starting position.

4. A ratchet-like mechanism for a typewriter carriage comprising a roller operatively engaged with said carriage, a lever having a limited movement about the axis of said roller and engaging said roller, means operated by each key of the typewriter for releasing said lever from the roller, a spring for moving said lever and roller to the extent of said movement and a spring for engaging the lever with the roller and restoring said lever to the starting position upon release of the key.

5. A ratchet-like mechanism for a typewriter as in claim 4 with spring means for providing frictional engagement between said roller and the member moving with the carriage.

6. An escapement mechanism for a typewriter carriage having a bias comprising a roller operatively connected with said carriage, a first lever having a limited movement about the axis of said roller, frictionally engaging said roller to rotate it in one direction, a second lever on a fixed pivot frictionally engaging said roller to prevent its movement by said bias and means operated by each key of the typewriter for bringing the second lever into engagement with the roller and restoring the first lever to the starting position on the initial movement of the type key, and means moving the first lever to rotate the roller and release the second lever from the roller on the return on the key.

7. A back spacing mechanism for a typewriter carriage, comprising a friction roller operatively connected with the carriage, a first lever engaging said roller and having a limited movement about the axis of said roller for moving said roller in the normal direction, a second lever engaging said roller reversed with respect to the first roller and having a limited movement about the axis of said roller and means operated by a back spacing key of the typewriter for engaging the second lever and releasing the first lever from the roller, to back space the carriage.

8. A back spacing mechanism for a typewriter carriage, comprising a friction roller operatively connected with the carriage, a first lever engaging said roller and having a limited movement about the axis of said roller for moving said roller in the normal direction, a second lever engaging said roller reversed with respect to the first roller and having a limited movement about the axis of said roller, means operated by a back spacing key of the typewriter for holding the first lever inoperative and operating the second lever to back space the carriage.

6

9. An escapement mechanism for a typewriter carriage having a bias, an operating roller operatively connected with said carriage through a ratchet mechanism, means for operating said operating roller in steps by the keys of the typewriter, means controlled by said keys for holding said operating roller against rotation by said bias, and said ratchet mechanism permitting the free return of said carriage against said bias.

10. An escapement for typewriters comprising a carriage, a friction roller means operatively connected with said carriage to determine its movement, a lever frictionally engaging said roller means and having a movement about the axis of the roller, an adjustable cam for limiting the movement of said lever, and means controlled by each key of the typewriter for operating said lever to the extent of the movement as determined by said cam and to effect a corresponding movement of said carriage.

11. An escapement for typewriters comprising a carriage, a friction roller operatively connected with said carriage to restrict its movement, means operated by the keys of the typewriter for effecting limited variable length movements of said roller by each key in a normal direction, and means operated by a back spacing key of the typewriter for effecting a limited reverse movement of said roller.

12. A justifying mechanism comprising a carriage to be adjusted in a linear direction, a rotatable drum operatively connected with said carriage, a first arm pivoted to rotate about the axis of said drum, a second arm pivoted to rotate about the axis of said drum, means for adjusting the rotational movement of said arms, a lever for each arm pivoted at one end to the arm and means on said levers for engaging the drum to rotate it in opposite directions, and means for operating said levers.

13. An escapement for typewriters comprising a carriage, roller means operatively connected to said carriage, a lever frictionally engaging said operating roller and having a movement about the axis of said roller, a cam for restricting the free movement of said lever upon release thereof, means for adjusting said cam, means connected with the type bar for releasing said lever from operative engagement with said roller, means for actuating said type bar, and a spring for moving said lever to rotate said roller in the normal direction.

MATTHEW H. LOUGHRIDGE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,202,565	Reid	May 28, 1940
2,237,770	Smith	Apr. 8, 1941
966,035	Mercer	Aug. 2, 1910
1,264,589	Anderson	Apr. 30, 1918
2,199,556	Carroll	May 7, 1940
2,246,968	Antrim	June 24, 1941
2,111,410	Stickney	Mar. 15, 1938
2,225,356	Sibley	Dec. 17, 1940
2,047,733	Harrison	July 14, 1936
2,198,005	Evans	Apr. 23, 1940

FOREIGN PATENTS

Number	Country	Date
307,867	British	1929