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3,260,343

SPACING MECHANISM FOR POWER OPERATED TYPEWRITERS

Filed Dec. 26, 1961

2 Sheets-Sheet 1

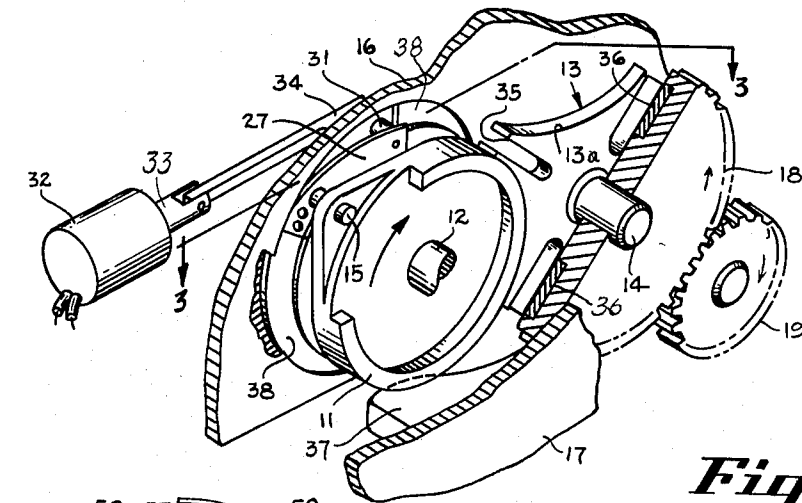


Fig. 1

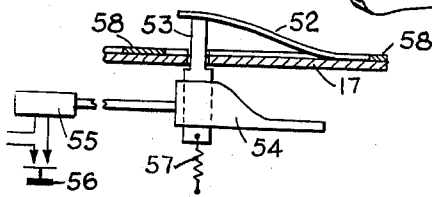


Fig. 8

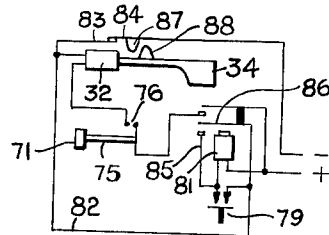


Fig. 11

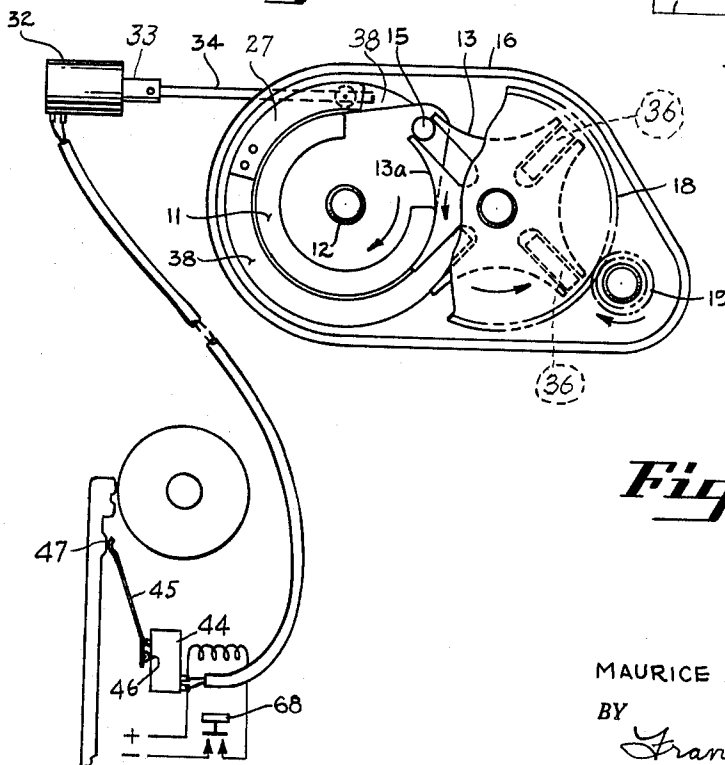


Fig. 2

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2 Sheets-Sheet 2

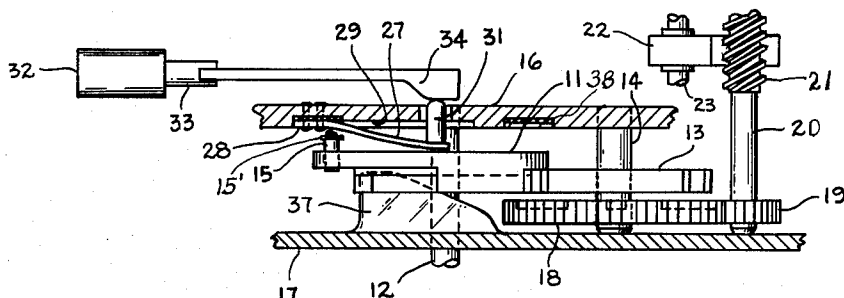


Fig. 3

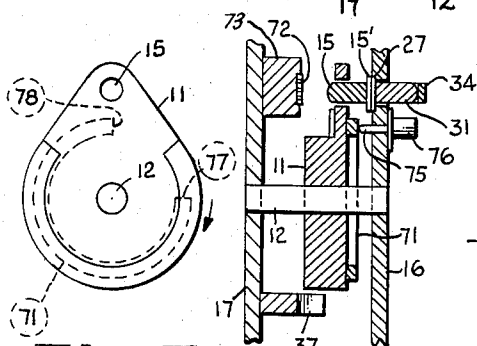


Fig. 9

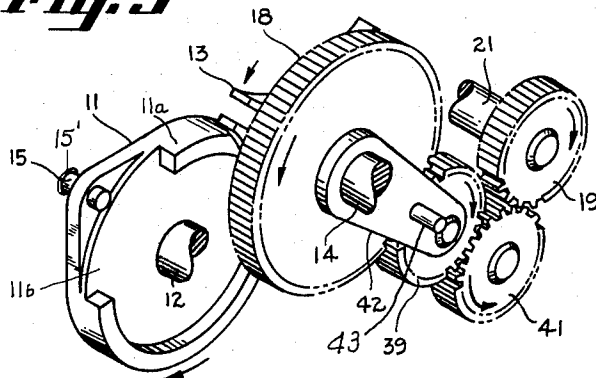


Fig. 5

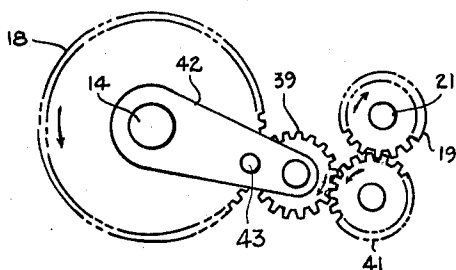


Fig. 7

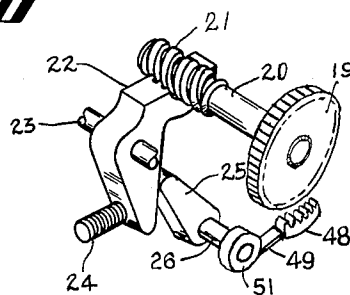


Fig. 4

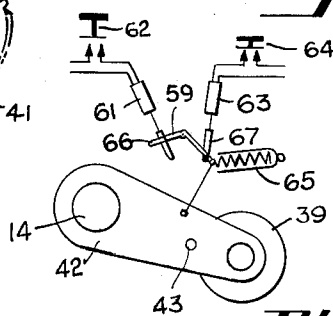


Fig. 6

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SPACING MECHANISM FOR POWER OPERATED TYPEWRITERS

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13 Claims. (Cl. 197—82)

This invention relates to improvements in spacing mechanisms for power operated typewriters and other printing devices.

One of the objects of this invention is to provide improvements in a power operated spacing mechanism suitable for letter spacing movement selectively to the right or to the left of a platen roll carriage or, alternatively, for letter spacing movement of a type basket carriage.

Another object of the invention is to provide an improved power operated spacing mechanism which will laterally space either carriage upon the happening of any of the following; the normal operation of a printing type arm, manual or automatic operation of a spacing bar, operation of a tabulating key, operation of back spacing key, or operation of a carriage return key.

Another object of the invention is to provide a power operated spacing mechanism having the above described capabilities and which accomplishes the spacing movements without the shock and attendant vibration characteristic of conventional spacing mechanisms which utilize motor or spring power and escapements.

Another object of the invention is to provide in the foregoing defined mechanism for the application of power thereto in a smoothly accelerating and decelerating action, such as is obtainable with a Geneva movement.

Other objects and advantages of the invention will be mentioned hereinafter or will become apparent in this specification.

The drawings show for illustrative purposes the nature and manner of operation of the invention, but it should be understood that the invention is not limited to the form or details of construction shown herein.

In the drawings:

FIG. 1 is a perspective view of a portion of the spacing mechanism, showing in particular the Geneva movement and the positively controlled drive pin in the Geneva movement.

FIG. 2 is a side elevation of the Geneva mechanism of FIG. 1, and added thereto a type arm actuated switch.

FIG. 3 is a cross-sectional view approximately on the line 3—3 of FIG. 1.

FIG. 4 is a perspective view of details of the worm drive, clutch and brake.

FIG. 5 is a perspective view of the Geneva assembly including a reversible gear mechanism.

FIG. 6 is a schematic view of controls for the reversible gear train.

FIG. 7 is a side elevation of the reversible gear train.

FIG. 8 is a schematic view of a solenoid controlled re-set cam.

FIG. 9 is a front elevation of a modified form of drive wheel separated from the complete Geneva movement.

FIG. 10 is a side elevation of the same wheel shown mounted in the casing.

FIG. 11 is a schematic drawing of a circuit to be used with said wheel.

To simplify the discussion, it will be assumed hereinafter that this spacing mechanism is employed to space a type basket carriage, a function for which it is admirably adapted.

The drive wheel 11 of the Geneva movement is fixed on a shaft 12 continuously driven directly or indirectly at a high speed by any suitable electric motor (not shown).

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A conventional star wheel 13 is fixed on a shaft 14 parallel to shaft 12 and is rotated only when engaged by the reciprocable pin 15 mounted in the drive wheel 11. The parallel shafts 12 and 14 are rotatably supported on the vertical walls 16 and 17, which may be part of a casing for the Geneva movement and are secured rigidly in any suitable manner to the general frame (not shown) of the machine.

The drive wheel 11 provides a conventional cylindrical surface 11a, interrupted by recess 11b, for holding the star wheel against rotation when not engaged by drive pin 15, as surface 11a contacts any concave recess 13a.

FIGURES 1 and 3 show the worm gear which is to be driven in one direction by the Geneva movement, whereas FIG. 5 and FIG. 7 show a reversible gear train which enables the Geneva movement to propel the spacing worm gear in either direction.

Referring first to FIGS. 1, 3 and 4, fixed on the shaft 14 along with the star wheel is a pinion gear 18 meshing with pinion gear 19, the latter fixed on the spacing worm gear shaft 20, an extension of the worm gear 21.

A clutch member 22 having segmental worm gear teeth formed therein, is pivotally mounted on a shaft 23, the latter being mounted integrally with, in this instance, the type basket carriage, so that when the worm gear 21 makes one revolution the basket will move one tenth of an inch, that is, if currently conventional typewriter spacing is desired. A spiral spring 24, under compression, normally urges the clutch 22 into operative engagement with the worm gear. An elongated dog 25 extending lengthwise beneath the line of travel of the clutch and fixed on rock shaft 26 may be operated in any appropriate manner, manually or otherwise, to disengage the clutch. This permits the carriage to be freely shifted manually.

Whereas a conventional Geneva movement has a drive pin, corresponding in location to drive pin 15, fixed immovably in the drive wheel, in this invention the pin 15 is mounted for axial sliding movement in the drive wheel. FIG. 3 shows it in its retracted or inoperative position, which enables the drive wheel to rotate continuously without the pin engaging a slot of the star wheel, thus to avoid propelling the latter. A small flange 15' may be provided on this pin to prevent it from being projected too far.

To protect the drive pin into operative position, I provide a cam spring 27, anchored at 28 and normally recessed in wall 16, but capable of being bent outwardly from the wall groove 29 (FIG. 3) by the coaction of pin 31 secured to the free end of the spring, a solenoid 32, armature 33 and cam 34. This solenoid may be energized to pull the cam to the left, as viewed in FIG. 3, by a switch closed by a spacing bar, by a switch closed by the type arm mechanisms, and by other switches as operations may require. When the spring is thus bent outwardly it becomes a cam, and, as may be seen in FIG. 1, as wheel 12 rotates further, the pin 15 is projected outwardly to an operative position where it may engage one of the four slots 35 of the star wheel and effect a one-fourth revolution of the latter. As the ratio of gears 18 and 19 is 4 to 1, the worm gear 21 is given one complete revolution.

The gear 18 is provided with four magnet inserts such as 36, insulated from the gear, each opposite and contiguous to a slot 35 in the star wheel, so that when drive pin 15 has been projected and is riding in one of these slots the magnet will attract it and insure it remaining projected until positively retracted.

When pin 15 moves out of one of the slots in the star wheel, its projected end will engage fixed cam 37 mounted on wall 17 and be fully retracted, and the other end of it will come into contact with magnet insert 38 recessed in wall 16 and thus be held retracted. If the solenoid 32,

at this time, is not being held energized, the pin 15 will remain retracted and the Geneva drive wheel may continue to rotate without rotating the star wheel. The spring 27 is not magnetized by magnet insert 38, and when fully retracted, the spring is flush with wall 16.

When the reversible drive of FIGS. 5 and 7 is employed, two additional pinion gears 39 and 41 are needed. Gear 39 will be mounted on a bracket 42 pivoted on shaft 14, and will constantly mesh with gear 18. For the forward drive in the normal printing direction, as shown in FIGS. 5 and 7, to move the type basket carriage from left to right, the gear 41 will be in mesh with gears 39 and 19, as shown. But, to reverse the travel of the type basket carriage, bracket 42 will be rotated on shaft 14 to cause gear 39 to disengage from gear 41 and to engage with gear 19. Any suitable means such as a manually operable shift pin 43 secured to bracket 42 and extending to the outside of the machine may be employed for shifting the gear 39 and this shift pin may be locked in forward or reverse position by suitable conventional detents or a locking plate (not shown). The manual shift of the gear 39 should take place only when the star wheel and its integrally movable gear 18 are at rest.

FIG. 2 shows how the normal operation of a type arm will effect spacing of the type basket carriage, either for normal left to right printing, or right to left printing on a paper carried by a stationary platen.

Positioned on the type basket assembly just below the common printing position which all type arms arrive at during a printing stroke, there is located a switch generally indicated as 44 having extending upwardly therefrom a non-conducting lever 45 pivoted at 46 on the casing of the switch. The upper end of this lever is in position to be contacted by a small projection 47 provided on each type arm, thus rocking the lever and closing a switch contact within the casing, establishing thereby a circuit to supply power to solenoid 32, which projects the drive pin. The switch 44 closes just as the type arm strikes the platen, and the relative timing is such that the type arm has time to bounce back and clear the platen before the basket moves relatively to the platen.

When the reversible drive of FIG. 5 is provided on a machine and is to be employed for a particular printing operation, the gear shifting pin is first set in reverse position and thereafter the normal operation of a spacing bar or of a typewriter key to cause printing of a character at the platen will be followed by the incremental spacing of the type basket toward the left.

As in a conventional Geneva movement, the cylindrical peripheral surface 11a of the drive wheel 11 is interrupted by a recess 11b adjoining the drive pin 15, and this cylindrical surface engages one of the conventional complementary concave recesses of the star wheel, to hold the latter against rotation. This together with the fact that the clutch 22 is normally engaged with the worm gear when spacing movement is not desired, serves to hold the type basket stationary. No spring wound belt or strap and pawl is required to hold the type basket at a desired position.

Because of the position and extent of the cam spring 27 relatively to the drive and star wheels, the steel pin 15 can be projected by the solenoid 32 only just in time to engage one of the slots of the star wheel.

While a four-toothed star wheel is shown herein, it should be understood the wheel may have more or less teeth, and that the gears associated therewith may have various ratios.

It will be perceived that the Geneva movement may readily be sealed in a casing, to exclude dirt, retain oil, and to contribute to the quiet operation of the machine.

For the sake of brevity and clarity in the claims a platen roll and a type basket may be referred to as printing components, and the term "printing component," as used in the claims, may refer to either. Also, the term

"carriage" may refer either to a platen carriage or type basket carriage.

When the rock shaft 26 is manually or otherwise rocked to disengage clutch 22 from the worm gear, the shaft 26 will simultaneously rock a toothed brake 48 into engagement with the pinion gear 19, thus holding the worm gear and the star wheel against rotation. This brake is supported on a flexible arm 49 extending from hub 51 fixed on shaft 26.

While the re-set or pin retracting cam 37 is shown as a fixed cam, I may substitute, a pivoted or otherwise movable cam which may be withdrawn from effective re-set position by any suitable means to facilitate repeat spacing action. For example, as shown in FIG. 8, I may employ a re-set spring cam 52, similar to cam 27, normally rigidly supported in projected or re-setting position by a horizontally reciprocable post 53 whose outer end is bifurcated to receive normally a supporting cam 54. This post supporting cam may be withdrawn by means of a solenoid 55, which may be selectively energized under the control of a switch 56.

It would be advantageous to close this switch and allow spring 57 to coact with the spring cam 52 to retract the latter when fast repeat spacing of the carriage is desired, thus allowing the drive pin 15 to remain projected for the duration of the repeat spacing, in contact with magnet inserts 58, when not in contact with one of the magnet inserts 36 embedded in gear 18, whether responsive to the actuation of a tabulator key or a carriage return key.

FIG. 6 shows schematically an arrangement for solenoid control of the reversible gear mechanism of FIG. 7. A bell crank 59 will be so pivotally supported and its arms so proportioned that in one position it will hold gear 39 in the forward drive position (as shown in FIG. 5) and when shifted by one of the solenoids the bell crank will hold the gear in the reverse drive position. Solenoid 61 and switch 62 may be employed to produce the forward drive, while solenoid 63 and switch 64 will effect the reverse drive.

As it is advisable that the solenoids be energized only momentarily to kick the bracket 42 to either of its positions and then be de-energized, a conventional toggle spring assembly 65 acting on one arm of the bell crank may be relied on to hold the gear mechanism either in forward or reverse position. To shift the gears to reverse, the solenoid 63 will be energized and a loop on the end of the solenoid armature rod will engage the adjacent arm of the bell crank and rotate it. Similarly, to return the gears to forward drive, solenoid 61 will be momentarily energized, causing a looped end of its solenoid rod to engage the other arm of the bell crank and rotate it far enough to throw the toggle assembly past dead center.

The loops 66 and 67, which embrace the bell crank arms represent simplified schematic showings of a lost motion connection between the solenoids and the bell crank arms. Any suitable lost motion device may be substituted therefor.

All the solenoids referred to herein are of conventional types which energize to full operating strength rapidly, and, when de-energized, are returned to normal position by self-contained springs.

In FIG. 2 there is schematically shown how a typical repeat key 68 may be used to energize solenoid 32 and thus project the drive pin 15, and hold the solenoid energized.

While solenoids are shown in FIGS. 6 and 8, it is contemplated that these might be replaced by mechanical linkages actuated merely by manually operated keys. For example, a carriage return key, manually actuated, could through an appropriate system of linkages close and hold closed a switch to energize solenoid 32, and mechanically shift the reversing gear bracket 42 to the reverse drive position, and at the same time mechanically withdraw the cam 54 to retract the re-set cam.

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Carriage return movement could easily be terminated at a predetermined left hand margin by use of conventional electrical limit switch or a conventional mechanical limiting device. In general, it will be apparent that the novel features of this invention may readily be coordinated with known carriage control mechanisms already well developed in this art.

While other means may be employed for achieving precise control over the timing of the projecting of the driving pin 15, I have shown herein in FIGS. 9, 10 and 11 an arrangement which may be used satisfactorily for that control.

For this purpose the driving wheel 11, as shown in FIGS. 9 and 10 is provided with an arcuately shaped cam 71, shown in dotted lines in FIG. 9. As seen in FIG. 10, this cam is on the rear face of the wheel, facing the casing wall 16, and may be made of any suitable metallic or non-metallic material. It may be adjustably secured in any suitable manner to the wheel 11, so that it may have its front or rear ends adjusted angularly relatively to the position of pin 15 and the cam 27.

Cam 27 is shown in FIG. 1 with its higher end at what may be called approximately the 12 o'clock position, as seen in FIGS. 1 and 2. This cam 27 may also be adjustably mounted on the casing closer or further removed from the relative position of the open end of the nearest slot in the star wheel.

Assuming that cam 27 remains where it is shown, pin 15, whenever it is projected, will leave the end of cam 27 at approximately the 12 o'clock position. Its projected end will be in contact with an insert magnet 72 to hold it projected, the magnet being insulated and mounted in a ledge 73 mounted on wall 17 and both extending arcuately a short distance into proximity with the periphery of gear 18 which carries inserts 36 (FIG. 1) for performing the same function. This magnet 72 should be provided preferably whether or not the devices of FIGS. 9 to 11 are employed.

As the wheel 11 rotates clockwise and the pin 15 moves past the cam 27, the front beveled end 78 of cam 71 will engage and displace laterally or retract a reciprocable spring loaded rod 75 causing normally closed switch 76 to open (see FIG. 11), thus opening one side of the circuit to solenoid 32. As the wheel 11 rotates further the rod 75 will remain retracted until the rear end 77 of cam 71 passes the 12 o'clock position at which the rod is located. At this moment the front end 78 of the cam will be at the 9 o'clock position. There now remains 90° more rotation for driving wheel 11 before the rod 75 will again be retracted.

Referring now to FIG. 11 and 2, and assuming that solenoid 32 is not energized and that switch 79 may be any fast operating switch making only a brief unsustained contact such as is made by switch 44, for example, when this switch 79 is closed the self-locking relay 81 becomes energized and locked. The circuit effecting this is traced as follows: from positive battery through relay 81 through the closed contacts of switch 79, through lead 92, normally closed contacts 83 and 84 adjoining the solenoid armature, thence to negative battery. Relay 81 has become locked as follows: from positive battery through the relay coil, now closed contacts 85 and 86, lead 82 to negative battery.

If at the instant the relay 81 was energized and locked, the cam 71 was holding switch 76 open, as shown in FIG. 11, the solenoid 32 could not become energized. However, as soon as the trailing end 77 of the cam passes the rod 75 the switch 76 closes and the solenoid is instantly energized by a circuit from positive battery through the upper now closed contacts of the relay, closed switch 76, solenoid 32, closed contacts 83 and 84 to negative battery.

Within the next 90° of rotation of the driving wheel 11 the pin 15 will be projected to cause the star wheel there-

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after to be rotated a quarter turn and space the carriage one space.

However, as the solenoid fully closes, the non-conducting knob 87 on contact arm 84 is struck and displaced by non-conducting knob 88 on the armature rod and the circuit at that point is opened cutting off negative battery from both the solenoid 32 and the self-locking relay, releasing both.

Thus is achieved a proper control over the projecting of the pin 15. If the switch 79, for example, be closed by a type arm bar when the pin 15 is between the 9 o'clock and 12 o'clock positions and switch 76 is then closed, first the relay and then the solenoid will be energized.

Factors such as relative location of cam 27 and star wheel, speed of driving wheel, speed of action and release of solenoid 32 must be taken into consideration when determining the arcuate length of the cam and its position on the driving wheel. The 90° radial angle between the ends of the cam 71 is merely illustrative. It may be greater or less than 90°. It may be substantially decreased to compensate for use of a fast operating solenoid 32, if the speed of rotation of wheel 11 permits, but, on the other hand, possibly may need to be increased in proportion to the speed of the wheel. The length of the cam affects the maximum length of time or the maximum amount of angular rotation of wheel 11 during which the holding or delay devices of FIG. 11 can hold switch 76 open and delay the energizing of solenoid 32 after switch 79 has been operated.

While the switch 44 is so located as to be closed in the manner described, it could be operated by some other part of the printing mechanism and at any selected point in the cycle required to print a character and restore the type arm to rest position.

For convenience of disclosure the switch 44, which makes only a brief contact, is shown as directly energizing solenoid 32. When the holding circuit of FIG. 11 is employed, switch 44 would supply current to the holding circuit and be substituted for switch 79.

As it is desirable that any switch operated by a conventional typewriter spacing bar should energize the same holding circuit, I may use for that purpose, in parallel with switch 79, any suitable conventional commercial switch which makes a brief closing contact on the downstroke of the spacing bar and as quickly opens so that the carriage will space just one space for each operation of the bar.

It should be understood that this invention is not limited to the details of construction disclosed herein but embraces such modifications, variations and other forms as may be contrived without departing from the scope of the invention defined in the appended claims.

Having shown and described my invention, I claim:

1. In a machine of the class described and having a pair of cooperating printing components, a spacing mechanism for moving one component transversely of the machine relatively to the other comprising a Geneva movement including a continuously driven Geneva driving wheel and a coacting star wheel, gear means adapted for incrementally spacing one component transversely of the other, means rotatable with the intermittent rotation of the star wheel for actuating said gear means, an eccentrically disposed axially slidable pin carried by the driving wheel selectively projectable to and retractable from a position at which it will operatively engage the star wheel, cam means adapted for engaging one end of the pin for projecting the other end of the pin, and means engageable with the other end of the pin for retracting the pin, said cam means being mounted at one side of the driving wheel and normally retracted but projectable for projecting said other end of the pin outwardly from the other side of the driving wheel.

2. In a machine for the class described having one printing component movable parallel to another printing

component, a spacing mechanism for moving said one component incrementally including a Geneva movement having a star wheel and an operatively associated driving wheel, an eccentrically disposed axially slidable pin carried by the driving wheel selectively projectable to and retractable from a position at which it will engage the star wheel during rotation of the drive wheel, cam means adapted for engaging one end of the pin for selectively projecting the other end of said pin, and means engageable with the other end of the pin for retracting said pin, said cam means being mounted at one side of the driving wheel and normally retracted but projectable for projecting said other end of the pin outwardly from the other side of the driving wheel.

3. In a machine of the class described and having a pair of cooperating printing components, including printing arms, a spacing mechanism for moving one component transversely of the machine relatively to the other comprising a Geneva movement including a continuously driven Geneva driving wheel and a coacting star wheel, gear means adapted for incrementally spacing one component transversely of the other, means rotatable with the intermittent rotation of the star wheel for actuating said gear means, an eccentrically disposed axially slidable pin carried by the driving wheel selectively projectable to and retractable from a position at which it will operatively engage the star wheel, cam means adapted for engaging one end of the pin actuated by one of said components during a printing stroke for projecting the other end of the pin, and means engageable with the other end of the pin for retracting the pin, said cam means being mounted at one side of the driving wheel and normally retracted but projectable for projecting said other end of the pin outwardly from the other side of the driving wheel.

4. In a machine of the class described and having a pair of cooperating printing components, including printing arms, a spacing mechanism for moving one component transversely of the machine relatively to the other comprising a Geneva movement including a continuously driven Geneva driving wheel and a coacting star wheel, gear means adapted for incrementally spacing one component transversely of the other, means rotatable with the intermittent rotation of the star wheel for actuating said gear means, an eccentrically disposed axially slidable pin carried by the driving wheel selectively projectable to and retractable from a position at which it will operatively engage the star wheel, solenoid actuated cam means adapted for engaging one end of the pin for projecting the other end of the pin, means actuated by the printing arms for energizing the solenoid, and means engageable with the other end of the pin for retracting the pin, said cam means being mounted at one side of the driving wheel and normally retracted but projectable for projecting said other end of the pin outwardly from the other side of the driving wheel.

5. In a machine of the character described, a spacing mechanism comprising an elongated worm gear, a clutch having worm gear teeth for selective engagement with said gear, a printing component connected with said clutch for spacing travel under control of the clutch and gear, and a Geneva movement assembly including a radially slotted star wheel and a gear rotatable integrally therewith operatively geared to said worm gear to drive the latter, a continuously rotating Geneva drive wheel operatively associated with the star wheel carrying an eccentrically positioned axially slidable drive pin, fixed cam means adapted for retracting said pin out of the plane of said star wheel, a movable cam mounted independently of the rotating star wheel and drive wheel and means for moving said cam into the circular pathway of one end of said pin when retracted for projecting the other end of the pin into the plane of the star wheel to operatively engage a slot of the latter, said movable cam

being mounted laterally of the drive wheel and normally retracted out of said pathway.

6. In an intermittent motion Geneva mechanism, a slotted star wheel mounted for rotation only in a single plane, a normally rotating driving wheel mounted for rotation only in a single plane, a driving pin mounted on the driving wheel for sliding movement perpendicular to the plane of the driving wheel to and from a projected operative position at which it will engage a slot of the star wheel during rotation of the driving wheel, selectively operable means adapted for engaging one end of the pin for projecting the other end of the pin into operative position, means mounted contiguously to the star wheel for rotation therewith, and magnets carried by the latter means in register with the slots of the star-wheel adapted for magnetically holding the pin in projected position while engaged with any of said slots, and means engageable with the other end of the pin for retracting the pin from operative position to a retracted position out of the plane of the star wheel during further rotation of the driving wheel.

7. In a typewriter, a spacing mechanism comprising an elongated worm gear extending transversely of the typewriter, a printing component mounted for movement transversely of the typewriter, a Geneva movement including a slotted star wheel mounted for rotation in a single plane, a coacting driving wheel mounted for rotation in a single plane, a driving pin reciprocally mounted on the driving wheel, solenoid operated cam means adapted for engaging one end of the pin for projecting the other end of the pin to an operative position at which it may engage a slot of the star wheel during ensuing rotation of the driving wheel, means engageable with the other end of the pin for retracting the pin, a reversible gear train driven by the star wheel and operatively connected for rotating the worm gear selectively in either direction; a worm gear follower meshing with the worm gear and connected to said component for propelling the component, type arm actuating means for energizing the solenoid adapted for spacing the component incrementally in normal printing direction, and means for reversing the gear train, said cam means being mounted at one side of the driving wheel and normally retracted but projectable for projecting said other end of the pin outwardly from the other side of the driving wheel.

8. A spacing mechanism as defined in claim 7 and having additional means for holding said solenoid energized simultaneously with the actuated reversing means for returning the component to a predetermined starting position for line printing.

9. In a machine of the class described, a carriage spacing mechanism comprising a continuously driven driving wheel mounted for rotation only in a single plane and a coacting Geneva star wheel, a driving pin mounted reciprocally in the driving wheel for sliding movement perpendicular to the plane thereof, solenoid powered cam means adapted for engaging one end of the pin for projecting the other end of the pin to an operative position for subsequent engagement with a slot of the star wheel during further rotation of the driving wheel, means engageable with the other end of the pin for retracting the pin from said operative position, a printing mechanism, and means including circuit closing means actuated by the printing mechanism adapted for supplying an energizing current to said solenoid powered means in timed relation to the rotation of the driving wheel when said wheel is at a predetermined angular position in its rotation, said cam means being mounted at one side of the driving wheel and normally retracted but projectable for projecting said other end of the pin outwardly from the other side of the driving wheel.

10. In a machine of the class described, a carriage spacing mechanism comprising a continuously driven Geneva driving wheel and a coacting slotted star wheel, each wheel being mounted to rotate only in a single

plane, a driving pin mounted in the driving wheel for sliding movement perpendicular to the plane of the driving wheel, normally retracted but projectable magnetically powered cam means adapted for engaging one end of the pin for projecting the other end of the pin to an operative position where it will engage a slot of the star wheel during rotation of the driving wheel, magnetic means for holding the pin projected after it has been rotated by the driving wheel beyond said pin projecting means, and means engageable with said other end of the pin for retracting the pin to an inoperative position out of the plane of the star wheel.

11. In a machine of the class described, a carriage spacing mechanism comprising a continuously driven Geneva driving wheel and a coacting slotted star wheel, each wheel being mounted to rotate only in a single plane, a driving pin mounted in the driving wheel for axial sliding movement perpendicular to the plane of the driving wheel, normally retracted but projectable magnetically powered cam means adapted for engaging one end of the pin for projecting the other end of the pin to an operative position where it will engage a slot of the star wheel during rotation of the driving wheel, means positioned in the path of the projected pin after it has emerged from a slot of the star wheel for retracting the pin to an inoperative position out of the plane of the star wheel, and means for selectively rendering the retracting means temporarily ineffective.

12. In a machine of the class described having a printing mechanism, a carriage spacing mechanism comprising a continuously driven Geneva driving wheel and a coacting slotted star wheel, each wheel being mounted to rotate only in a single plane, a driving pin mounted in the driving wheel for sliding movement perpendicular to the plane of the driving wheel, normally retractable but projectable magnetically powered cam means adapted for engaging one end of the pin for projecting the other end of the pin to an operative position where it will engage a slot of the star wheel during rotation of the driving wheel, means engageable with the other end of the pin for retracting the pin to an inoperative position out of the plane of the star wheel, a holding circuit including a self locking relay, means operated by the printing mechanism during a printing stroke cycle for operating said relay, an arcuate cam on said driving wheel concentric with the axis thereof, holding means including a switch operable by said arcuate cam closable in timed relation with the rotation of the driving wheel at a predetermined angular position of the driving wheel and having one switch contact connected to said magnetically powered means, the relay when locked being

adapted to supply current to another contact of said switch for energizing the magnetically powered means upon the closing of said switch, and means operable by said magnetically powered means adapted for releasing said relay.

13. In a machine of the class described having a printing mechanism, a carriage spacing mechanism comprising a continuously driven Geneva driving wheel and a coacting slotted star wheel, each wheel being mounted to rotate only in a single plane, a driving pin mounted in the driving wheel for sliding movement perpendicular to the plane of the driving wheel, normally retractable but projectable magnetically powered cam means adapted for engaging one end of the pin for projecting the other end of the pin to an operative position where it will engage a slot of the star wheel during rotation of the driving wheel, means engageable with the other end of the pin for retracting the pin to an inoperative position out of the plane of the star wheel, circuit closing means operated by the printing mechanism during a printing stroke cycle, withholding means operating in predetermined timed relation with the rotation of the driving wheel adapted for withholding a current supply to the magnetically powered means during a predetermined portion of the rotation of the driving wheel and having a holding circuit including a self-locking relay rendered operable by the operation of said circuit closing means, said withholding means being further adapted during another portion of the rotation of the driving wheel to connect to the magnetically powered means an operating current supplied through the withholding means by the operated holding circuit, and means timed for releasing said relay after the pin has been projected.

References Cited by the Examiner

UNITED STATES PATENTS

975,659	11/1910	Uebelmesser	74-436
2,093,545	9/1937	Bryce et al.	197-82 X
2,307,112	1/1943	Cunningham	74-436
2,589,486	3/1952	Emrick	74-436 X
2,795,150	6/1957	Seidler	74-436
2,870,647	1/1959	Lauxen	74-436

FOREIGN PATENTS

825,981	12/1959	Great Britain.
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