United States Patent

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[54] **DOCUMENT FEED AND CONTROL DEVICE**
9 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **226/141,** 74/112, 197/127, 226/157
[51] **Int. Cl.** **B65l 17/22**
[50] **Field of Search** 226/157, 136, 139, 141; 235/2; 74/112; 197/84, 127, 130, 133

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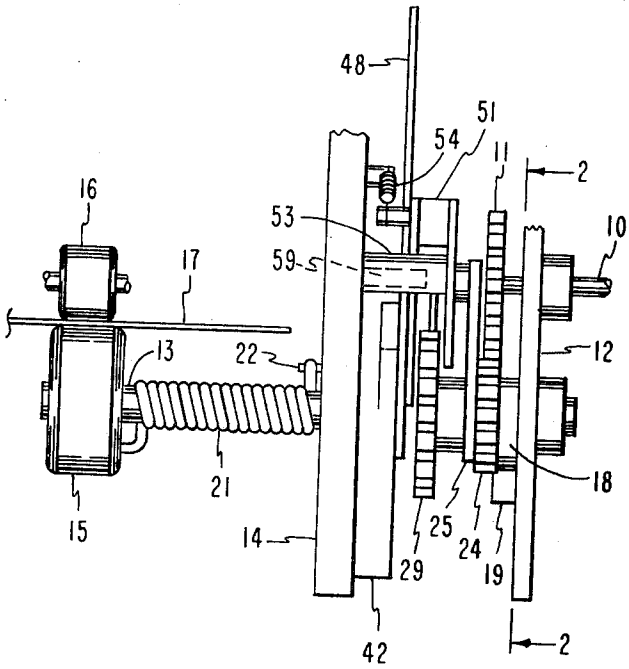
ABSTRACT: A document control device which utilizes a single mode of input drive to affect any of a selected plurality of modes of document feed output. A modified ratchet wheel on the output shaft is driven in various modes by a drive element variously directed by a channel cam structure during a fixed arcuate drive cycle.



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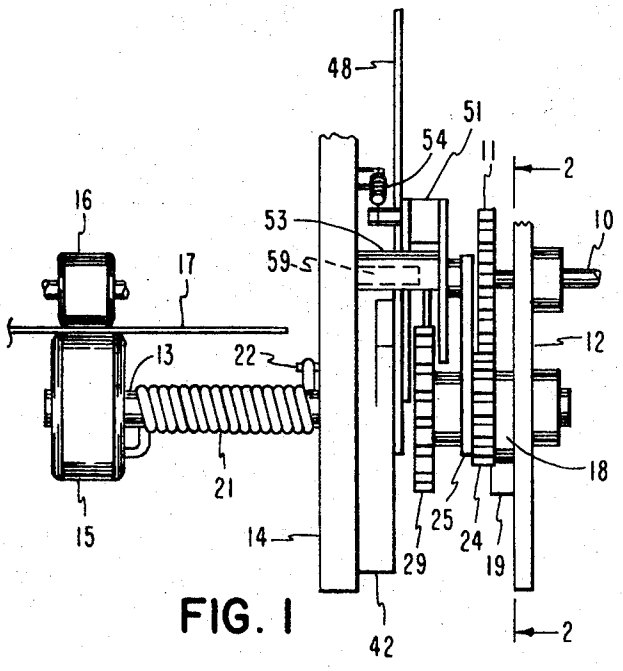

FIG. 1

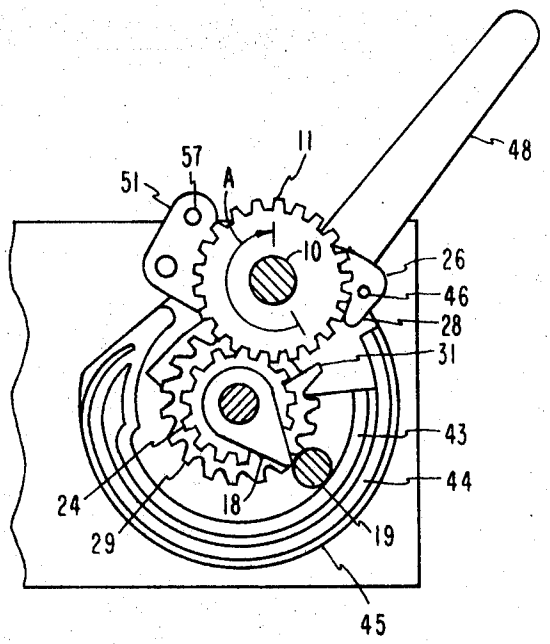

FIG. 2

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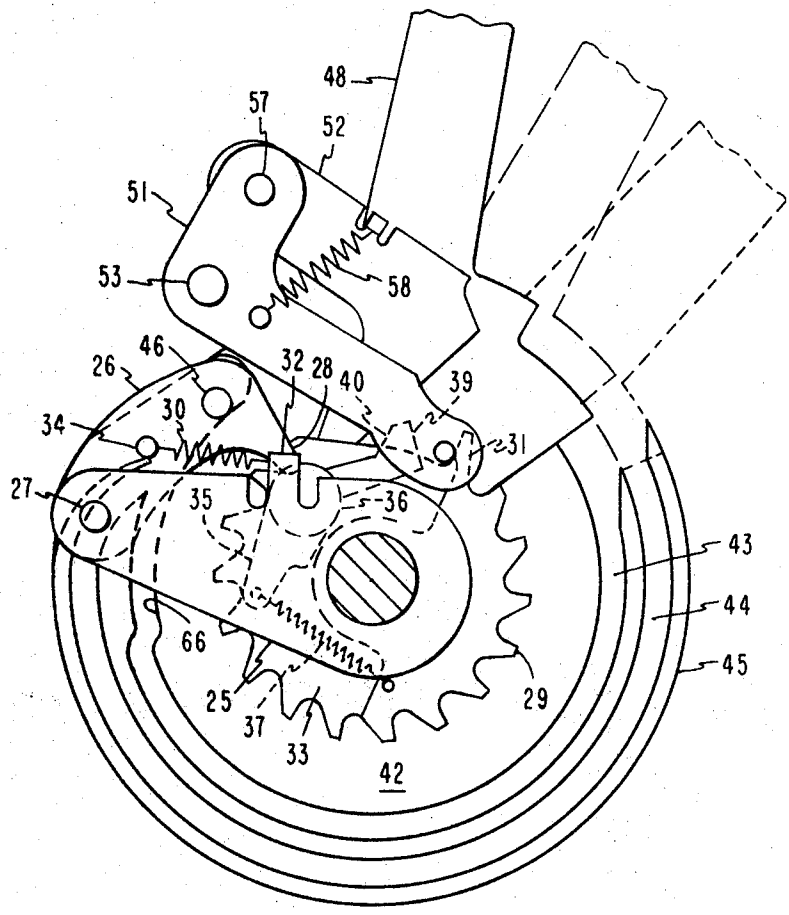
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FIG. 3

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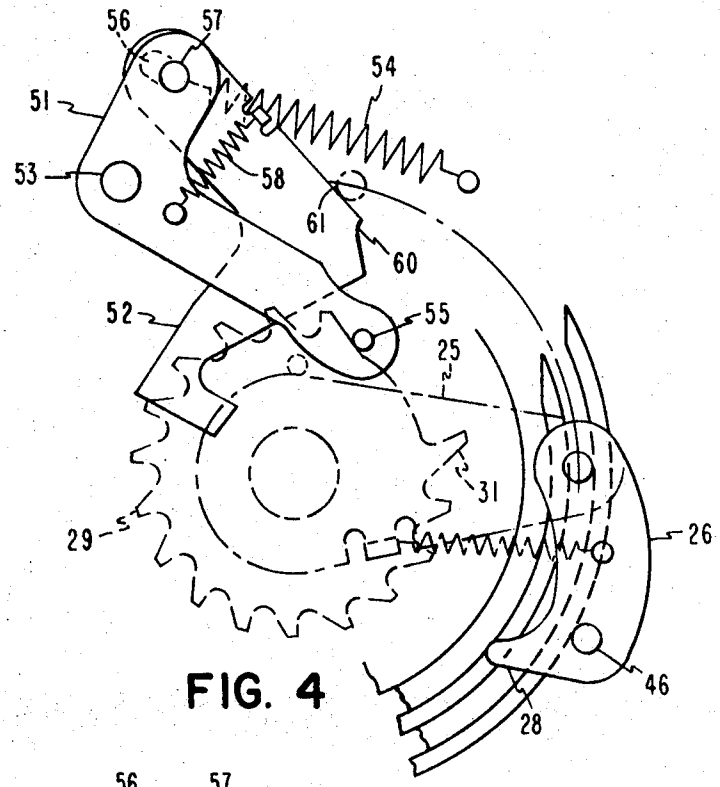

FIG. 4

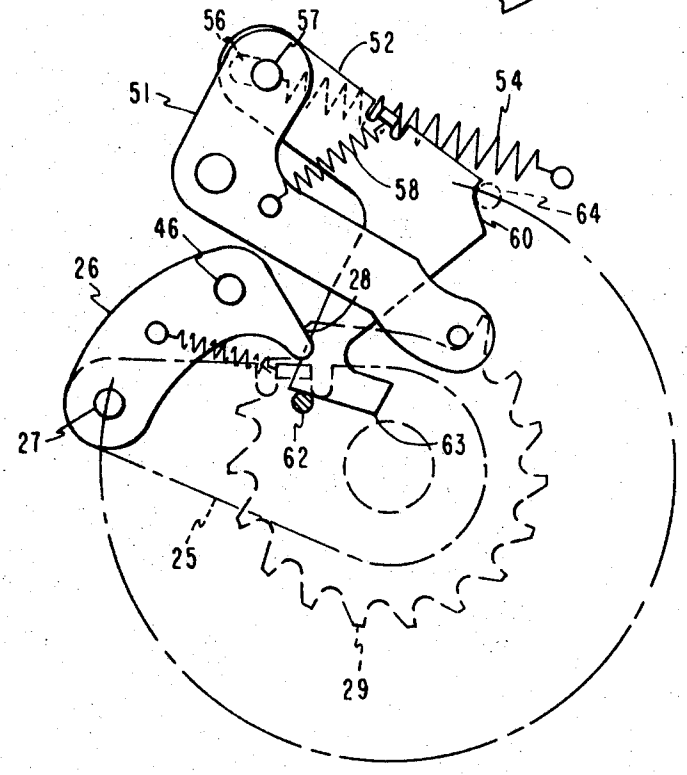

FIG. 5

DOCUMENT FEED AND CONTROL DEVICE

BACKGROUND OF THE INVENTION

This invention relates to document handling apparatus and more particularly to apparatus for selectively positioning a document in predetermined positions in accordance with selected operating mode.

It is often a requirement of accounting or transaction recording devices that a document be controlled to effect printing at specific line locations. Uniform incrementing between line locations affords little problem, but more often it is necessary to utilize a plurality of line selecting operating modes with respect to a single document. The disclosed embodiment of the instant invention provides for no document advance, for a single line advance, for a first total at a predetermined location irrespective of the number of prior entries and a second total at a second predetermined location. Thus the device is selectively controlled to cause a single input to affect three output modes.

The illustrated device may be used to position a document with respect to a print mechanism for the sequential entry of item amounts to a predetermined maximum number of entries. If prior to a total a machine cycle occurs which does not require the entry of an item amount the document is not advanced. Upon taking a subtotal the document is advanced to a predetermined position irrespective of the number of items previously entered and a total is also entered at a predetermined position following the subtotal.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevation of the control device of this invention partly broken away. FIG. 2 is a partial section taken along line 2–2 of FIG. 1. FIG. 3 is an axial view as seen from the right side of FIG. 1 at the interface between the driven gear and the arm secured thereto with alternate positions of the control lever shown in phantom view. FIG. 4 is a partial elevation showing the cam follower following the cam external peripheral surface with certain parts and an alternate position of the reset drive pin shown in phantom view. FIG. 5 is a partial elevation view showing the cam follower at the terminal position of a total cycle with a reset level cocked and a phantom view of the reset drive pin in an alternate position immediately prior to triggering the reset lever.

DETAILED DESCRIPTION

Referring to FIG. 1 an input drive shaft 10 is journaled through a sidewall 12 and carries a gear 11. An output shaft 13, journaled through the sidewalls 12 and 14, carries at its distal, cantilevered end a feed roll 15 which cooperates with a pressure roll 16 to control the advance of a document 17 retained therebetween. An arm 18 as seen in FIG. 2 is carried by the shaft 13 and abuts against a stud 19 mounted on sidewall 12 to restrain rotation in one direction and establish a home position for shaft 13 and the elements that rotate in unison therewith. A torsion spring 21 concentrically mounted about the cantilevered portion of shaft 13 has one end anchored to feed wheel 15 and the opposite end anchored to the pin 22 carried by sidewall 14 to bias arm 18 toward the home position of engagement with stud 19.

Secured to one another and journaled about shaft 13 are a driven gear 24 which engages drive gear 11 and an arm 25. A lever 26 is pivotally interconnected about a pin 27 to the radial extremity of arm 25. The lever 26 has a projecting terminal portion 28 that is selectively engageable with a ratchet wheel 29 toward which it is urged by the biasing force of a tension spring 30 extending from a stud 34 carried by the lever and a projecting tab 32 formed as an integral portion of the arm 25. The ratchet wheel 29 is secured to and turns in unison with shaft 13 and has on its periphery a series of identical teeth, one tooth 31 of extended length and a peripheral portion devoid of teeth extending counterclockwise from the long tooth 31 includes seen in FIG. 3. The ratchet wheel 29 also includes an

axially recessed portion 33 wherein a lever 35 is mounted about a pin 36 with a tension spring 37 extending between apertures in the lever and ratchet wheel to urge the lever in a counterclockwise direction, as seen in FIG. 3, into abutting relation with ratchet wheel 29. The lever surface 39 functions in the same manner as the surface of an adjoining tooth whereas any force exerted approximately normal to the surface 40 of lever 35 serves only to pivot the lever clockwise about the axis of the pin 36 and is ineffective to drive the ratchet wheel.

Mounted on wall 14 is a channel cam 42 which has two arcuate channels 43 and 44 and an exterior arcuate surface 45 along which a cam follower stud 46 carried by lever 35 is guided. A control lever 48 determines through its pivotal position which of three paths the cam follower stud 46 follows during an excursion from the home position as seen in FIG. 2 to the terminal position illustrated in FIG. 3. When the lever is in the position shown in FIG. 2 the cam follower is prevented from dropping into either of channels 43 or 44 and traverses from the initial to final position along the exterior peripheral surface 45 of the cam. When control lever 48 is in the full line position shown in FIG. 3 the cam follower element is permitted to fall into the channel 43 whereas with the control arm in a pivotal position shown in the dash-dot position of FIG. 3 the cam follower is permitted to enter and follow channel 44.

The ratchet wheel detent lever 51 and the trip and release lever 52 are shown in FIGS. 4 and 5. The detent lever 51 is pivotally mounted about pin 53 carried by wall 14 and is urged in a clockwise direction as seen in FIGS. 4 and 5 by the biasing force of tension spring 54 to hold the detent pin 55 which projects from the end of the lever to restrain the rotation of ratchet wheel 29 against the biasing force of torsion spring 21 (FIG. 1) when the ratchet wheel is rotated away from the home position. Trip and reset lever 52 is pivotally connected through an elongated lost motion opening 56 about a pin 57 carried by detent lever 51. A tension spring 58 extending between the tab formed in the trip lever 52 and a stud carried by detent lever 51 normally biases the trip and reset lever into a position of abutting engagement with a pin 59 projecting from and carried by the wall 14. During the initial and intermediate operations, each time the lever is returned to the home position the projecting pin 27 engages the surface 29 of the trip and reset lever 52 as shown in phantom view at 61 causing no effect upon detent lever 51. However as ratchet wheel 29 rotates to its terminal position as shown in FIG. 5 (the same operating position illustrated in FIG. 3) a pin 62 projecting from the ratchet wheel surface and extending toward wall 14 rotates into position where it first engages the surface of the trip and reset lever 52 closely adjacent the corner 63 and through the final few degrees of rotation moves the lever to the position shown in FIG. 5 causing the trip and reset lever to be pivoted to a position shown in FIG. 5. The pin 27, when returned to the home position as shown in the dotted line position 64, engages the trip and reset lever surface 60 causing a slight further overtravel to pivot the detent pin 55 out of engagement with the ratchet wheel 29 whereupon the torsion spring 21 (FIG. 1) effects restoration of shaft 13, lever 18, ratchet wheel 29, and feed wheel 15 carried in unison therewith to the home position illustrated in FIG. 2. Upon release of the driving force the detent lever 51 and trip and reset lever 52 self restore to the initial condition at the home position.

OPERATION

With the document 17 introduced between the feed roll 15 and pressure roll 16 to a predetermined initial position, during each sequence of operation the drive shaft 10 is rotated causing the lever 25 and the connected associated drive lever 26 to be rotated causing follower pin 46 to move from the initial position shown in FIG. 2 to the final position wherein the cam follower element 46 is at the end of the common terminal channel as shown in FIG. 3. Thereafter rotation of shaft 10 is

reversed and the drive mechanism is restored to the home position which is indicated in FIG. 2 by the rotation of the drive gear 11 through the arc indicated by the arrow A. The control lever 48, though being selectively positioned in one of the three alternative positions shown in FIG. 3, determines which mode of document advance is to be effected by a cycle of the drive mechanism. With control lever 48 positioned as shown in FIG. 2 the cam follower 46 will proceed along the exterior surface 45 of the channel cam 42 and engage the ratchet wheel 29 only at the terminal location causing no rotational advance of ratchet wheel or shaft 13 connected thereto. When control lever 48 is positioned as shown in the dot-dash position in FIG. 3 the cam follower 46 will be permitted in the home position to fall into channel 44 through the action of the biasing spring 30 permitting it to excursion along the channel and approach the arcuate surface 66 at the outlet of channel 44 to cause the distal end of lever 26 to engage the ratchet wheel 29 and advance the ratchet wheel one tooth space between the outlet of the channel and the terminal position. Accordingly during each excursion through the channel 44 the ratchet wheel 29 is advanced one tooth space. When the control lever 48 is at the full line position shown in FIG. 3 the cam follower stud 46 of lever 26 is permitted to enter channel 43 which has an outlet joining the surface 66 to permit lever 26 drive portion to engage the adjacent ratchet tooth and drive ratchet wheel 29 three tooth spaces before attaining the terminal position. In addition when the cam follower 46 is in channel 43 the driving portion of the lever will pass beyond the radial end of each of the short ratchet teeth but will engage the extended projecting portion of the single long tooth 31 with the result of the long tooth will be engaged at whatever position it occurs along he periphery of ratchet wheel 29 during the excursion of the cam follower through channel 43 and will carry that tooth to the outlet of the channel 43 and advance the ratchet wheel three more tooth spaces beyond the rotational position thus attained.

With the ratchet wheel 29 configuration as shown and initiating the sequence of operations from the initial or home position shown in FIG. 2 during a sequence of operations the cam follower 46 may be excursioned through the channel 44 during as many as 12 consecutive operations, each of which will advance the ratchet wheel one tooth space and correspondingly the controlled document the longitudinal distance corresponding to the rotational advance of the ratchet wheel between adjoining teeth as would be representative of the entry of items in an accounting machine. When it is desired to take a subtotal the control lever 48 is moved to the position which permits the cam follower to excursion through the channel 43 permitting the drive element to pick up the long tooth 31 at whatever location it is disposed about the periphery, in accordance with whether one or 12 prior entries have been made, and move such long toothed to a common position for such total irrespective of the number of entries made on the document. When taking a total on the accounting machine the cam follower is once again permitted to excursion through the channel 43 causing a three tooth position advance of the ratchet wheel and corresponding longitudinal advancement of the document controlled by the feed wheel with the result that the total entry is likewise made at the same location on the document irrespective of the number of operations or items entered prior to the initiation of the subtotal.

This final total operation also brings the ratchet wheel stud 62 to the position shown in FIG. 5 to set trip and reset lever 52 such that the final restore operation brings the stud 27 around to the home position to engage surface 60, release the detent 55 and permit shaft 13 to restore to the home position shown in FIG. 2. It will be recognized that as shaft 13 is restored to the home position the feed wheel 15 reverses its rotation and restores the document 17 to the initial position.

We claim:

1. A document feed and control device comprising:

a multiple track channel cam having first and second channels each extending from a common initial location to a common terminal location;

a rotary driven element;

a drive member including a cam follower portion and a driving portion operable to advance said driven element; and

selectively operable control means adjacent said initial location for directing said cam follower into a predetermined one of said first and second channels, said cam follower portion following said first channel to affect advance of said driven element in a first mode and following said second channel to affect advance of said driven element in a second mode.

2. The document feed and control device of claim 1 further comprising:

releasable detent means to restrict movement of said driven element to one rotational direction and drive means for moving said drive member to cause said cam follower portion to move from said cam initial location to said terminal location and return; and

wherein said driven element comprises a toothed ratchet wheel which is engaged and driven by said drive member driving portion.

3. A document feed and control device of claim 2 wherein a portion of said ratchet wheel is devoid of teeth to limit the number of times such ratchet wheel can be advanced in one of said modes.

4. The document feed and control device of claim 3 wherein said drive member advances said ratchet wheel one tooth space in said first mode and a plurality of tooth spaces in said second mode.

5. The document feed and control device of claim 4 wherein said ratchet wheel includes a tooth of increased radial length engageable with said drive member when the latter excursions through said second channel to affect a common final position of said ratchet wheel irrespective of the initial position of said increase length tooth adjacent said second channel.

6. The document feed and control device of claim 5 wherein said control means comprises a control lever which controls access of said cam follower to said channels of said cam at said initial location, said control lever having a first position permitting access to said first channel, a second position permitting access to said second channel, and a third position denying access to either said first or second channels.

7. The document feed and control device of claim 6 further comprising a terminal channel portion in said cam extending from said terminal location to and communicating with the outlets of said first and second channels and presenting a camming surface at a uniform radial distance from the axis of said ratchet wheel.

8. The document feed and control device of claim 7 wherein said cam further presents an exterior camming surface extending from said initial location to a position adjoining said terminal location such that when said drive member is pivoted in a second pivotal direction opposite the direction of advance of the driven element said driving portion follows the surface of the ratchet tooth next adjoining in said second pivotal direction causing said cam follower portion to be guided onto said exterior camming surface, whereby said cam follower returns to said initial position along said exterior camming surface.

9. The document feed and control device of claim 2 further comprising:

an output shaft secure to said ratchet wheel for total movement in unison therewith;

biasing means urging said output shaft in a direction opposite said one rotational direction;

cooperating stop means limiting travel of said shaft in said direction opposite said one rotational direction; and

release means selectively operable to disengage said detent from said ratchet wheel whereby said biasing means is freed to urge said output shaft in said opposite of said one rotational direction.