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RIBBON FEEDING MECHANISM

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2 Sheets-Sheet 1

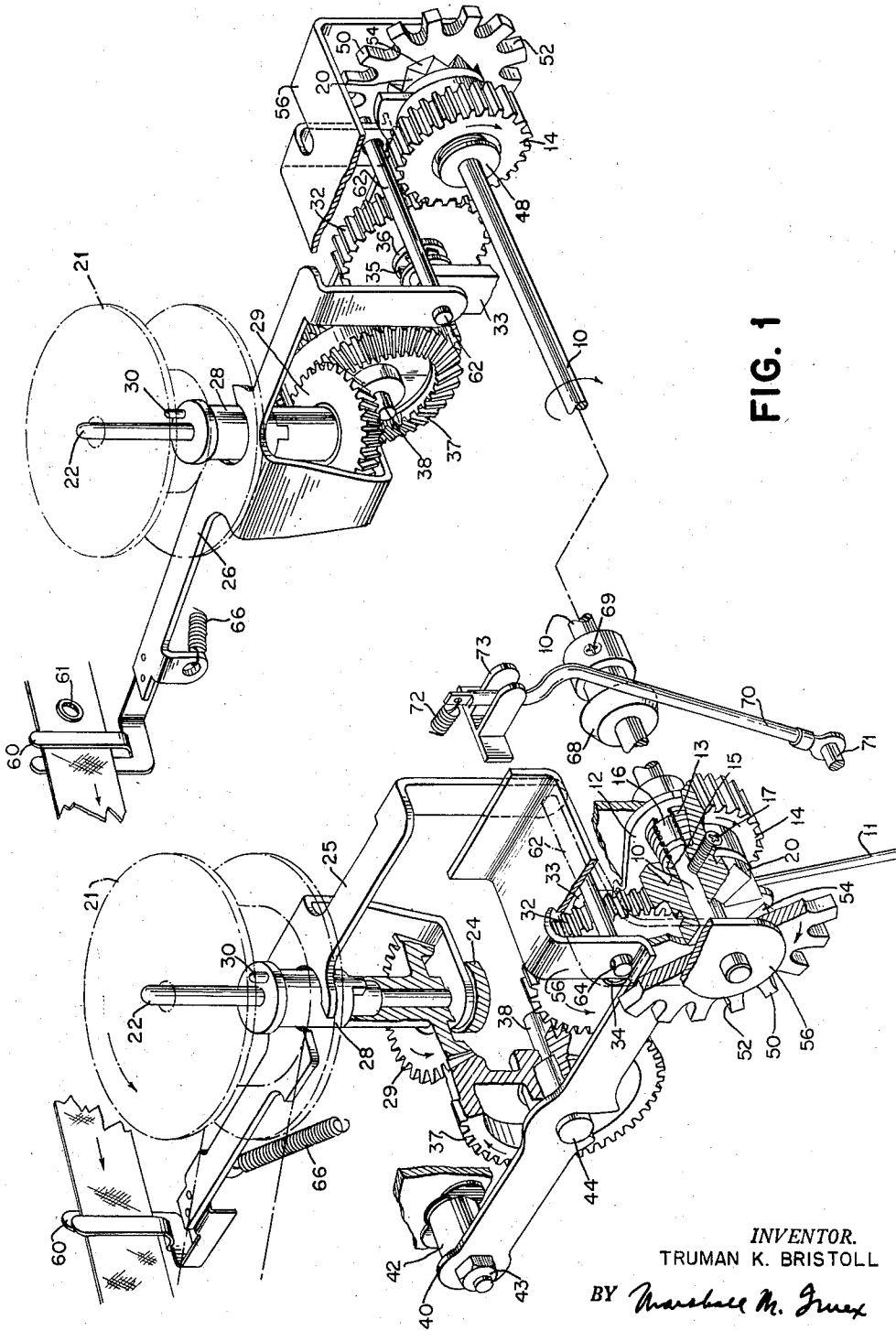


FIG. 1

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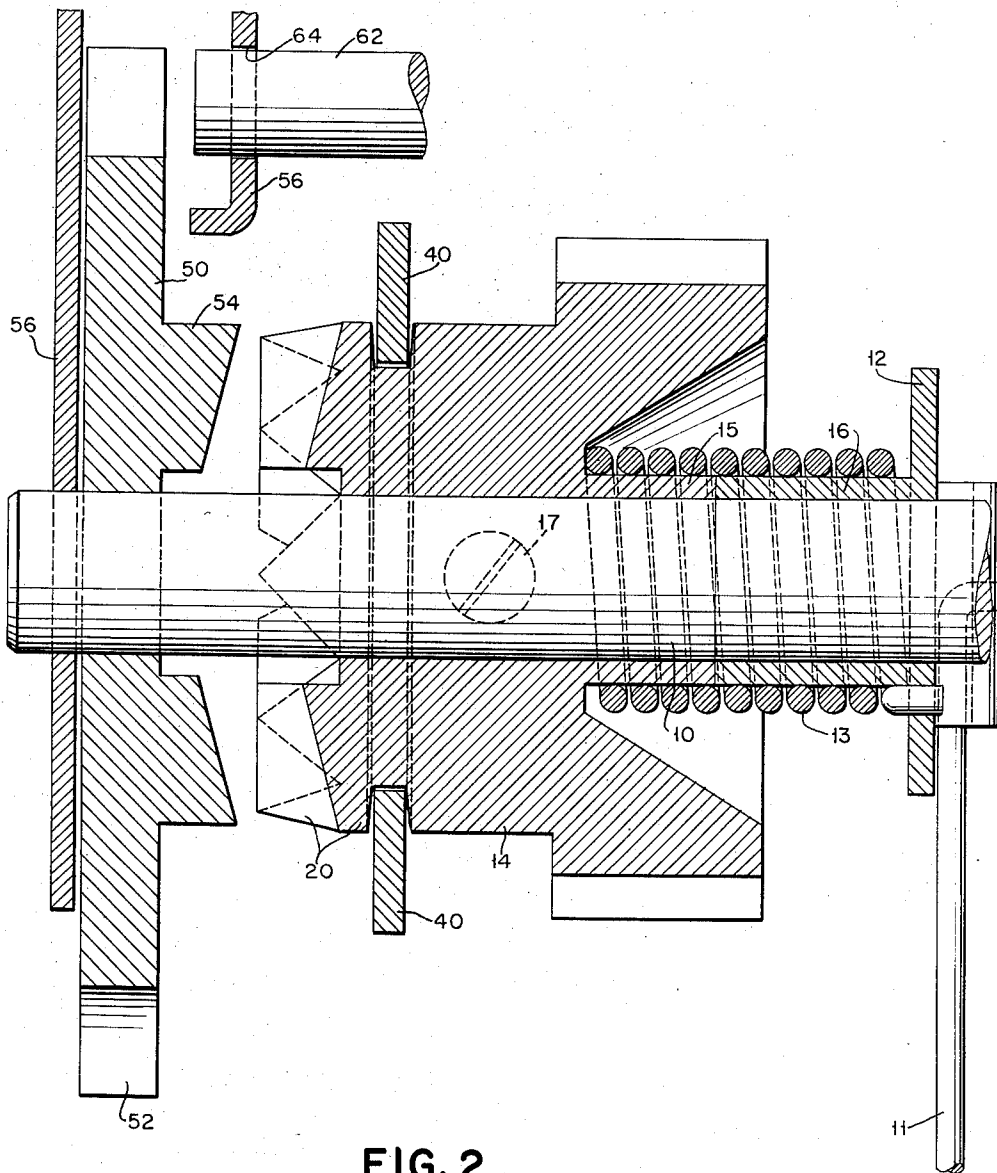


FIG. 2

1

2,858,928

RIBBON FEEDING MECHANISM

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3 Claims. (Cl. 197-165)

This invention relates to typewriters of the power driven class, and more particularly to an improved ribbon feeding mechanism for such typewriters.

The principal object of the invention is to provide an improved ribbon feeding device for a typewriter.

Another object of the invention is to provide an improved ribbon feeding device having means actuated by the ribbon for reversing its direction of feed.

Still another object of the invention is to provide an improved ribbon feeding device having means actuated by the ribbon when it is substantially unwound from a spool for making a power actuated mechanism effective to reverse the direction of ribbon feed.

A further object of the invention is to provide an improved ribbon feeding device which is simple in construction, inexpensive to manufacture, and reliable in operation.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Figure 1 is a perspective drawing of the ribbon feed and ribbon reversing mechanism, partly in section.

Figure 2 is an enlarged sectional view of the driving clutch and a portion of the reversing mechanism.

Briefly, the ribbon feeding mechanism is driven by power actuated means in the typewriter each time that the carriage moves one letter space. A horizontal shaft 10 with gear trains at its ends drives one or the other of two spool-carrying spindles 28 by alternately shifting to engage one or the other gear train with the driving gear of the appropriate spindle. The reversal of the ribbon drive is initiated by a button 61 on the ribbon when one spool is exhausted, and thereafter, the driving shaft is caused to move axially by one or the other of two cams and the rotation of the driving shaft.

Referring to Figure 1, it will be noted that the horizontal shaft 10 is driven by a reciprocating link 11 acting through a spring clutch composed of an arm 12, a cylindrical helical spring 13, and a gear member 14. The link 11 is driven from a continuously turning power roll (not shown) on each letter space operation in a manner well known in the art. As shown more clearly in Figure 2, the gear member 14 has a hub 15 extending from within a recess in one of its faces. The arm 12 has a hub 16 opposing the hub 15 and having the same diameter as the latter. The shaft 10 passes through the hubs 15 and 16 and is secured to the gear member 14 by a set screw 17. The spring 13 is positioned around the hubs 15 and 16, and is connected at one end to the arm 12 and frictionally engages the gear 14 at its other end. It loosely engages the peripheral surfaces of the hubs and is arranged to wind up when the arm is rotated clockwise, thereby clamping both hubs 15 and 16 by the reduction in the spring's cylindrical diameter. In this way, the gear member 14 is caused to rotate clock-

2

wise by the arm 12, as viewed in Figure 1. When the link 11 is moved downward on its return stroke, the spring 13 unwinds and increases its diameter, which releases the gear member 14 from the arm 12. Thus, the shaft 10, the gear 14, and another gear member 14 mounted at another end of the shaft 10 are incrementally driven each letter space.

With reference to Figure 1, each of a pair of ribbon spools 21 is mounted at an end of a vertical rod 22, of which there are two, fixed to the typewriter frame rearwardly at each end of the shaft 10. Considering the left-hand portion of the structure, a frame portion 24 supports the lower end of the vertical rod 22, and an arm 25 is pivotally connected to the vertical rod 22 and rests upon the frame portion. Another arm 26 is similarly mounted at the right end of the device. Mounted for rotation on the rod 22 is a spool supporting spindle 28 having a bevel gear 29 coupled by projection and slot to its lower end. Projecting from the upper part of the spindle 28 is a stud 30 arranged to couple the ribbon spool 21 to the spindle 28.

The gear member 14 has two sets of gear teeth. A first set is parallel with the axis of rotation of gear 14 and is constantly in mesh with teeth on an idler gear 32. A second set of gear teeth 20 resembling a crown extends from an end of the member opposite hub 15 and projects outwardly in the direction of the axis of the shaft 10. The idler gear 32 is rotatable about a fixed stud assembly 33 and is axially secured by a clip 34. As best viewed at the right side of Figure 1, a spring 35 is positioned by a disc 36 and resiliently engages the gear 32 to offer slight resistance to the turning of the gear 32 so as to oppose any counterclockwise motion of gear 14 on the downward stroke of the arm 11. A gear 37 has two sets of teeth, one set arranged parallel to its axis of rotation and constantly in mesh with gear 32, and the other set arranged at an angle of 45 degrees with respect to the first set for selective engagement with the bevel gear 29. The gear 37 is mounted for rotation about a fixed stud 38 and is secured to an arm 40 by a sleeve stud 44 which is slidably mounted at an end of the stud 38. One end of the arm 40 is coupled to a fulcrum stud 42 by a nut 43, and the other end is connected to the gear member 14 at an annular slot therein. With this arrangement of parts, rocking of the arm 40 about its fulcrum point causes the stud 44 to slide back and forth along the fixed pin 38 to engage and disengage the gear 37 with the gear 29. The width of the gears 14, 32 and 37 is such that their axial movement with respect to each other is never great enough for the gears to disengage.

The gear train on the right end of the shaft 10 is identical with the one described except that the arm 12 and the spring 13 are omitted and a spacer 48 is substituted for the arm 12. Since the shaft 10 need be driven only at one point, the right-hand gear 14 does not serve as a portion of a clutch.

In a manner to be described hereafter, the shaft 10 is shifted laterally to change the drive from one ribbon spool to the other. However, from the description thus far, it follows that the gears 14 are moved laterally with the shaft 10 to swing the arms 40 about their fulcrum points causing the pairs of gears 29 and 37 to alternately engage and disengage.

A pair of annular members 50 are rotatably mounted on each end of the shaft 10. Each member 50 has a plurality of radial slots 52 cut therein and two cam projections 54 constructed on one of its faces to mate with the teeth of the crown gear 20. A pair of brackets 56, one at each end of shaft 10, retain their respective annular members 50 at the ends of the shaft in a substantially fixed axial position.

One end of the arm 25 is connected to a ribbon holder

3

60, which is arranged to allow the ribbon to pass therethrough and to prevent the passage of a button 61 attached near an end of the ribbon. Connected to each of the arms 25 and 26 at its lower end is a pin 62 which is slidably received in an opening 64 in the bracket 56. A spring 66 biases the arm 25 counterclockwise about its supporting rod 22, and another spring 66 biases the arm 26 clockwise about its supporting rod.

Referring to the operation of the invention by example, assume the parts to be shown in Figure 1 with the shaft 10 in its extreme right-hand position, which places the gears 29 and 37 at the left side of the mechanism in driving engagement. The gear member 14 at the right end of the shaft 10 has its gear teeth 20 engaged with the cam projections 54 on the face of member 50. As viewed in the drawing, the shaft 10 is rotated clockwise by a small amount each letter space causing clockwise rotation of the gears 14 and 37. At the left end of the mechanism, since gears 37 and 29 are thus engaged, the ribbon spool is caused to turn counterclockwise and take up the ribbon. When the right-hand spool 21 is nearly empty, the button 61 on the ribbon causes the arm 26 to pivot counterclockwise. The pin 62 carried by arm 26 is moved into one of the slots 52 in the member 50. The pin 62 prevents the member 50 at the right end of the shaft from rotating with gear 14 which results in the latter being moved axially away from member 50 by the action of the cam projections 54 on gear teeth 20. The shaft 10 is caused to move with the gear 14 to the left-hand position where the arm 40 on the left side of the device carries gear 37 out of engagement with gear 29. The right arm 40 swings to the left with the gear 14 causing the right-hand spool to be driven since its bevel gear 29 is now engaged with the gear 37. When the button moves away from the ribbon holder 60 as the ribbon is fed in the opposite direction, the arm 26 is restored to its inactive position by the spring 66.

A cam 68 with reversely sloping faces is mounted on the shaft 10 and secured thereto by a set screw 69. A bar 70 is pivotally connected to the base by a stud 71 and is biased rearwardly by a spring 72. The bar 70 is positioned by a guide 73 and engages the cam 68 at one of the sloping faces as shown in Figure 1. With this arrangement of parts, the shaft 10 is detented in one or the other of its extreme lateral positions. For example, when the shaft 10 is moved to the left as was previously explained, the bar 70 slides up the left-hand face of the cam causing the spring to extend. After reaching the high point on the disc, further movement of the shaft causes the bar 70 to begin sliding down the right-hand face of the cam. Thereafter, the spring 72 and the rod 70 contribute to the movement of the shaft to the operating position. Thus, the shaft remains in one or the other effective position unless acted upon positively by the reversing mechanism.

The arm 25 operates in a manner similar to the arm 26 causing the shaft 10 to move from left to right and reverse the ribbon feed so that the left-hand ribbon spool is being driven.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made without departing from the spirit of the invention. It is the intention therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. A ribbon feeding mechanism for a typewriter comprising, in combination, a frame; a pair of ribbon spools including a ribbon having a pair of stop members, each adjacent to its respective ends; a horizontal drive shaft; means mounting said shaft on said frame for rotation and for axial movement to one or the other of two oper-

4

ating positions; driving means for rotating said shaft; a pair of means, each operable at an end of said shaft for alternately driving said ribbon spools and responsive when actuated by one of said stop members and at least one of said means comprising a rod supported by said frame; a driven gear rotatably coupled to said rod; a vertical spindle rotatably coupled to said rod and attached to said driven gear; means mounting said spool on said spindle for rotation with the latter; an arm; means mounting said arm on said frame for pivotal movement; an annular member rotatably supported on said shaft and having a slot in its periphery and a cam on its face; a lever pivotally mounted and having a slot therein for the passage of the ribbon therethrough and displaceable by engagement therewith of the respective stop member on the ribbon; a pin mounted on said lever and connectible with said slot in said annular member when said arm is pivoted by said stop member; a gear member securely connected to said shaft and coupled to another end of said arm for pivoting the latter, said gear member having a projection on its face and adapted to be engaged with said cam and to be disengaged from the latter when said annular member is engaged by said pin and said shaft is rotated; a driving gear rotatably mounted between the ends of said arm for selective engagement with said driven gear when said arm is pivoted; an idler gear rotatably mounted on said frame and continuously engaged with said driving gear and said gear member; and means effective to normally hold said shaft in one or the other operating position.

2. A ribbon feeding mechanism for a typewriter comprising, in combination, a frame; a pair of ribbon spools including a ribbon having a pair of stop members each adjacent its respective ends; a horizontal drive shaft; means mounting said shaft on said frame for rotation and for axial movement to one or the other of two operating positions; driving means for rotating said shaft; a pair of means, each operable for alternately driving said ribbon spools and effective when actuated by one of said stop members and at least one of said means comprising a rod supported by said frame; a driven gear; means mounting said driven gear and said spool for rotational movement together with said rod; an arm; means mounting said arm on said frame for pivotal movement; an annular member rotatably supported on said shaft and having a slot in its periphery and a cam on its face; a lever having a slot therein for passage of the ribbon therethrough and pivotable by engagement with the respective stop member on said ribbon, said lever having a projection connectible with said slot in said annular member when said arm is pivoted; a gear member connected to said shaft and coupled to another end of said arm, said gear member having a projection on its face and adapted to be engaged with said cam and to be disengaged from the latter when said annular member is engaged by said pin and said shaft is rotated; and a driving gear rotatably mounted between the ends of said arm for selective engagement with said driven gear when said arm is pivoted and means continuously coupling said gear member and said driving gear for rotating the latter.

3. A ribbon feeding mechanism for a typewriter comprising, in combination, a printing ribbon having a stop member thereon; a supply spool for said printing ribbon; a first gear; means mounting said first gear for rotation and for carrying said supply spool; a take-up spool; a second gear; means mounting said second gear for rotation and for carrying said take-up spool; a third gear in mesh with said second gear; a horizontal shaft; means for rotating said shaft; a fourth gear fixed to said shaft; a fifth gear mounted for rotation and constantly in mesh with said third gear and said fourth gear; a first pivotable member mounting said third gear for rotation and for selective engagement with said second gear responsive to axial movement of said horizontal shaft; a sixth

5

gear having a cam follower portion and fixed to said horizontal shaft; a seventh gear adapted to be engaged with said first gear; an eighth gear mounted for rotation and constantly in mesh with said sixth and seventh gears; a cam member having a projection thereon and rotatably supported on said horizontal shaft; a second pivotable member mounting said seventh gear for rotation and for selective engagement with said first gear responsive to axial movement of said horizontal shaft; and a lever pivotally mounted and having a slot therein for passage

5

10

6

of the ribbon therethrough and pivotable by engagement with stop member on said ribbon and having a portion engageable with said projection on said cam member to prevent movement of the latter when said stop member pivots said lever.

References Cited in the file of this patent

UNITED STATES PATENTS

831,935	Cook -----	Sept. 25, 1906
1,781,725	Handley -----	Nov. 18, 1930