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3,190,430

RIBBON HANDLING MECHANISM

Filed Oct. 17, 1962

2 Sheets-Sheet 1

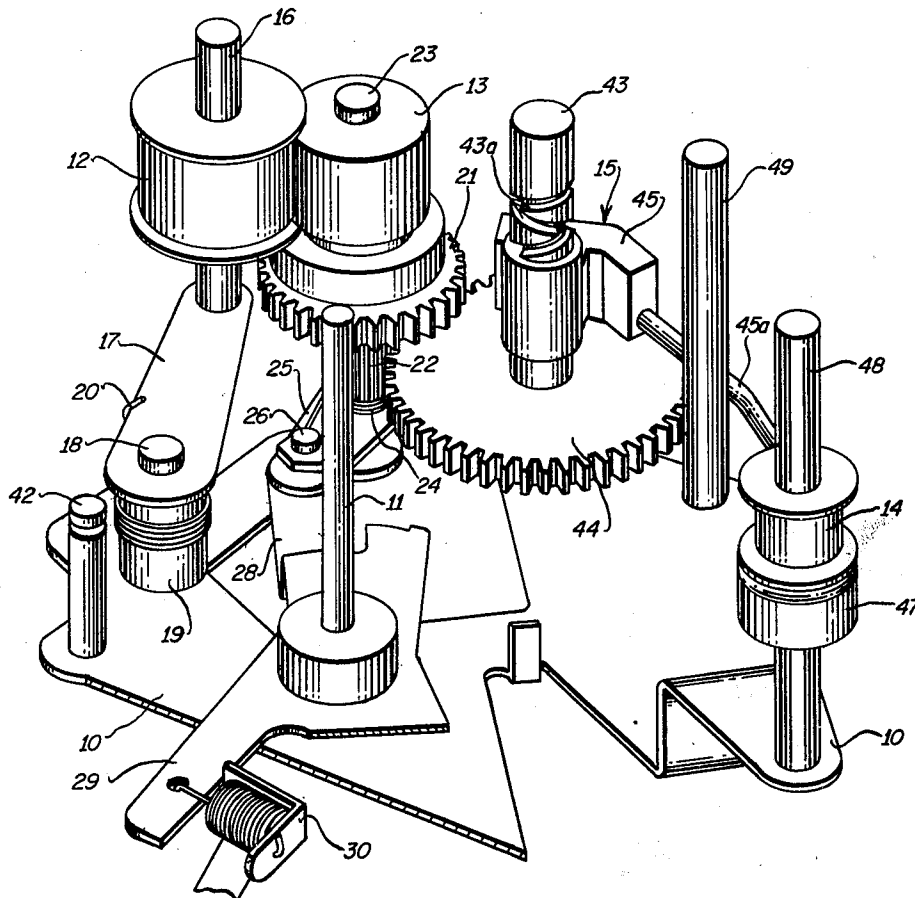


Fig. 1

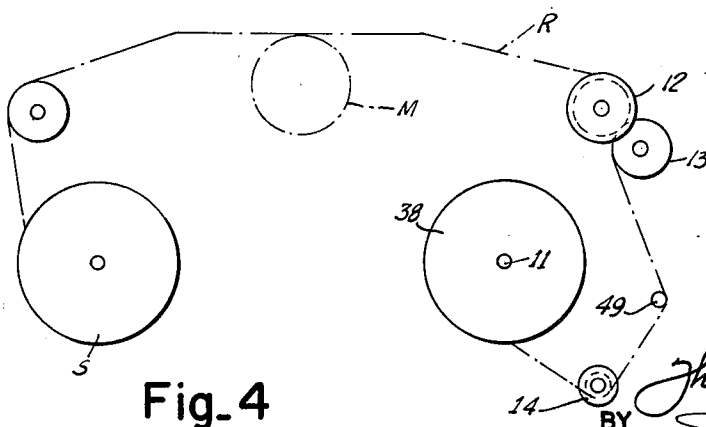


Fig. 4

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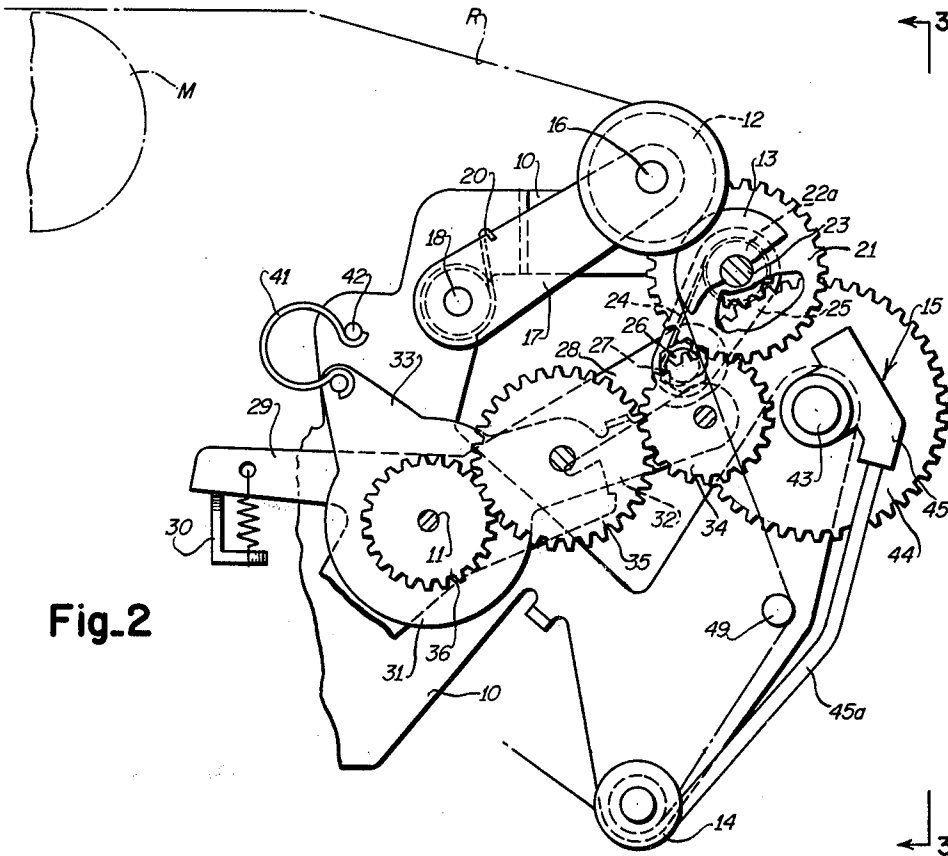


Fig. 2

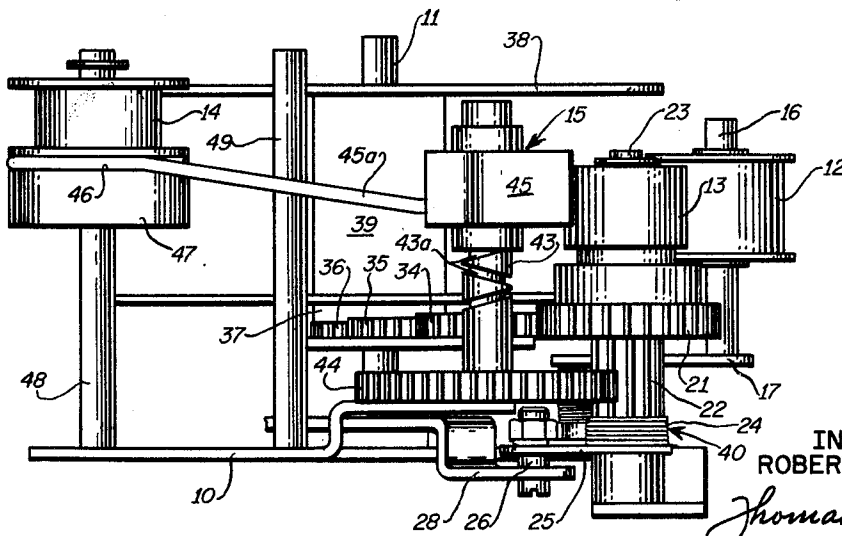


Fig. 3

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RIBBON HANDLING MECHANISM

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5 Claims. (Cl. 197—151)

This invention relates to a device for handling typewriter ribbon and more particularly to a device for handling carbon ribbon in a typewriter having a single printing head.

In a typewriter characterized by a single printing head, hereinafter referred to as a matrix machine, the use of carbon ribbon has attendant disadvantages. In conventional matrix machines wherein the matrix moves parallel to the axis of the platen, the carbon ribbon supply and take-up spools move with the matrix. Because of space limitations these spools are small and accordingly have much less ribbon capacity than those commonly used on a machine having a conventional traversable carriage supported platen. Accordingly relatively frequent ribbon changes are necessary because carbon ribbon can be used but once, thus inconveniencing the typist and causing a loss of time.

It is accordingly among the objects of this invention to provide a carbon ribbon handling device that obviates such disadvantages in addition to others in a thoroughly practical and efficient manner. Other objects will be in part apparent and in part pointed out hereinafter.

In the drawing wherein there is shown a preferred embodiment of the invention and wherein similar reference characters refer to similar parts throughout the several views:

FIGURE 1 is a perspective view of the mechanism with portions of the spool drive gear train omitted;

FIGURE 2 is a top plan view; and

FIGURE 3 is a side elevation taken along the line 3—3 of FIGURE 2.

FIGURE 4 is a schematic top plan view on a reduced scale of the ribbon handling device.

In general the device comprises a pair of mounts for carbon ribbon supply and take-up spools respectively which are mounted on the printing head carriage of the matrix machine so as to be transported with the printing head. A drive mechanism is connected to the take-up spool to rotate it during ribbon feed so as to wind up ribbon as it is fed thereto. A ribbon feeding mechanism comprising a driven feed roller and an idler pressure roller draws ribbon from the supply spools and incrementally feeds it to the take-up spool. Interposed between the ribbon feeding mechanism and the take up spool is a rotatable lead screw geared to the feed roller and carrying a nut. The threads on this screw are so cut that upon rotation the nut travels up and down lingering slightly at the extremities of its travel. An arm is attached to this nut so as to rise and fall with it, the end of the arm carrying a guide pulley around which is trained the run of the ribbon between the feed roller and take up spool. The supply and take up spools have an axial depth that is substantially greater than the width of the ribbon, for example, of the order of three to one; the ribbon being spirally wound on the supply spool. Thus while the spools are of conventional diameter they have, by reason of their depth, about three times the ribbon capacity of conventional spools. Accordingly, when the ribbon is fed to the guide pulley, this pulley in moving up and down, causes the used ribbon to be spirally cross wound on the take up spool. As noted above the pitch of the lead screw is such that the nut and accordingly the guide pulley linger at the top and bottom (when

changing direction) of their travel so that the ribbon stacks evenly on the take up spool. Without this linger or dwell the ribbon would build up at the middle of the spool because of overlapping.

In the drawing I have shown only that portion of the ribbon handling mechanism that is involved in feeding carbon ribbon to the take up spool. This mechanism in practice would include a ribbon vibrator, means for handling two-color fabric ribbon, reversing mechanism therefor and various other elements which may be of the nature disclosed in the copending application of Paul F. Page, Serial No. 223,159, filed September 12, 1962.

As shown in FIGURE 1 the mechanism is mounted on a frame 10 comprising a portion of the printing head carriage and in general includes a take up spool spindle 11, pressure and feed rollers 12 and 13, a vertically reciprocable guide pulley 14, and a lead screw and follower device generally indicated at 15, which is connected to and operable to raise and lower the guide pulley which accordingly guides the ribbon to the take up spool in such a manner that the ribbon is spirally repeatedly cross wound on the spool.

Pressure roller 12 is preferably formed of rubber or similar frictional material and is rotatably mounted on a shaft 16 secured to and extending upwardly from an arm 17 pivotally carried by a pin 18 fastened to a collar 19 mounted on frame 10. A spring 20, coiled around collar 19, has one end connected to arm 17 and the other to frame 10, the spring being so coiled as to bias arm 17 clockwise whereby a carbon ribbon R (FIGURE 2) trained between rollers 12 and 13 is pressed by the former against the latter. The two rollers accordingly securely grip the ribbon and intermittently feed it in a manner to be described, in equal increments during successive cycles of operation thus to insure presentation of fresh ribbon at the printing position at each printing operation and to economize ribbon by feeding just enough of it between successive printing operations to preclude overstriking.

As shown in FIGURES 2 and 3 feed roller 13, a drive gear 21 and a drive pinion 22 are secured together so as to rotate as a unit on a pin 23 secured to frame 10, the lower end of the pinion comprising a hub 22a which with a spring 24 coiled therearound comprise the elements of a wrap spring clutch 40. The anchored end of clutch spring 24 is secured to an arm 25 oscillatably mounted on pin 23. A drive pin 26 is mounted on the end of arm 25 and extends through a slot 27 formed in a crank 28. Crank 28 is oscillatably mounted on spool spindle 11 and has an arm 29 connected to a driver 30 that may be operated as disclosed in said Page application to oscillate the crank. It will now appear that as crank 28 is oscillated clutch 40 will alternately engage and disengage, clutch spring 24 being so wound that upon clutch engagement roller 13, gear 21 and pinion 22 are rotated counterclockwise. Thus roller 13 is intermittently rotated in equal increments so that ribbon is fed in equal increments that are at least and preferably slightly greater than the extent of a type character space thus avoiding overstriking and at the same time economizing the ribbon.

A gear carrier plate 31 is rockably mounted on spindle 11 and includes an arm 32 and an ear 33. A pair of meshing gears 34 and 35 are rotatably mounted on arm 32, gear 34 being movable into and out of mesh with gear 21 and gear 35 being in constant mesh with a gear 36 which forms a part of a ribbon spool mount 37 carried by spindle 11. A take up ribbon spool 38 includes a core 39 which receives mount 37 when the spool is installed, the core and mount having a slip fit relationship whereby the spool may be rotated by the mount and may

also move relative thereto. Carrier plate 31 is manually adjustable between meshing and unmeshing positions where gears 21 and 34 are respectively in and out of mesh, the plate being retained in either of these positions by an overcentering spring 41 the opposite ends of which are respectively connected to carrier ear 33 and a pin 42 mounted on frame 19. Plate 31 is moved to its in mesh position when carbon ribbon is being fed and to its out of mesh position to disable the gear train 21, 34, 35, 36 when fabric ribbon is being handled in the manner disclosed in said Page application. It may now be seen that when gear 21 is in mesh and is driven by arm 25 as described above spool 38 is intermittently rotated to take up ribbon fed thereto by rollers 12 and 13. The gears are so dimensioned that spool 38 moves at a rate somewhat greater than that at which ribbon is fed by rollers 12 and 13; it is for this reason that the slip fit between spool mount 37 and spool core 39 is provided and also because of the varying effective diameter of the take-up between empty and loaded conditions.

As shown in FIGURES 1 and 3 a lead screw 43 and a connected gear 44 are rotatably mounted on frame 10 with gear 44 meshing with pinion 22 so as to be driven thereby. A follower or nut 45 meshes with the threads 43a of the lead screw, these threads being so formed that upon rotation of the screw, nut 45 reversibly travels up and down, the top and bottom threads of the screw being so formed that the nut lingers momentarily at the upper and lower extremities of its travel for a purpose to be described. One end of an arm 45a is fastened to nut 45, the other end of this arm being curled into an annular groove 46 formed in the hub 47 of guide pulley 14 which is vertically movably mounted on a shaft 48 secured to frame 10. Accordingly as nut 45 travels up and down, arm 46 imparts the same movement to pulley 14.

The mechanism operates as follows. Carbon ribbon from the supply S (FIGURE 4) is threaded through the ribbon guides on the vibrator arms as shown in said Page application, is trained between rollers 12 and 13, is passed around a guide post 49, secured to frame 10, and thence around guide pulley 14 with its free end being attached to take up spool 38 in any suitable manner. As crank 28 is oscillated feed roller 13 is intermittently rotated counterclockwise (FIGURE 1) to feed ribbon R incrementally past the printing head or matrix M. At the same time gear 22 drives gear 44 to rotate lead screw 43 causing nut 45 to move up or down as the case may be, pulley 14 partaking of the same movement. Thus the ribbon trained around pulley 14 is also raised or lowered and is accordingly spirally repeatedly cross wrapped on the take up spool 38 as the spool is rotated. As noted above lead screw 43 is so designed that nut 45 lingers momentarily at the extremities of its travel so that the ribbon will stack evenly on the take up spool. Otherwise the ribbon would build up at the middle of the spool core. In practice I have obtained good results with a ribbon about .220" wide and a take up spool having a depth of about .625".

It may now be seen that I have provided a carbon ribbon handling mechanism that attains the objects set forth above in a thoroughly practical and efficient manner.

As other embodiment of the invention are possible and as modifications of the one disclosed may be made, all without departing from the scope of the invention it is to be understood that the foregoing should be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a carbon ribbon handling mechanism for a matrix

writing machine having a printing head mounted on a carriage that travels horizontally during the printing operation, said mechanism comprising, in combination, a rotatable ribbon supply spool mounted on such carriage, the axial depth of such supply spool being substantially greater than the width of the carbon ribbon,

a ribbon take-up spool of the same axial depth as said supply spool,

means rotatably mounting said take-up spool on said carriage,

a pair of ribbon feeding rollers rotatably mounted on said carriage and adapted to embrace and feed a carbon ribbon,

means for rotating said take-up spool and at least one of said rollers whereby ribbon is fed by said rollers to said take-up spool,

and means disposed in the path of ribbon travel between said rollers and said take-up spool for alternately raising and lowering the ribbon during the feeding thereof whereby the ribbon is spirally cross wound on said take-up spool.

2. Mechanism according to claim 1 wherein said last mentioned means comprises a shaft vertically mounted on said carriage and a guide pulley reciprocably slidably and rotatably mounted on said shaft.

3. Mechanism according to claim 2 wherein said last mentioned means also comprises a vertical rotatable lead screw drivably mounted on said carriage and a nut on said screw connected to said guide pulley.

4. Mechanism according to claim 3 including means to intermittently rotate said take-up spool, and means forming a driving connection between said take-up spool and said lead screw whereby upon rotation of said take-up spool said lead screw is driven.

5. Mechanism according to claim 3 wherein the threads at the opposite ends of said lead screw are so formed that said nut and accordingly said guide pulley linger at the extremities of their travel when changing direction of travel.

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