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L. P. FRECHETTE ETAL

3,237,747

CAM OPERATED RIBBON VIBRATOR AND RIBBON FEED MECHANISM

Filed Sept. 14, 1964

3 Sheets-Sheet 1

Fig-1

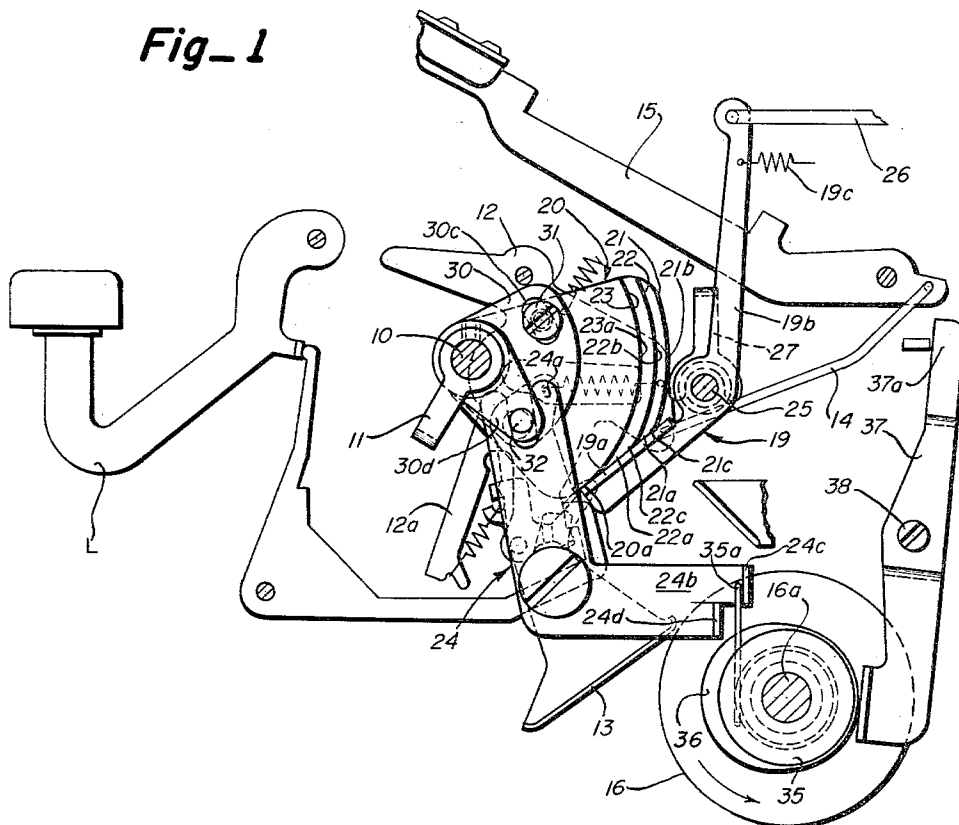


Fig-3A

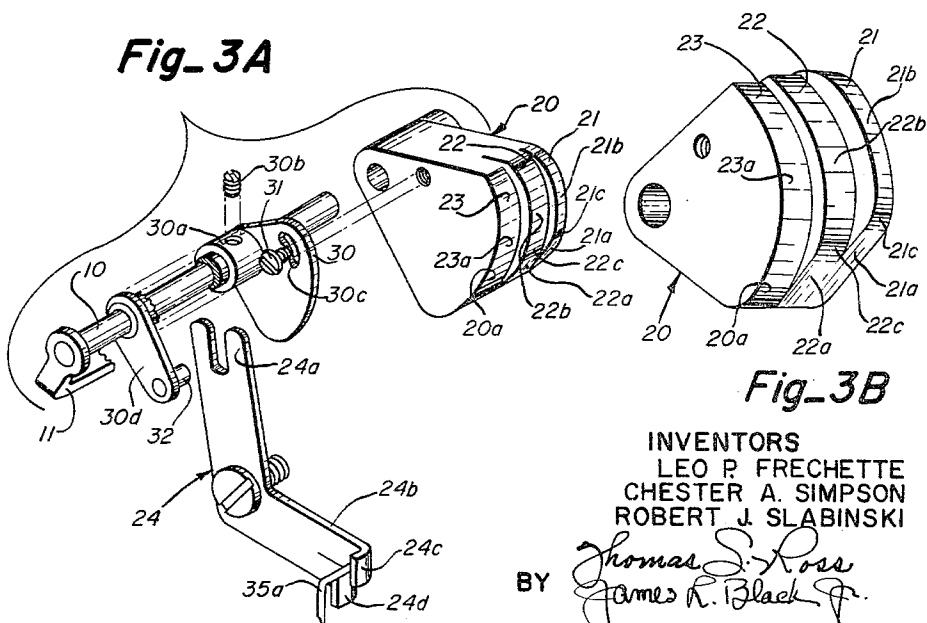


Fig-3B

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3 Sheets-Sheet 2

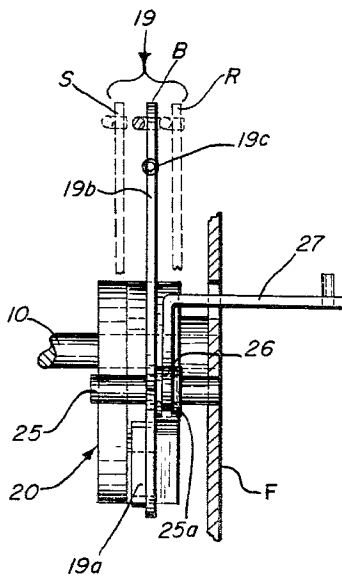
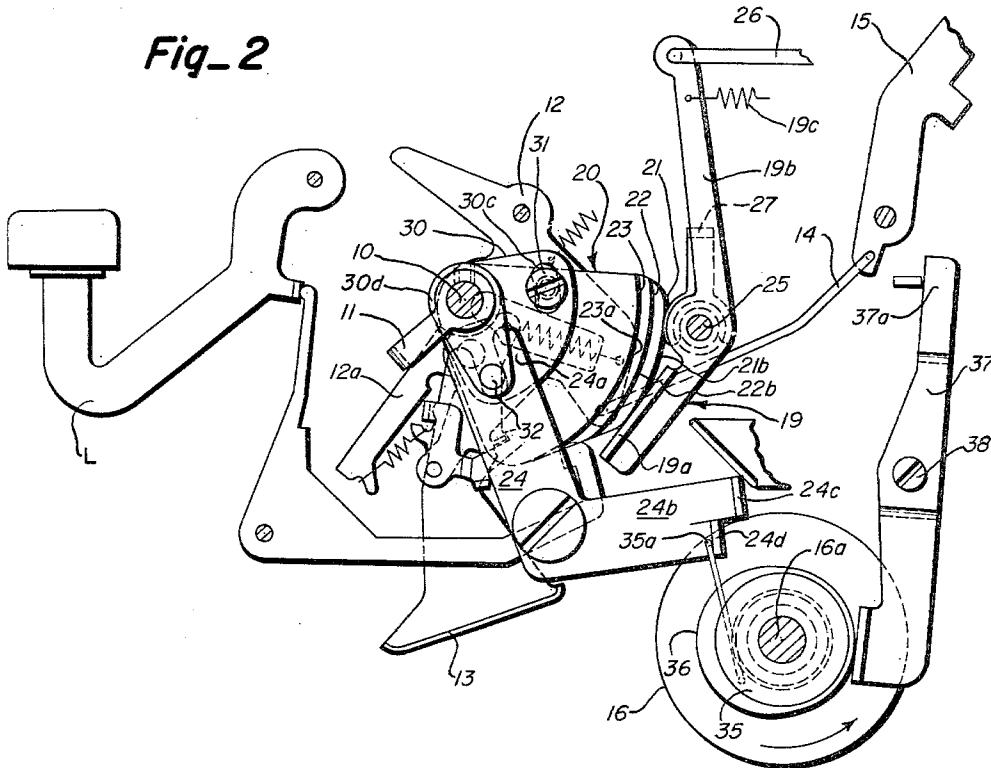


Fig_4

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3 Sheets-Sheet 5

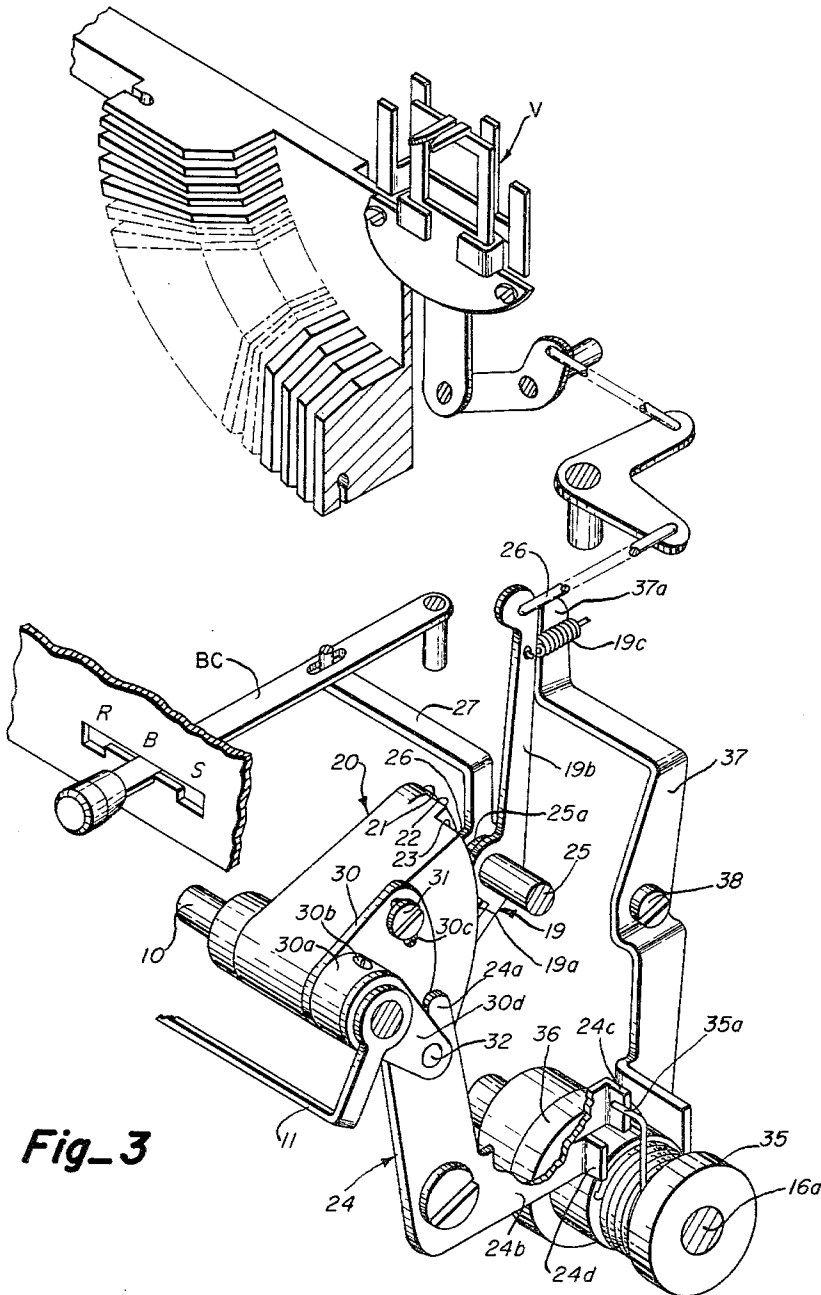


Fig_3

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CAM OPERATED RIBBON VIBRATOR AND RIBBON FEED MECHANISM

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3 Claims. (Cl. 197—159)

This invention relates to a ribbon vibrator and ribbon feed drive mechanism for an electric typewriter.

Various commercially available typewriters are characterized by a vibrator that is directly linked to a U-bar, motion of which raises the vibrator until it hits its up-stop to position the ribbon in proper printing position. The motion or travel of the U-bar is necessarily different, because of tolerances, for each type bar. Accordingly, some type bars will still have some distance to travel before hitting the ribbon when the ribbon vibrator is against its up-stop or limit position. This will cause the type bar to stop prematurely resulting in a low density or missing character. Even a tedious and critical adjustment to the linkage between the type bar and the U-bar for each type bar often fails to rectify this condition.

Another difficulty is frequently evident in the over-load of the small electric motor resulting from simultaneous operation of the ribbon vibrator and ribbon feed mechanism in addition to the selected type bar action.

It is accordingly an object of this invention to provide a ribbon vibrator and ribbon feed mechanism capable of alleviating choking of the type bars and spreading the vibrator and ribbon feed loads on the motor.

A further object is to provide such a mechanism that is structurally simple, sturdy and inexpensive, that is reliable over an extended period of use and that requires a minimum of initial adjustment and subsequent field service. Other objects will in part be apparent and in part pointed out hereinafter.

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

FIGURE 1 is a side elevation, partly in section, showing the mechanism of the invention, in rest position, in conjunction with a typical type bar action;

FIGURE 2 is an elevation similar to FIGURE 1 showing the parts in active condition;

FIGURE 3 is an isometric view of the ribbon vibrator and feed mechanism;

FIGURE 3A is an exploded isometric view of the cam unit;

FIGURE 3B is an enlarged isometric view of a cam comprising a portion of the mechanism; and

FIGURE 4 is a fragmentary elevation of the FIGURE 1 mechanism without the type bar action.

Referring first to FIGURE 4, a stud shaft 10 is rockably mounted on the side frame F of the typewriter and has connected thereto a U-bar 11 (FIGURE 1) adapted to be operated by a sub-lever 12 comprising a portion of a type action, other parts of which are a drive cam 13 pivotally mounted on the sub-lever, and a link 14 which connects an exemplary type bar 15 to the sub-lever. Cam 13 is driven by a power roll 16 upon depression of a key lever L to actuate sub-lever 12 whose arm 12a rocks U-bar 11 clockwise and which swings type bar 15 clockwise to effect a printing operation. Shaft 10 is also rocked clockwise by the U-bar (see co-pending application of Leo P. Frechette, Serial No. 285,322 filed June 4, 1963).

Fastened to shaft 10 (FIGURES 3A and 3B) is a cam unit, generally indicated at 20, comprising three cams 21, 22 and 23. Cam 21 includes an operative surface 21a

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of increasing radius and a fixed radius dwell surface 21b. Cam 22 includes an operative surface 22a of increasing radius and a fixed radius dwell surface 22b. Cam 23 has a fixed radius surface 23a which acts as a cam follower stop as will be described below. Cam surface 22a is of increasing radius to point 22c where it merges with dwell 22b. All of the aforementioned radii refer to the axis of shaft 10. It should be noted that while cam unit 20, which is preferably a molded integral part, is much smaller than portrayed in the drawing and has small inertia and momentum characteristics, it is driven by power roll 16 which, in spite of the characteristically small driving motor (not shown) therefore, has ample power to operate the cam systems at adequate speed thus relieving the load on the keyboard levers. This advantageous condition obtains because of the dwell portions 21b and 22b on cams 21 and 22 respectively, the only real drain on the motive power being occasioned when cam points 21c or 22c drive their follower, generally indicated at 19, and when cam unit 20 drives a ribbon feed bell crank generally indicated at 24, but at a time subsequent to operation of follower 19.

Follower 19 (FIGURE 4) is fastened to a shaft 25 which is mounted on the machine frame F for axial movement relative thereto. This shaft has a collar 25a which is embraced by a yoke 26 secured to a linkage system 27 (FIGURE 3) connected to a conventional manually operable bichrome lever BC whereby the shaft 25 may be shifted to the right or left (FIGURE 4) depending on what color ribbon or stencil is optionally desired.

Follower 19 includes a shoe 19a (see also FIGURE 1) adapted selectively to engage cams 21, 22 or 23 depending on the typist's selection of black B, red R, or stencil S by operation of bichrome lever BC. This follower also includes an arm 19b (FIGURE 3) connected to which is a spring 19c to bias follower 19 clockwise to force shoe 19a into engagement with the selected cam whereby the follower is rocked upon rotation of the cams 21 or 22. The upper end of follower arm 19b is connected to a link 26 which, in turn, is conventionally connected to a ribbon vibrator mechanism V. Thus as follower 19 is rocked by one or the other of cams 21 or 22, the ribbon vibrator is raised and lowered, first to present the selected band of the ribbon at the printing position and then to lower the ribbon to provide clear view of the printed character.

To attain one of the objects of this invention, the contours of cams 21 and 22 are somewhat critical although not within narrow tolerance limits. The preferred, and indeed advantageous, sequence of operations is elevation of the vibrator to present the ribbon at printing position, next impact of the type bar and then ribbon feed thus dividing the load on the motor and providing high character per second operation of the machine without any manual load imposed on the key bars or the U-bar. This feature accordingly obviates the many critical and tedious adjustments referred to above. It also greatly reduces the otherwise necessary number of parts which contribute to the weight and the noise output of the typewriter, particularly a portable for which the disclosed mechanism is well adapted.

Cam unit 20, which is shown in detail in FIGURES 3A and 3B comprises, as described above, the cams 21, 22 and 23. Cam point 21c in this embodiment of the invention, is preferably and approximately 72 degrees counterclockwise from the vertical, cam point 22c being preferably and approximately 67 degrees counterclockwise from the vertical, in accord with the geometry of the particular design, when the cams are at rest. We do not wish, however, to be limited to these approximate locations as they are not that critical. The principal criterion is that the ribbon is elevated sufficiently in advance of the type bar impact while precluding any pos-

sibility of type bar choke resulting from the ribbon vibrator locking complete movement of the type bar. This preclusion is provided by the dwells on the cams and the disassociation of the vibrator from the key bars. At the point 20a on cam unit 20 the radius of each of the several cams 21, 22 and 23 is the same. The radius of cam 21 increases from point 20a along its surface 21a to point 21c where it becomes constant. The radius of cam 22 increases from point 20a along its surface 22a to point 22c where it becomes constant. The operative and dwell surfaces of cams 21 and 22 are thus generated to impart, upon operation, the desired timed motion to follower 19 (FIGURES 1 and 2). This relationship of parts and the timing of their cyclic operations permits very high character per second printing.

When a key lever is depressed cam 13 is rocked into engagement with power roll 16 and sub-lever 12 is rocked clockwise. Arm 12a of the sub-lever drives U-bar 11 clockwise rocking shaft 10 and accordingly cam unit 20 clockwise. As the cam unit 20 rocks from its FIGURE 1 position to that of FIGURE 2, cam 21, assuming that follower 19 has been registered with that cam, forces follower shoe 19a counterclockwise thus swinging follower arm 19b to the left to elevate the vibrator V by way of link 26. It may be seen from the position of the parts in FIGURE 2 that, when follower shoe 19a engages cam dwell 21b, type bar 15 has not reached its impact or printing position. The type bar cannot be locked or choked, however, because the follower shoe is on the dwell 21b and the type bar action is free to complete its cycle of operation. The same condition obtains when the follower shoe 19a is in engagement with cam 22.

It will be recalled that sub-lever 12 rocks U-bar 11 and accordingly shaft 10 and cam unit 20. A plate 30 (FIGURE 3A) has a collar 30a which is fastened to a shaft 10 by a set screw 30b and is provided with a slot 30c which receives a set screw 31 that is threaded into the cam unit whereby the plate is adjustable relative to the cam unit. An arm 30d is fastened to collar 30a and carries a pin 32 that is received in the bifurcated end 24a of crank 24 whereby rocking of the cam unit 20 as described rocks crank 24 counterclockwise. The crank includes an arm 24b provided with spaced lugs 24c and 24d which, in conventional manner, control the tail 35a (FIGURE 1) and accordingly engagement and disengagement of a wrapped spring clutch 35 mounted on the drive shaft 16a of power roll 16. Shaft 16a carries a cam 36 connected to clutch 35 and arranged to drive a ribbon feed follower 37 pivotally mounted on a stud shaft 38 secured to the machine frame, the upper end 37a of this follower being connected to the ribbon feed mechanism (not shown) in conventional manner. By virtue of the adjustability of plate 30, the timing of actuation of the ribbon feed clutch 35 may be accurately set.

When crank 24 is rocked counterclockwise its lug 24c is lifted away from clutch tail 35a permitting the clutch to engage and accordingly drive cam 36 thus to swing its follower 37 and actuate the ribbon feed drive mechanism. By virtue of the adjustability of plate 30 and its arm 30d, the timing of the operation of crank 24 may easily be set so that the ribbon feed mechanism is actuated at the proper time subsequent to vibrator and type bar operation.

A typical operation ensues when the type bar action is activated by depression of a keyboard lever. Cam 13 is rocked into engagement with power roll 16 resulting in clockwise movement of sub-lever 12 whose arm 12a drives U-bar 11 clockwise to similarly rock shaft 10. Cam unit 20 is thus rocked and follower 19 swings counterclockwise to operate the vibrator by way of link 26. At the proper time, depending on the setting of plate 30, bell crank 24 is rocked counterclockwise to effect engagement of clutch 35 whereby cam 36 is rotated by shaft 16a to drive follower 37 which, in turn, drives the ribbon feed drive mechanism.

Thus we have provided a ribbon vibrator and ribbon feed drive mechanism that attains the several objects set forth above in a thoroughly practical and efficient manner.

As other embodiments 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.

We claim:

1. Typewriter mechanism having a power roll adapted for driving type actions and for preventing the elevated limit position of a ribbon vibrator from terminating the type actions comprising,

a ribbon vibrator mounted for movement toward a limit position relative to a printing point on said typewriter,

a shaft,

a U-bar mounted on said shaft for rocking motion, said U-bar being engageable by elements of driven type actions, said actions rocking said U-bar non-uniformly,

a cam member secured to said shaft and having a camming surface comprising a first arcuate portion and a second dwell portion,

a follower means biased into engagement with said camming surface, said first arcuate portion driving said follower at a controlled rate of velocity from a rest position to said limit position, said second dwell portion of said cam maintaining said follower stationary at said limit position,

and means connecting said follower and said ribbon vibrator whereby when said type action is activated by said power roll and said cam member is rocked, said vibrator is elevated to said limit position over the interval of engagement of said follower with said first cam position and whereby continued rocking of said cam by said type action over the interval of engagement of said follower with said second portion of said camming surface maintains said ribbon vibrator stationary at said limit position.

2. Mechanism according to claim 1 wherein said cam member has at least one other adjacent camming surface and including selective means connected to said follower means for selectively shifting said follower means from one to another of said surfaces depending on whether black, or red position is desired, said other camming surface having a different first arcuate portion thereby elevating said vibrator to a second position.

3. Mechanism according to claim 1 further comprising ribbon feed actuator comprising

a second cam freely mounted on said power roll,

a clutch mounted on said power roll for engaging said second cam and said power roll,

a second cam follower engaging said second cam, and connected to said ribbon feed actuator,

and crank means coupled to said shaft and operative thereby incident to movement of said shaft through a predetermined arc to engage said clutch whereby rocking of said shaft engages said clutch and operates said ribbon feed actuator.

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