Aug. 24, 1954 K. S. GOODALE ET AL 2,687,199

MAGNET UNIT FOR OPERATING TYPEWRITERS

Filed Dec. 21, 1950 3 Sheets-Sheet 1

FIG. 4.

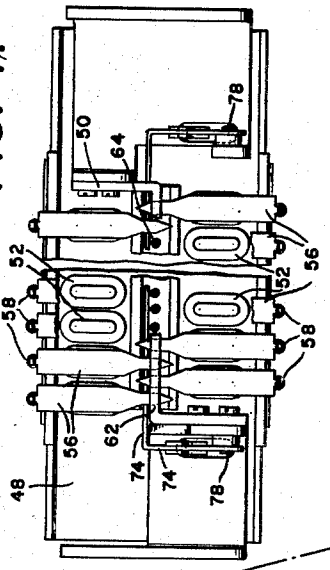


FIG. 1.

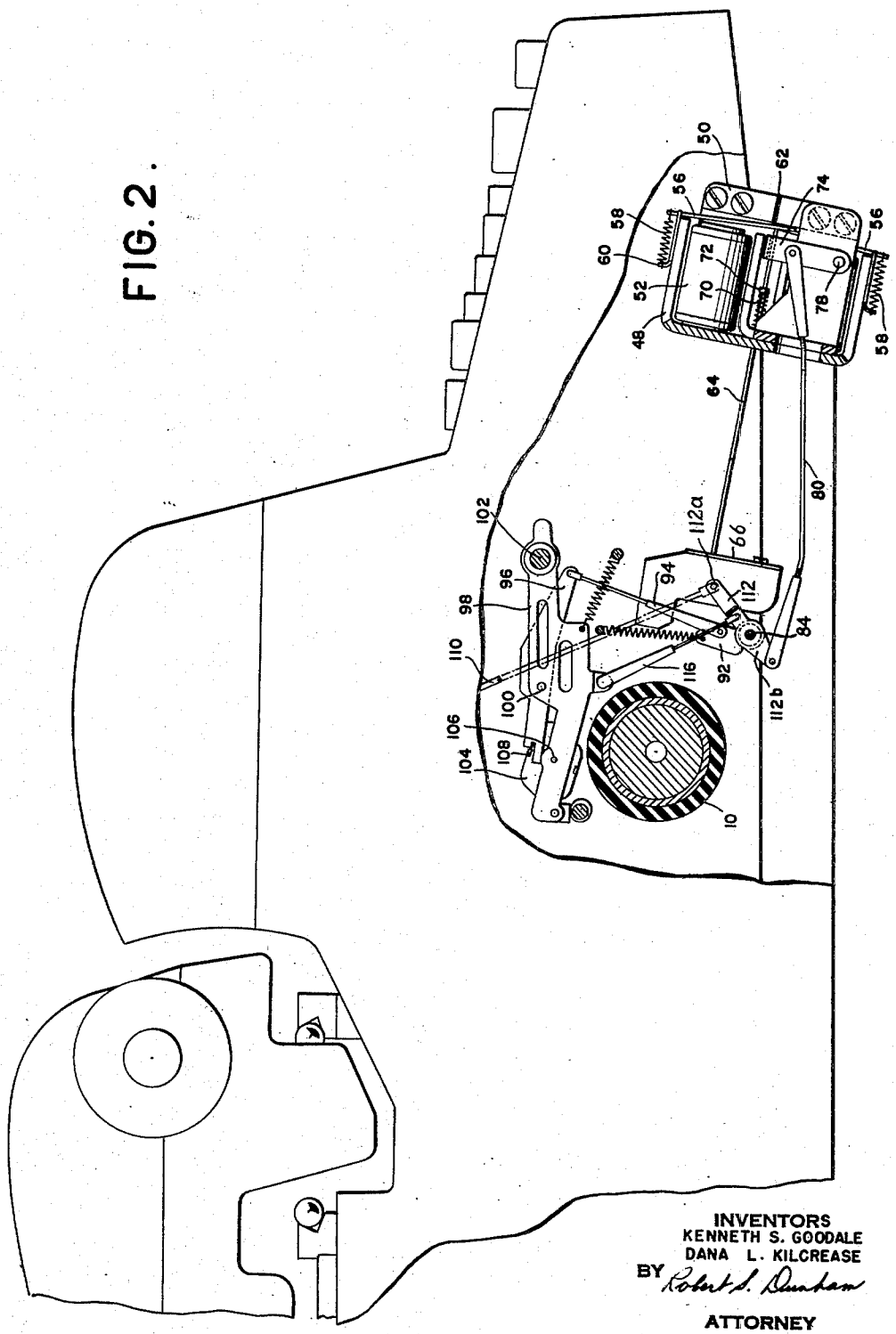
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FIG. 2.



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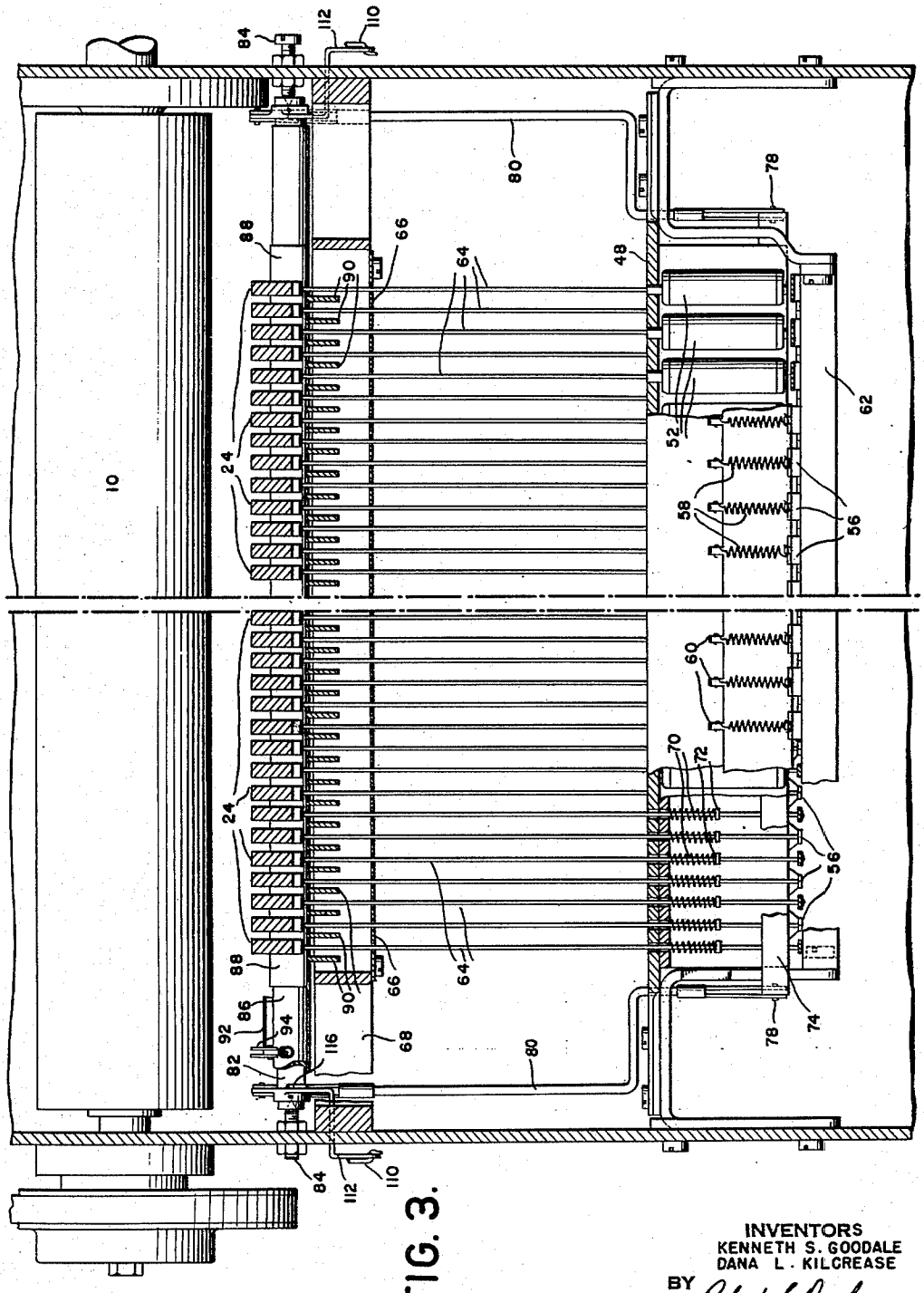


FIG. 3.

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MAGNET UNIT FOR OPERATING TYPEWRITERS

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8 Claims. (Cl. 197—19)

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This invention relates to control mechanism for power operated typewriters. In its specific aspect the invention relates to electromagnetic control means for controlling the operation of power operated typewriting machines.

It is an object of the invention to provide a compact electromagnetic control mechanism for tripping the power cams of power operated typewriters in order that the typing action thereof may be automatically controlled.

It is a specific object of the invention to provide in an eletromagnetic control mechanism for power operated typewriters a series of electromagnets each in control of a related type bar operating assembly and to provide means operative upon each type bar operation to recondition the electromagnetic control devices for positive operation on succeeding printing strokes of the type bar mechanism.

It is conventional to provide power operating means for typewriters wherein a type bar operating linkage is provided and wherein such linkage is powered for producing a printing stroke of the type bar by moving a power cam mechanism associated with the type bar linkage into operative relation with a constantly rotating power roller. Heretofore the automatic selection of the respective type bar operating mechanisms has involved the simultaneous movement of related key levers. In accordance with the present invention the electromagnetic control mechanism provided herein operates independently of key lever action in that an electromagnetic trip device is provided in operative relation with each one of the type bar actuating assemblies. As a consequence, the structure is such that the keyboard may be manually operated without in any way influencing the automatic electromagnetic operating mechanism, and the electromagnetic operating mechanism is so disposed and related to the type bar operating assemblies that the power cam units thereof are directly tripped by the electromagnetic control devices without in any way disturbing or otherwise influencing the normal manual operating mechanism of the keyboard.

The objects and advantages of the invention disclosed herein will become fully apparent as the detailed description thereof is read in conjunction with the drawings forming a part of this application and in which drawings:

Fig. 1 is a view partially in section and partially in full line of certain parts of a power operated typewriter showing a type bar, manual type bar operating levers and electromagnetic mechanism for the control of the type bars;

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Fig. 2 is a side elevational view of the power operated typewriter of Fig. 1 with portions of the casing and side frame broken away to show certain underlying structure pertaining to power operated ribbon feed and lift mechanism and electromagnetic type action control linkage;

Fig. 3 is a transverse horizontal view, partly in section, through the power drive and control mechanism of the typewriter of Figs. 1 and 2, parts being broken away to show underlying structure; and

Fig. 4 is a broken, front, elevational view of the magnet unit forming an important part of the typewriter control mechanism.

The printing action of the typewriter illustrated herein and to which the present improvements are applied is adapted for power operation under the influence of a constantly rotating power roller 10 which is driven in any well known manner, as by an electric motor (not shown). Each type face 12 is carried by a type bar 14 which is adapted to be operated into impression making contact with a record receiving sheet trained about a platen 16. Each type bar 14 is pivoted on a type bar segment wire 18 about which it is rocked under the influence of a sub-lever 20 to which it is connected by means of a link 22. Each sub-lever 20 is adapted for operation by a power cam 24 which is pivoted to its sub-lever by means of a pivot stud 26. The sub-levers 20 and the power cams 24 are normally, i. e. in inoperative condition, so disposed that a serrated surface 28 on each cam 24 is slightly spaced from the rotating power roller 10. This position of the cams 24 is maintained by means of an associated spring 30 which has one end thereof attached to its cam at a point above the pivot stud 26 and which has its other end attached to a forwardly projecting portion of its sub-lever 20. As a consequence of the spring tension, the cams are normally biased about their pivot point 26 in a counterclockwise direction to such an extent as to provide a small space between the serrated surface 28 of the cams and the peripheral surface of the power roller 10.

The upper end of each sub-lever 20 has a projecting ear 32 from which extends a lateral stud 34 which is adapted to engage in an elongated slot 36 formed in an upstanding ear of a release member 38, the opposite end of the release member being embraced by an inturned ear 40 in the upper end of the forwardly projecting portion of its sub-lever 20. A spring 42 tends to hold the release member 38 in its forwardly disposed position. A manually operable key lever 44 is pivoted for operative contact with each release member

38 whereby downward movement thereof will rock the associated cam 28 in a clockwise direction to project its serrated surface 28 into contact with the power roller 10. Whenever the serrated surface 28 of a cam 24 is brought into contact with the continuously rotating power roller 10, the cam 24 will be rocked in a clockwise direction and because of the eccentricity thereof the point of connection between the sub-lever 20 and the cam 24 will be moved forwardly, thereby rocking the sub-lever 20 about its pivot point 46. Such motion is, of course, effective to rock the sub-lever 20 in a clockwise direction and through the link 22 rock the type bar 14 in a counterclockwise direction about its pivot wire 18, thereby imparting a printing stroke to the type bar.

As hereinbefore stated this invention relates primarily to electrically controlled typewriters of the class wherein electric impulses representative of characters are provided for energizing electromagnets which control related power cams to cause the typing or printing operation. It is the specific purpose of this invention to provide in such typewriters an electromagnetic control for each of the character key cams, and to this end there is provided a frame member 48 which is in the form of a generally U-shaped channel and which includes mounting ears 50 at the ends thereof by means of which the channel may be attached to the side frames of the typewriter with its open side facing toward the front or keyboard end of the typewriter. Within the channel 48 are disposed a plurality of magnets 52, one such magnet for each of the character operating cams 24. As best seen in Fig. 4 of the drawing the magnets 52 are disposed in two rows in the frame 48 and the magnets of one row are staggered in respect to the magnets of the other row. This is a convenient arrangement by means of which the magnets are assembled in a unit which is so compact as to fit in the limited space available at the front of the typewriter. The magnets 52 are selectively energized in any of the several ways that are known in the art to cause the printing of characters and to perform the necessary machine functions during the course of the composition.

To the top and bottom outer faces of the supporting frame 48 are affixed armature pivot plates 54 upon which the armatures 56 are pivotally mounted. In this manner there are provided two staggered rows of armatures having the outer ends thereof pivoted in their related pivot plate 54 and having their free inner ends adjacent each other but in staggered and overlapping relation in an endwise direction. A spring 58 attached to the outwardly projecting end of each armature 26 and anchored at a spring lug 60 formed in the pivot plate 54 serves to hold its armature 56 away from its related magnet when such magnet is deenergized. A brass strip 62 which is attached to the ends of the armature frame 48, and which is disposed across the overlapping free ends of the armatures and in somewhat outwardly spaced relation thereto, serves to limit the rocking motion of the armatures in a direction away from their related magnets under the influence of the spring 58.

Each armature 56 has associated therewith a cam operating rod 64. The rod 64 has one end thereof in contact with its related armature and the other end thereof in contact with its related operating cam 24. The rod 64 passes through a slot in the wall of the magnet frame 48 and through a slotted guide plate 66 which is carried by a frame member 68 fixed to the side walls of the typewriter frame and in a position directly in front of the sub-levers 20 and the operating cams 24. Each rod 64 is normally urged into an inoperative position with its forward end in contact with its related armature 56 by means of a spring 70 which has one end thereof in contact with a portion of the magnet frame 48 and the opposite end thereof in contact with a collar 72 fixed to the forward end of the rod.

It will be seen from the foregoing that whenever one of the magnets 52 is energized and its related armature 56 is attracted thereto, the rocking motion of the armature is transmitted through its related cam operating rod 64 whereby the cam 24 is rocked about its pivot point 26. This movement projects the serrated face 28 of the cam into contact with the rotating power roller 10 and the sub-lever 20, and its related type bar 14 is therefore operated through a printing stroke as previously described. It is, of course, understood that a magnet 52 is provided for each of the type bar assemblies, and that an operating rod 64 is provided for each of the cams 24 associated with the respective type bar operating assemblies.

One of the important features of this invention contemplates the provision of an armature knock-off mechanism which is automatically operable each time a type bar is operated under the control of one of the electromagnets. To the end that such knock-off mechanism may be effectively provided, the magnet frame 48 pivotally supports a knock-off bail 74 which is in the shape of a relatively wide inverted U. The bail 74, therefore, includes a generally horizontal portion which is located at the overlapping zone of the several armatures 56, and on the rear side of such armatures. The bail also provides a pair of downwardly extending legs 76, one at each end thereof, and the free ends of these legs are pivoted on studs 78 fixed to the magnet frame 48. As a consequence of this arrangement, the bail 74 may be rocked on its pivots 78 to bring it into contact with the free ends of the several armatures, thereby forcing such armatures away from the related magnet cores. This operation is useful and in many cases necessary in overcoming residual core magnetism. Each end of the bail 74 has attached thereto the forward end of an operating link 80 which extends rearwardly to a point adjacent a ribbon lift bail shaft 82. The ribbon lift bail shaft 82 extends transversely of the typewriter structure and is mounted for rocking movement on pivot studs 84 (Fig. 3). Mounted on the ribbon lift bail shaft and adapted for relative rocking movement in respect thereto is a ribbon lift bail sleeve 86, and extending upwardly from the ribbon lift bail sleeve is a ribbon lift bail 88. The ribbon lift bail 88 extends upwardly into the zone of influence of a downwardly extending hook-like projection 90 formed in the sub-lever 20. Each time a sub-lever 20 is rocked through an operating movement, the hook-like portion 90 thereof engages the ribbon lift bail 88, and thereby rocks that bail in a counterclockwise direction to lift the typewriter ribbon into impression position between the type face and a record sheet on the platen 18. The structure and operation of the ribbon lift linkage adapted for operation by the bail 88 is well known in the art and it is, therefore, not illustrated in the drawings.

By reference to Fig. 2 of the drawings it will be

seen that one end of the ribbon lift bail sleeve has a plate 92 attached thereto and extending therefrom. Pivoted to the plate 92 is a ribbon lift cam link 94 which extends upwardly, and has its upper end linked to a ribbon lift cam release lever 96. The lever 96 is mounted for rocking movement on a ribbon lift cam lever 98 by means of a pivot stud 100. The lever 98 is mounted for rocking movement on a pivot shaft 102 which extends inwardly from the side wall of the typewriter frame. Near the outer free end of the ribbon lift cam lever is a drive cam 104 which is of conventional construction and which is adapted to rock on a pivot pin 106 which is carried by the lever 98. The cam release lever 96 extends rearwardly beyond its pivot point 100 into juxtaposition with the cam 104 so that when the cam release lever 96 is rocked in a clockwise direction about its pivot point the free end of the lever will engage a lug 108 and rock the cam 104 into contact with the power roller 10. Because of the eccentricity of the cam 104 its contact with the roller 10 will serve to rock the ribbon lift lever 98 in a clockwise direction about its pivot shaft 102 to supply operating power for the ribbon lift mechanism. A ribbon feed link 110, at each end of the ribbon lift bail shaft 82, is actuated to operate associated ribbon feed mechanism.

To each end of the ribbon lift bail shaft is secured a plate 112 having oppositely extending fingers 112*a* and 112*b* (see Fig. 2). The aforementioned ribbon feed links 110 are secured to the free ends of the arms 112*a*, while the rear ends of the knock-off bail operating links 80 are attached respectively to the arm 112*b*. The forward ends of the bail operating links 80, as stated before, are attached to the knock-off bail 74. A ribbon lift bail shaft operating link 116 interconnects the ribbon lift cam arm 98 and the finger 112*a* of the plate 112 at the right of the typewriter as shown in Fig. 2.

It is a characteristic of the foregoing construction, therefore, that each time a type bar assembly is operated, the ribbon lift bail 88 will be rocked, thereby rocking the plate 92 attached to one end thereof, and the link 94 will be pulled down to rock the cam release lever 96 about its pivot in a clockwise direction. This will serve to rotate the cam 104 in a counterclockwise direction and it, through contact with the operating roller 10, will rock the ribbon lift cam lever 98 about its pivot rod 102 in a clockwise direction. Because of the connecting link 116 between the ribbon lift cam arm 98 and the plate 112 attached to the end of the ribbon lift bail shaft, such shaft will be rocked in a counterclockwise direction on its pivot points 84. As a consequence, the knock-off bail operating links 80 will be pushed forwardly, and the knock-off bail 74 will be forced into contact with the armatures 56, thereby releasing any armature that may be stuck to its related magnet.

By reference to Fig. 3 of the drawings it will be seen that a rock plate 112 is provided at each end of the ribbon lift bail shaft 82 so that each end of the armature knock-off bail 74 may be under the positive influence of an operating link 80.

From a consideration of the foregoing detailed description it is clear that this invention provides an extremely simple and compact electromagnetic operating means for power driven typewriters. At the same time there has been provided in this compact control mechanism means for positively insuring the regular operation of the electromagnetic control devices.

The invention has been disclosed herein in a specific, exemplary embodiment, and it is contemplated that the structure may be altered in such respects as may be necessary to adapt the same to power driven typewriters of various types and models without departing from the essential teaching of the disclosure of this application.

We claim:

1. In combination with a power operated typewriter having a power roll, type bar and machine function linkage systems adapted for operation when coupled with said power roll, and a power cam carried by each of said systems in spaced relation to said power roll and mounted for movement into driving relation therewith, a control mechanism comprising a series of electromagnets between which and said power roll said cams are interposed, an armature for each of said magnets, and a mechanically independent operating rod extending between each of said cams and an associated armature, said rod being guided for longitudinal movement into direct operative contact with its associated cam whereby the same is moved into operative contact with said power roll upon energization of its associated electromagnet.

2. In combination with a power operated typewriter having a power roll, type bar and machine function linkage systems adapted for operation when coupled with said power roll, and a power cam carried by each of said systems in spaced relation to said power roll and mounted for movement into driving relation therewith, a control mechanism comprising a series of electromagnets between which and said power roll said cams are interposed, said electromagnets being disposed with their axes perpendicular to the axis of said power roll, an armature for each of said magnets mounted for movement toward and away from said power roll, and a mechanically independent operating rod extending between each of said cams and an associated armature, said rod being guided for longitudinal movement into direct operative contact with its associated cam whereby the same is moved into operative contact with said power roll upon energization of its associated electromagnet.

3. In combination with a power operated typewriter having a power roll, type bar and machine function linkage systems adapted for operation when coupled with said power roll, and a power cam carried by each of said systems in spaced relation to said power roll and mounted for movement into driving relation therewith, a control mechanism comprising a series of electromagnets between which and said power roll said cams are interposed, an armature for each of said magnets, an operating rod extending between each of said cams and an associated armature, and a guide plate positioned adjacent said cams, said rod being guided in said plate for longitudinal movement into direct operative contact with its associated cam whereby the same is moved into operative contact with said power roll upon energization of its associated electromagnet.

4. In combination with a power operated typewriter having a power roll, type bar and machine function linkage system adapted for operation when coupled with said power roll, and a power cam carried by each of said systems in spaced relation to said power roll and mounted for movement into driving relation therewith, a control

mechanism comprising a series of electromagnets between which and said power roll said cams are interposed, an armature for each of said magnets, an operating rod extending between each of said cams and an associated armature, said rod being guided for longitudinal movement into direct operative contact with its associated cam whereby the same is moved into operative contact with said power roll upon energization of its associated electromagnet, and a knock-off device for said armatures.

5. In combination with a power operated typewriter having a power roll, a ribbon lift cam assembly operable by said power roll following each type bar operation, type bar and machine function linkage systems adapted for operation when coupled with said power roll, and a power cam carried by each of said systems in spaced relation to said power roll and mounted for movement into driving relation therewith, a control mechanism comprising a series of electromagnets between which and said power roll said cams are interposed, an armature for each of said magnets, an operating rod extending between each of said cams and an associated armature, said rod being guided for longitudinal movement into direct operative contact with its associated cam whereby the same is moved into operative contact with said power roll upon energization of its associated electromagnet, a knock-off bail common to said armatures, and means interconnecting said bail and said ribbon lift cam assembly whereby said bail is operated when said cam assembly is operated by said power roll.

6. In combination with a power operated typewriter having a power roll, type bar linkage systems and a machine function linkage system adapted for operation when coupled with said power roll, and a power cam carried by each of said systems in spaced relation to said power roll and mounted for movement into driving relation therewith, a control mechanism comprising an electromagnet associated with each of said type bar linkage systems between which and said power roll said cams are interposed, an armature for each of said magnets mounted for movement toward and away from said power roll, an operating rod extending between each of said type bar linkage systems and its associated armature, said rods being guided for movement into operative contact with their associated cams whereby the same are moved into operative contact with said power roll upon energization of their associated electromagnets, means for moving the cam of said machine function linkage system into operative contact with said power roll each time one of said type bar linkage systems is operated, an armature knock-off bail, and means under control of said machine function linkage system for operating said knock-off bail each time said last named linkage system is actuated.

7. In combination with a power operated typewriter having a power roll, type bar linkage systems and a machine function linkage system

adapted for operation when coupled with said power roll, and a power cam carried by each of said systems in spaced relation to said power roll and mounted for movement into driving relation therewith, a control mechanism comprising an electromagnet associated with each of said type bar linkage systems between which and said power roll said cams are interposed, an armature for each of said magnets mounted for movement toward and away from said power roll, an operating rod extending between each of said type bar linkage systems and its associated armature, said rods being guided for movement into operative contact with their associated cams whereby the same are moved into operative contact with said power roll upon energization of their associated electromagnets, a rock shaft, a bail associated with said shaft, means for rocking said bail whenever a type bar is operated, means connecting said bail to said machine function cam for tripping the same into contact with said power roll, and means connecting said machine function linkage system to said rock shaft whereby the latter is rocked when said machine function linkage system is operated.

8. In combination with a power operated typewriter having a power roll, type bar linkage systems and a machine function linkage system adapted for operation when coupled with said power roll, and a power cam carried by each of said systems in spaced relation to said power roll and mounted for movement into driving relation therewith, a control mechanism comprising an electromagnet associated with each of said type bar linkage systems between which and said power roll said cams are interposed, an armature for each of said magnets mounted for movement toward and away from said power roll, a mechanically independent operating rod extending between each of said type bar linkage cams and its associated armature, said rods being guided for longitudinal movement into operative contact with their associated cams whereby the same are moved into operative contact with said power roll upon energization of their associated electromagnets, means for moving the cam of said machine function linkage system into operative contact with said power roll each time one of said type bar linkage systems is operated, an armature knock-off bail, a rock shaft, means under control of said machine function linkage system for operating said rock shaft each time said last named linkage system is actuated, and means interconnecting said rock shaft and said knock-off bail whereby the latter is rocked whenever said rock shaft is operated by said machine function linkage system.

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