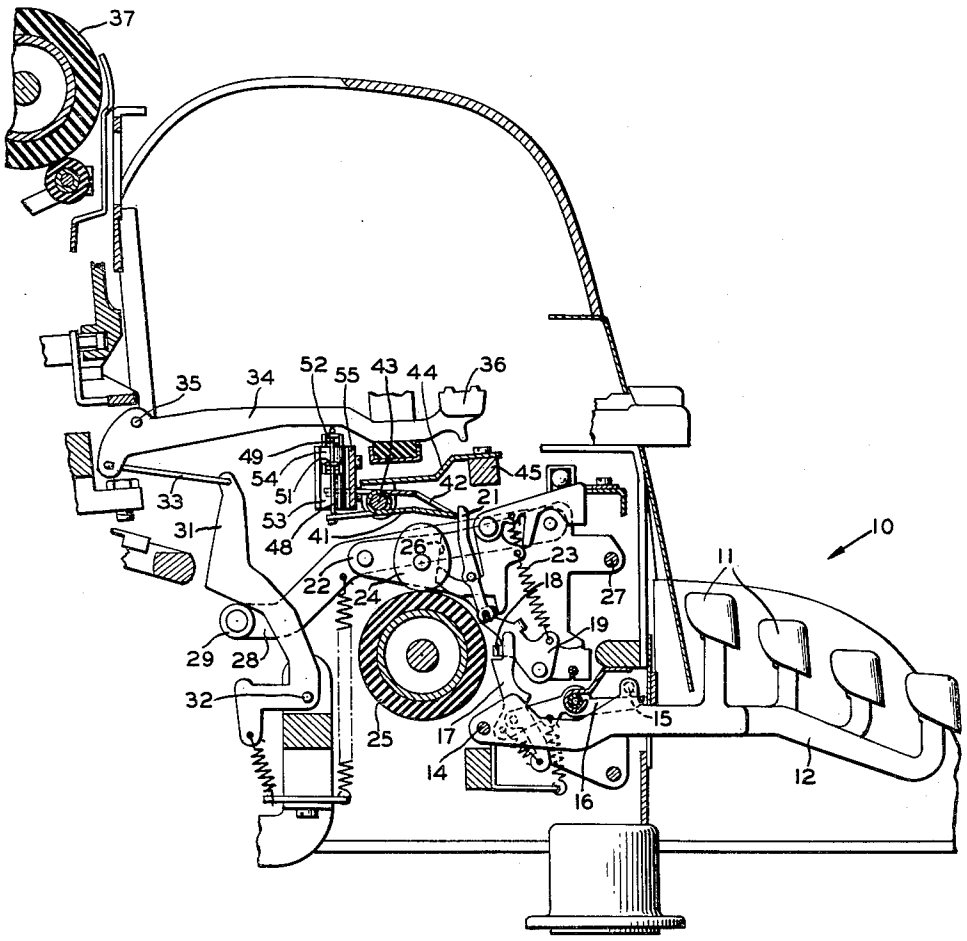
Feb. 20, 1962 O. WALTER ET AL 3,021,935

MECHANICAL INTERLOCK DEVICE

Filed May 13, 1960 2 Sheets-Sheet 1

FIG. 1



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FIG. 2

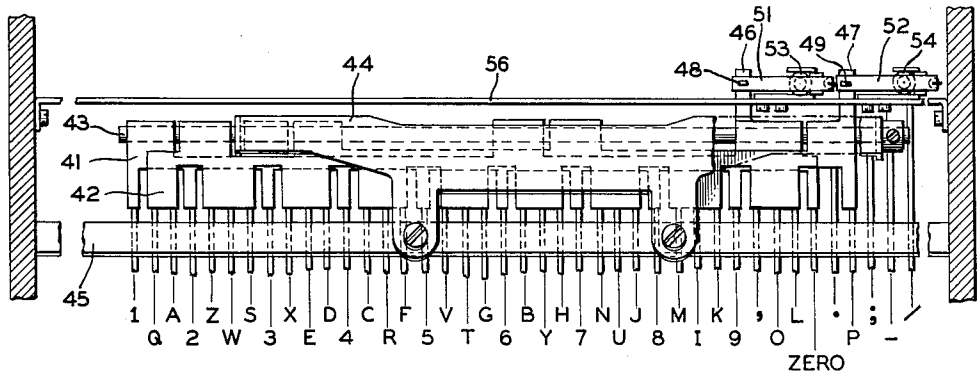


FIG. 3

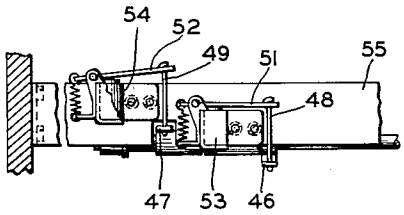


FIG. 4

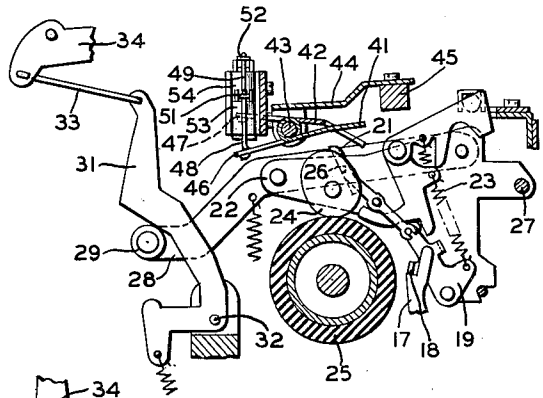


FIG. 5

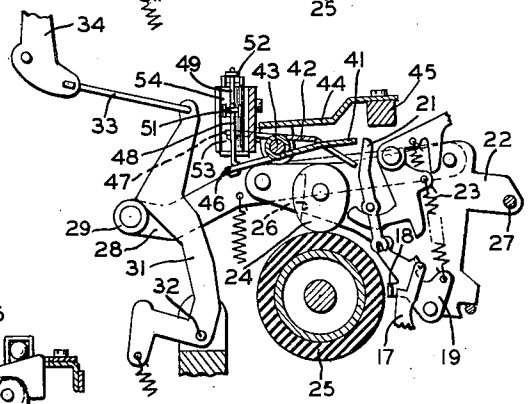
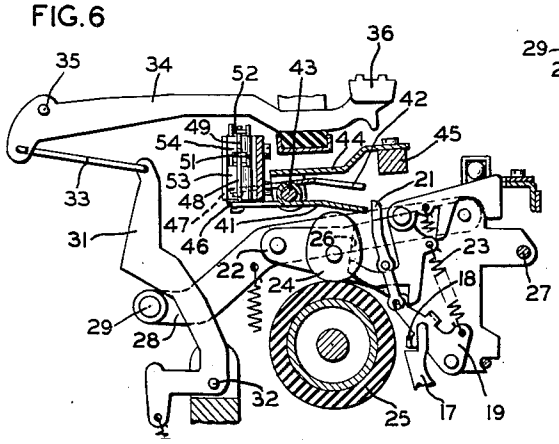


FIG. 6



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3,021,935

MECHANICAL INTERLOCK DEVICE

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Filed May 13, 1960, Ser. No. 29,091
6 Claims. (Cl. 197—17)

This invention relates generally to lockup devices for mechanically actuated machines such as a typewriter, bookkeeper or the like and, more particularly, to a selective interlock device associated with the control members of said apparatus for selectively disabling various combinations or groups of said control members at different stages of the machine's operation.

The invention is disclosed herein in the embodiment adapted for use with the keyboard controlled type bar power mechanism of an electric typewriter, of well known design, but it of course should be understood that the invention may be adapted for use with keyboard controlled machines other than typewriters or to any mechanical apparatus having actuating and control members equivalent to the power mechanism and key levers of a typewriter or the like.

The invention, in the embodiment herein disclosed, is intended to prevent the operator of a typewriter from making certain kinds of errors in typing operation wherein a machine is being utilized for producing formatted copy. For example, when the typewriter is utilized for preparing certain business forms a predetermined area of a line of typing might call for only numerical data, while another area of the line might call for only alphabetic data. Another area of the line might call for data which might be either numeric or alphabetic data. The device according to the invention includes a plurality of lockup bails, one for performing each separate lockup function. Accordingly, with the device set up for performing the interlock functions of the sort above mentioned by way of example, one of the bails would be associated with only the numeric keys and would be brought into operation to prevent printing by a numeric type bar in all of the line area wherein only alphabetic information data is called for. Another bail would be similarly associated with all the alphabetic keys to prevent printing by an alphabetic type bar in those areas of the line wherein only the numeric data is called for.

Associated with each of the lockup bails is an electromagnetic actuator for controlling the shifting of its associated bail from ineffective to effective setting. The actuators may, in turn, be controlled by any appropriate means which operates to complete energizing circuits to the actuators in accordance with the escapement position of the carriage of the machine. An important feature of the device resides in the fact that the lockup bails cooperate directly with a member of the type bar power mechanism which is self restoring independently of its associated key lever during the course of a cycle of operation of the power mechanism. This feature permits a lockup bail to be moved into an effective lockup position with respect to its associated group of power mechanisms even though one of the related key levers may at the time of said movement be held in its operative position.

Accordingly, an object of the invention is to enable the selective interlocking of a plurality of groups of mechanical members such as the key levers of a keyboard operated apparatus.

It is a further object of the invention to provide a mechanical interlock device for a plurality of groups of control members which is incapable of jamming and in which the effectiveness of the device is not dependent upon a control member being in its inactive position before the associated lockup means is actuated.

It is a further object to provide a mechanical interlock device having a minimum number of parts, which is durable and reliable in operation, and which is economical to manufacture.

Further objects of the invention, together with the features contributing thereto and advantages resulting therefrom, will be apparent from the following description when read in conjunction with the drawing wherein:

FIG. 1 is a sectional view from the left hand side of a portion of a typewriting apparatus showing the interlocking device of the present invention associated with the keyboard controlled type bar actuating power mechanism.

FIG. 2 is a plan view of the device.

FIG. 3 is a fragmentary view in rear elevation showing the electro-magnetic actuators of the device.

FIG. 4 is a sectional view of the power mechanism for one of the numeric type bars at the start of a cycle of the power mechanism and with the lockup bails controlled to enable the typing of only numeric information.

FIG. 5 is a view similar to FIG. 4 showing the position of the parts near the mid point of a cycle of the power mechanism.

FIG. 6 is a view similar to FIG. 4 of the parts at the completion of the cycle of the power mechanism but with the lockup bails now controlled to permit typing of only alphabetic data.

FIG. 1 illustrates the key action of the conventional model of an electric typewriter, the keyboard 10 of the machine having the individual key buttons 11 in the usual four bank arrangement, each key button being mounted on the upright arm portion of a related key lever 12.

To briefly describe the key action, each key lever is pivoted on a common pivot rod 14 and carries a stud 15 which engages a bell crank 16. The rear arm of bell crank 16 pivotally supports a pawl 17 which engages an ear 18 formed on a pivoted arm 19 which has a pin and slot connection with a finger like actuator 21. The arm 19 and actuator 21 are pivoted to a power arm member 22 and are urged to the position shown in FIG. 1 under tension of a spring 23. The power arm also supports an eccentric roller 24 which in its normal inactivated position, as shown in FIG. 1, is disengaged from the main power roll 25, the latter being driven in a clockwise direction and extending across the width of the machine to provide a source of driving power to each of the several key actions. Depression of one of the keys 11 and the associated key lever 12 operates through bell crank 15 to elevate pawl 17, rocking arm 19 clockwise against the tension of spring 23 and rocking the finger like actuator 21 counter-clockwise into engagement with a cut away shoulder 26 formed in the surface of the eccentric roller 24. This action causes the eccentric to rotate a sufficient distance so as to come into driving contact with the power roll 25 whereupon eccentric action through rotation of the roller 24 causes the power arm 22 to rock clockwise about its pivot 27. A rearwardly extending arm 28 secured to the power arm 22 carries a camming roller 29 bearing on a camming shoulder of a lever 31 pivoted at 32 and connected by pull rod 33 to the type lever 34 which in turn is pivoted at 35. Accordingly, it will be seen that depression of one of the keys 11 will trip or set in motion the associated power mechanism to cause a rapid rise and fall of the power arm extension 28 and result in a corresponding rocking of the type lever 34 whereupon the type head 36 strikes the platen 37 and returns to the position shown at the completion of a cycle of the typing action. It will be noted that all the power driven parts of the mechanism as described operate

through one full cycle of movement whereupon they restore to the position as shown. In particular, the finger like actuator 21 restores to its original position relative to the eccentric roller 24 early in the cycle under influence of spring 23 as the power arm 22 starts to rise. This restoration of the parts results even though the key 11, operated to trip off the power action, is held depressed, either inadvertently or otherwise, and is not released before completion of a cycle of the power driven mechanism.

It will of course be understood that the power driven mechanism also operates, through carriage escapement mechanism not shown herein but of a conventional type, to cause escapement of the carriage supporting the platen 37 so as to position the sheet or form being typed upon in preparation for the next cycle of typing action. Carriage escapement movement occurs immediately after the type lever 34 strikes the platen and during the later portion of the cycle when the type bar is returning to its restored position. It will be apparent that in view of the high operating speed of the power drive roll and consequent short cycle time for the power driven mechanism, a complete cycle of typing action, including carriage escapement, may easily be accomplished before the activated key button 11 has been fully released by the operator of the machine.

The selective lockup mechanism according to the present invention includes a pair of lockup bails 41, 42 extending substantially across the width of the machine. The rearward edge of each bail is bent around to form a bearing by which each bail is pivotally mounted on a pivot rod 43 which is supported in bent under ears formed on a support bracket 44 which in turn is suitably secured by screws or the like to a transverse bar 45 extending between and joined to the side frames of the machine. The forward edge of each of the lockup bails 41, 42 is formed with cut-out areas thus providing each bail with a series of blocking projections which coact with the actuator members 21 of the type bar power mechanisms for a selected group of keys. The lower lockup bail 41 is formed so as to provide blocking projections for the power mechanisms associated with the numeric keys of the machine, while the upper bail 42 is formed with blocking projections which cooperate with the power mechanisms associated with only the alphabetic keys of the machine. Since with the present embodiment of the invention it is not desired to lock up keys for printing punctuation or performing machine functions other than the typing of numeric or alphabetic data, neither one of the lockup bails is provided with projections for blocking the actuation of these punctuation or machine function control keys. The relation of these blocking projections of the lockup bails to the respective power mechanisms can best be seen in FIG. 2 wherein it will be noted that the projections of one of the bails align with the cutaway areas in the other bail thereby enabling either one of the bails to rock a limited extent about the pivot rod 43 into and out of the blocking position independently of one another.

A rearwardly extending arm 46, 47 formed on each bail 41, 42, respectively, is connected by link members 48, 49 respectively to the armatures 51, 52, respectively, of individual electro-magnetic actuators 53, 54 for each of said lockup bails 41, 42. Said actuators are suitably mounted on a bar 55 extending between the side frames of the machine. Each actuator, upon energization, operates to rock the associated lockup bail in a counterclockwise direction about pivot rod 43 so as to raise the blocking projections of the bail above and clear of the path of movement of the related power mechanism actuators 21. Deenergization of the actuators 53, 54, the armatures of which are spring biased, rocks the bails in a clockwise direction to a position wherein the blocking projections thereon drop directly behind and accordingly block the operative movement of the related power mechanism actuators 21.

FIGS. 4, 5 and 6 illustrate the operation of the selective lockup bails in relation to the operation of the type bar power mechanism at different periods of an operating cycle. In these figures it should be understood that the power mechanism is one associated with one of the numeric keys and that the action is initiated at a carriage escapement position wherein only numeric data is to be typed which position immediately precedes a carriage escapement position wherein only alphabetic data is to be typed. As seen in FIG. 4, the numeric key lockup bail 41 is in its raised ineffective position due to energization of the associated actuator 53 thus permitting the finger like actuator 21 to rotate the eccentric 24 a sufficient extent to initiate a cycle of the power mechanism. In FIG. 5, which shows the parts in position near the mid point of the cycle, the raising of the power arm 22 by action of the eccentric 24 on the drive roll 25 permits the finger like actuator 21 to restore to its upright original position relative to the bails under influence of spring 23, even though pawl 17 may still be held elevated by continued key depression, and this restoration of the actuator 21 occurs prior to the mid point of the operating cycle. At about the mid point of the operating cycle the type head 36 strikes the platen 37, and shortly thereafter carriage escapement takes place which in this instance, through suitable circuitry (not shown herein), interrupts the circuit to actuator 53 and completes a circuit to actuator 54 so as to thereby reverse the position of bails 41, 42 to their positions shown in FIG. 6, which illustrates the position of the parts of the completion of the power mechanism cycle. Accordingly, it will be seen that prior to completion of the operating cycle and as the carriage escapes to the next escapement position, in which only alphabetic data is to be typed, the bail 41 is rendered effective and the bail 42 is rocked to its ineffective position thereby preventing the typing of numeric data in said next carriage escapement position but permitting the typing of alphabetic data at said next carriage escapement position. In the event the numeric key which was operated to initiate the power mechanism cycle were to be held depressed after completion of the operating cycle, this would have no effect upon the bail 41 assuming its effective blocking position since the actuator 21 restores, as aforementioned, early in the operating cycle and regardless of the position of the related key lever. A repeat operation of the same power mechanism can not be effected until the related key lever is fully released permitting the pawl 17 to again engage under the ear 18 of the arm 19. Similarly, when the bails are rocked back into position to permit typing of only numeric data, i.e. as shown in FIG. 4, the timing of the operational movement would be the same, taking place during the cycle of typing the last item of alphabetic data prior to the cycle in which the first item of numeric data may be typed.

From the foregoing it will be apparent that the bails 41, 42 by cooperating directly with the actuators 21 which are self-restoring independently of the position of the related key levers, avoid the necessity for providing a yieldable feature for each separate blocking projection of the bails, which would be required if the bails were to coact directly with the key levers of the machine.

As an example of one application of the invention to a particular use, it may be assumed that the typewriter is to be used for preparing formatted material wherein the format calls for a line of typing in which the first ten letter space positions are to contain numeric data but not alphabetic data; wherein the next twenty letter space positions may contain alphabetic data but not numeric data; and wherein the remainder of the typing line may contain both alphabetic and numeric data. To carry out this format, the circuit closing means for actuators 53, 54 would be conditioned so as to complete a circuit to actuator 53 throughout the first ten carriage escapement positions

thereby actuating the lockup bail 41 to permit operation of the numeric keys throughout the first ten letter space positions of the line. The circuit closing means will also be conditioned to interrupt the circuit to actuator 53 and to complete a circuit to actuator 54 as the carriage escapes to the eleventh letter space position, maintaining this circuit condition throughout the next twenty letter space positions to permit operation of the alphabetic keys but not the numeric keys of the machine. The circuit closing means would then be further conditioned to complete a circuit to actuator 53 while still holding the circuit to actuator 54 as the carriage escapes to the thirty-first letter space position, maintaining this condition throughout the remainder of the typing line, thereby permitting the operation of either the numeric or alphabetic keys of the machine for the remainder of the typing line.

From the foregoing, it will be apparent that the instant invention, in an embodiment such as herein disclosed, will greatly reduce the possibility of operator error in carrying out a formatted typing operation by restricting the operator to the use of a particular group of keys at any given letter space position and locking up other keys of the keyboard corresponding to data of a nature which is not permitted at a particular letter space position by the format being followed. It will also be apparent that by associating the lockup means of the device directly with a self-restoring member of the respective type bar power mechanisms, the design of the device becomes simplified, requiring only parts that are economical to manufacture and highly efficient for accomplishing the desired function.

While there is shown and described what is considered to be a preferred embodiment of the invention, it is obvious that many changes in form could be made without departing from the spirit of the invention, and it is intended, therefore, that the invention be not limited to the exact form shown and described nor to anything less than the whole of the invention as hereinbefore set forth and hereinafter claimed.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a keyboard controlled machine of the class described having individual cyclically operable and colinearly arranged power mechanisms associated with individual keys of the keyboard, each of said mechanisms including an actuator movable under the influence of its associated key to an effective position for initiating a cycle of operation of said mechanism and self-restoring to its ineffective position during said cycle of operation, a plurality of lockup members disposed adjacent to said actuators and mounted for shifting into and out of blocking relation to said actuators, each of said members being formed to prevent the movement of only a selected group of said actuators to the effective cycle initiating position, and means for shifting said members selectively into and out of blocking relation to their respective actuators.

2. In a keyboard controlled machine of the class described having individual cyclically operable and linearly aligned power mechanisms associated with individual keys of the keyboard, each of said mechanisms including an actuator movable under the influence of its associated key to an effective position for initiating a cycle of operation of said mechanism and self-restoring to its ineffective position during said cycle of operation, a plurality of lockup members each having an edge disposed adjacent to said actuators, each of said members being mounted for shifting motion to bring its edge into and out of blocking relation to said actuators, the edge of each of said members being cut away to form a series of spaced blocking projections for preventing the movement of only a selected group of said actuators to the effective cycle initiating position, and means for shifting said members selectively into and out of blocking relation to their respective actuators.

3. In a keyboard controlled machine of the class described having individual cyclically operable and linearly aligned power mechanisms associated with individual keys of the keyboard, each of said mechanisms including an actuator movable under the influence of its associated key to an effective position for initiating a cycle of operation of said mechanism and self-restored to its ineffective position during said cycle of operation, a selective interlock mechanism for disabling said power mechanisms including a first bail member having an edge cut away to form blocking projections for the actuators related to the keys of a first category, a second bail member having an edge cut away to form blocking projections for the actuators related to keys of a second category, each of said bail members being mounted for shifting movement into and out of the operative path of motion of its related actuators, and means for shifting said members selectively into and out of blocking relation to their respective actuators.

4. The invention according to claim 3 wherein said first and second bail members are mounted for shifting movement about a common pivot member, the blocking projections along the edge of one of said bail members aligning circumferentially within the cutaway areas formed in the edge of the other bail member.

5. The invention according to claim 3 wherein the means for shifting said bail members includes separate electro-magnetic actuators mounted in fixed position relative to said bail members and each having its armature connected to a respective one of said bail members.

6. The invention according to claim 3 wherein said keyboard controlled machine comprises data recording equipment and wherein said first bail member disables only the actuators controlled by keys of one data category and said second bail member disables only actuators controlled by keys of another data category.

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