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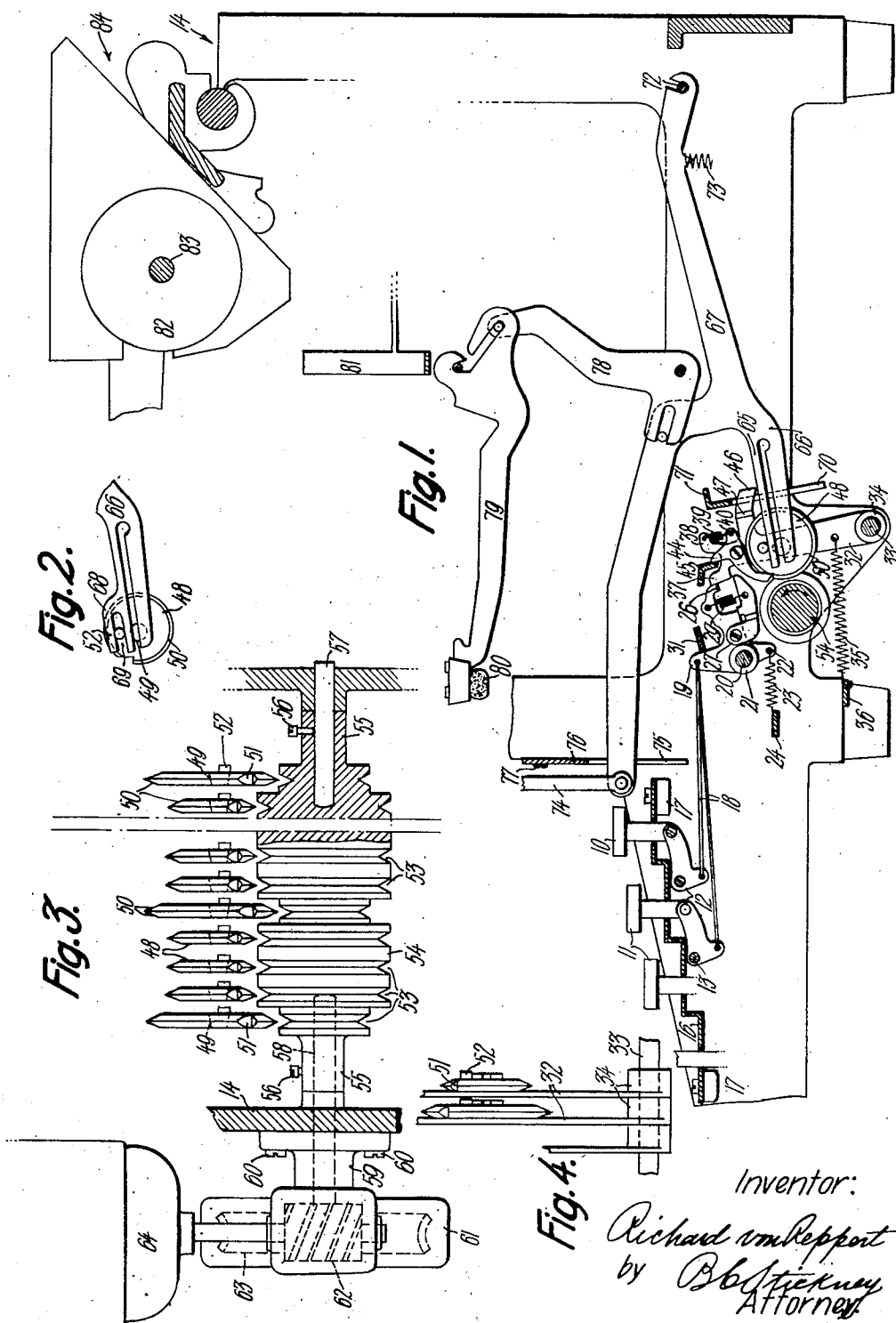
R. VON REPPERT

1,827,693

TYPEWRITING MACHINE

Filed Nov. 5, 1928

2 Sheets-Sheet 1



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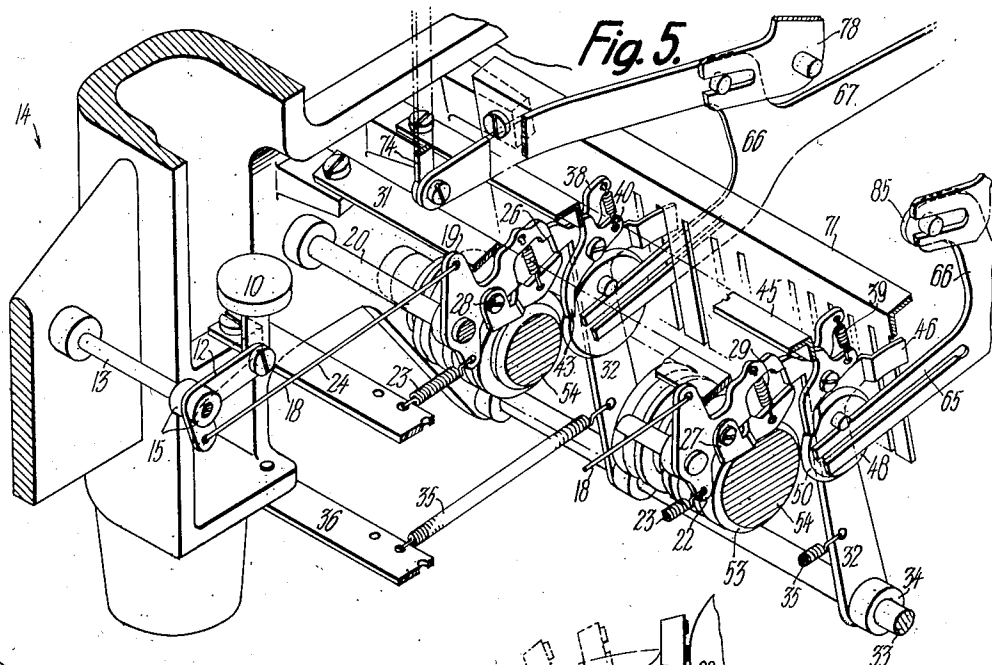
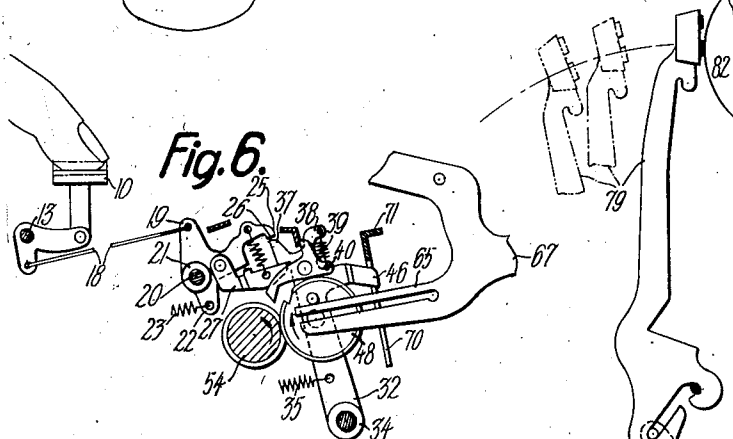
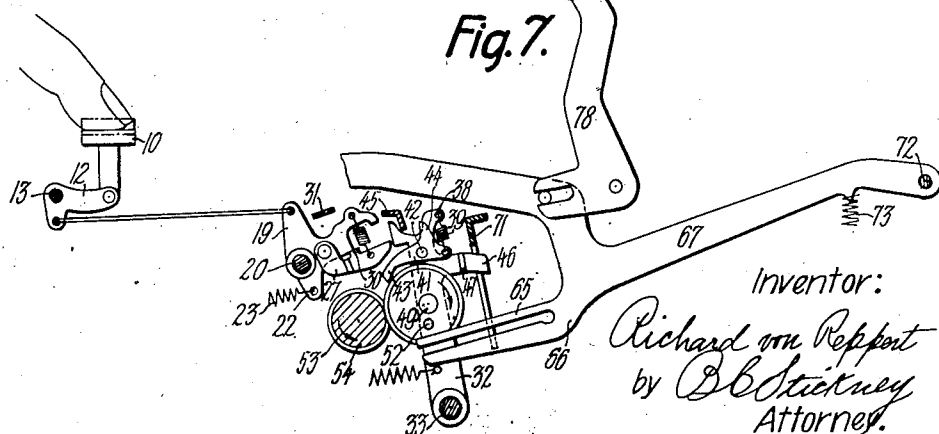
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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TYPEWRITING MACHINE

Application filed November 5, 1928. Serial No. 317,226.

Due to the great speed of power-driven typewriters, they are put to hard usage, and are subject to great shocks when printing. In a finger-powered machine, the shocks are readily absorbed by the light type-bars, which are easily moved. When, however, the heavier mass of an adding mechanism has to be moved, it has been found necessary to operate the numeral type-bars at a slower speed, to avoid damage.

This invention provides safe and different actuating speeds for two classes of type-bars in any one machine. This is efficiently accomplished through the use of simple members, readily made, and which do not break or get out of order under hard usage. Furthermore, these simple members can be quickly and cheaply assembled, and can be inexpensively installed as units in the machine. If necessary also, they can be readily replaced.

An important provision in this invention is the means used to gradually accelerate the motivation of the type-bars, to thereby avoid shocks. A second provision is the interposition of flexible members between the type-bars and the source of power, to absorb and minimize any shocks not so avoided. Another feature is a provision for slippage between the driving and driven members, should the latter become jammed, whereby no damage will result to said members.

One of the features of this invention is to enable the numeral-typing devices to be operated at a lower speed than the rapidly-operated character-typing devices. This is accomplished by having varied diameters of both the driving members and the driven members.

Another feature is that the numeral-typing levers may be connected to the driven members so that it will insure the positive return of said levers and prevent the driving member from actuating said lever a second time prior to its complete cycle. In this manner the numeral levers will be completely restored before being operated again.

Another feature resides in the construction of the typing levers which are so formed as to be resilient. The driven member acts on this

resilient piece of the lever, and should the type-bars become obstructed in their path towards the printing point, the lever, still being acted on by the driven member will, due to this resiliency, greatly lessen the shock, and the driving member and driven member, being so constructed as to have enough slippage, will permit the driving member to continue to rotate without damaging any parts of the type-action.

Still another feature lies in the simple, compact and durable construction of the present invention, the small parts of the mechanism being so constructed as to form a pair of units which can be assembled outside the machine. Each unit is mounted on a cross-shaft which may be readily placed in the machine.

The key releases an eccentrically-mounted pressure disk which frictionally couples the correlative adding and typing mechanisms with the propellent roller for operating the type-bars and dial-wheels, after which the pressure disk, through its eccentric rotation, is directly restored to normal reset position.

This invention embodies a power-driven roller having a series of annular friction grooves. The keys are employed to selectively connect this rotating roller with the type-bars and dial-wheels through associated main or typing levers, each main lever being in engagement with an eccentric-pin on each of a series of disks which are aligned with the grooves and are normally disengaged therefrom. The depression of any key will cause its associated disk to connect the main lever with the roller. Each disk is carried by a swingable lever which is pulled toward the roller by a spring, and is normally latched out of use.

When a key is depressed, the latch is released and the spring will swing the lever and force the disk into engagement with one of the friction grooves. As the lever is swung, it trips and rocks a detent pivoted near its free end. This dislodges the detent from a notch in the periphery of the disk, and permits the disk to be rotated through friction. As the disk revolves, the attached eccentric-pin is swung around and down, which de-

presses the engaged main lever. The latter thereupon sets the associated dial-wheels and actuates the connected type-bar to strike against a work-sheet on the platen. The operator therefore, in merely releasing a latch, is saved from the tiring effort of manually actuating a number of parts.

Upon completion of the typing and setting operations, the main lever and connections are automatically restored as the eccentric-pin is swung up by the revolving disk, which permits the main lever to rise through spring-tension. Concurrently the off-center axis of the revolving disk has swung its supporting lever away from the roller. This permits a spring-pressed stepping lever on the latch to intercept and hold back the supporting lever. The further slight rotation of the disk by the roller then severs interfriictional engagement, because the off-center mounting of the disk causes its periphery to recede from the grooves as it rotates. Disengagement having been established, the spring on the main lever raises the latter to normal position, which forces the eccentric-pin to rotate the disk still further. The detent will then enter the notch and hold the disk in proper disengaged relation with the roller, which prevents its inadvertent rotation thereby. As the finger is removed from the key, the latter is restored through spring-tension. Such tension also disengages the associated stepping lever from said supporting lever, and permits the latter to be spring-pulled into normal position against the latch. This completes a cycle of operations.

In actuating any type-bar of an ordinary typewriter, or the character type-bars of a combined typewriting and adding machine, the keys may be operated at a very high speed. This is because the inert members which are moved comprise a very light mass that is quickly accelerated and restored. When, however, the numeral-keys of a combined typing and adding machine are operated, a greater number of parts have to be actuated. These comprise a much heavier mass, which must be motivated without strain and which is accomplished by a slower operation of the keys, with a resultant slower acceleration of the type-bars. The type-bars must then be actuated closer to the platen to gain sufficient momentum to insure a staccato blow. Also the keys must be fully depressed to insure the setting of the dial-wheels, or errors will result in the totals.

A feature of this invention lies in the embodiment of novel power-devices, whereby the character-keys can be operated at a very high speed, while the numeral-keys can be operated at a speed, which, while slower, is still relatively fast. This is accomplished primarily through the use of undershot extensions on the main levers, which are slit to form tines. The latter are flexible, and,

when actuated by the eccentric-pins, will absorb the shocks, due to their sudden depression. Any tension set up in the tines will then be expended in the further movement of the main levers. The latter with their associated members will thus be started and more quickly accelerated without strain, and the keys which release the disks can therefore be operated faster.

The tension of the tines also prevents or minimizes slippage between the power-roller and the disks, when the latter are suddenly started. The disks therefore will always be completely revolved, and be returned to normal disengaged positions to properly register with the roller, and the necessity of manually resetting is thereby avoided. Furthermore, the shocks caused by the impact of the type-bars on the platen are transmitted retroactively, and, when a restraining tine is used, are cushioned by the tines. The disks therefore will not slip because their rotation is not arrested by said shocks. As a further result of retroactive shocks, the tension set up in the restraining tines will be expended to more quickly restore the type-bars. The use of heavy resetting springs is thereby avoided, and they do not have to be overcome when the type-bars are actuated. This also avoids strain.

Another feature of this invention lies in the use of a power-roller having different sets of friction grooves, each set having a different diameter. The disks which engage the grooves also constitute different sets, each of which likewise has a different diameter. In normal positions the axis of the grooves will be parallel to a line through the axes of all the disks. Each set of disks is so positioned that the set having the larger diameter will register with the grooves having the smaller diameter, and vice versa. Furthermore, the diametral ratios between the respective sets of grooves and disks are such that normally the circumferences of said grooves and disks will have the same diametral clearance. With the power-roller driven at constant speed, the different sets of disks will each have a different peripheral speed when engaged with and rotated thereby.

In the construction shown, the smaller disks are associated with the character-type bars, and when engaged with the roller will actuate the type-bars at a fast speed. This is due to the greater peripheral speed of the large grooves which revolves the disks at a much greater rate. Conversely, with the same R. P. M. of the roller, the larger disks will be rotated more slowly, and the driven members will have more time to function. The large disks therefore are associated with the numeral-type bars, which, as previously explained, must be operated slower. Separate power-rollers rotated at different speeds are therefore unnecessary. Furthermore,

such groove and disk ratios can be used as will best meet particular requirements. Such a ratio can be used for the numeral-type bars as will give the fastest operation consistent with safety. Due to the means employed, this safe operation will be at a faster speed than that found practicable in other inventions.

Another feature is a means to positively oscillate the main levers in both directions. This is shown as a modification which is particularly advantageous where a large number of dial-wheels have to be set, which means a heavier mass to be restored. As speed of restoration is a desideratum, and a heavy resetting spring a disadvantage, an additional tine is formed on the extension of each main lever. Between this tine and another, the eccentric-pins of the disks are interposed and constrained. When the disks are rotated, therefore, said pins will both depress and raise the main levers to respectively actuate and partly restore the type-bars, and the restoration is quicker.

Another advantage of constraining the eccentric-pins results in synchronizing the restoration of the main levers and disks. The disks are prevented from returning to normal positions ahead of the main levers; wherefore the keys cannot be effectively operated a second time, until the driven mechanism has completed its functions. Should the keys be released and returned to normal positions in the meantime, they might mislead an operator into believing an operative cycle had been completed; and the premature depression of another key might then jamb the type-bars. To avoid this, conventional locking devices may be used, which will prevent the depression of a second key until the first typing mechanism has reset.

Another feature is the provision of an all-metal power-roller of small diameter, and a frictionally-driven actuating element for each type-bar mechanism, representing a very small mass as compared to that of the type-bar mechanism, whereby the friction drive for said actuating elements permits slip-page under too great a suddenly-applied load.

A further feature lies in the use of eccentrically pivoted friction disks having eccentric-pins engaged with the main levers, whereby, when the disks are rotated the speed of the pins is gradually increased, and is used to start and gradually accelerate the depression of said levers to thereby avoid shocks to the motivated parts.

Other features and advantages will hereinafter appear.

In the accompanying drawings,

Figure 1 is a partial vertical transverse section through a typing and adding machine, which is drawn partly in outline, and shows this invention applied thereto.

Figure 2 is a detail view showing a modified form of main lever.

Figure 3 is a partial plan view having parts broken away, and shows the friction grooves and disks of different diameters, as aligned in normal positions.

Figure 4 is a detail front view of a large and of a small diameter disk, with their respective supporting levers.

Figure 5 is a partial perspective view of a typing and adding machine having this invention embodied therein, and showing the position of the parts before a key has been depressed.

Figure 6 is a detail view of the parts of this invention just after a numeral-key has been depressed.

Figure 7 is a detail view of the parts of this invention shown in Figure 6, and as positioned before the numeral-type bar strikes the platen.

Referring to the drawings, the numeral-keys 10 and the character-keys 11 have bell-cranks 12 which are fulcrumed on shafts 13 carried by the framework 14 of a typing and adding machine shown partly in outline. The bell-cranks 12 are positioned by spacers or hubs 15, and set-collars not shown. The keys are guided by holes in an apron 16 which is attached by screws to lugs 17 formed on said framework 14. The bell-cranks 12 are connected by links 18 to rockers 19 that are rotatable on a shaft 20 which is supported on the framework 14.

The rockers 19 are separated by spacers or hubs 21, and are laterally positioned by set-collars not shown. Said rockers have ears 22 connected to contractile springs 23 which are anchored to a cross-bar 24 that is supported by the framework 14. Said rockers also have seats 25 and faces 26. Stepping or tripping levers or pawls 27 are pivoted on screws or studs 28 carried by said rockers. The stepping levers are linked to the rockers by contractile springs 29, and are spaced therefrom by integral stops 30. Said stepping levers are formed with a rounded end, and are offset to align with said rockers. A cross-bar 31 is carried by said framework, and acts as a stop to hold said rockers in normal position.

Disk-levers 32 are rotatably mounted on a shaft 33 which is supported by the framework 14. The disk-levers have hubs or spacers 34, and are positioned by set-collars not shown. Said disk-levers are linked by contractile springs 35 to a cross-bar 36 that is supported on said framework. The disk-levers at their upper ends have opposed ears 37 and 38. The latter carry contractile springs 39 which are also connected to ears 40 that form part of pawls 41. The pawls are rotatable on studs or screws 42 which are attached to said disk-levers. The pawls are also formed with detents 43, and trips 44, which engage a stop-bar 45 that is mounted on said framework.

The disk-levers 32 have tongues 46 which are offset as at 47. Said levers also carry friction disks 48 which are rotatably mounted off-center on conical studs 49 that do not project beyond the face of said disks. The latter have perimeters formed with double bevels 50 which in front elevation appear as wedge-shaped. The disks have notches 51 which are engageable by the detents 43. The friction disks carry eccentric-pins or studs 52 which may be hardened to assure less wearing away. Some of the friction disks also will have greater diameters than others, for reasons previously mentioned. The disks of different diameters are so positioned as to accord with the locations of their associated keys.

The bevels 50 are engageable with and will have the same angle as annular friction grooves 53 which are formed on a power-roller 54. Some of the friction grooves also will have greater diameters than others. The power-roller has hubs 55 having set-screws 56 which attach it to stub-shafts 57 and 58. The stub-shaft 57 is journaled in a boss formed on the framework 14, and may have a bushing therein. The stub-shaft 58 may be journaled in an opposed boss on said framework, or may pass through a hole of larger diameter therein, and be journaled in a bracket 59 which is attached by screws 60 to said framework.

The bracket 59 forms part of a gear-case 61 having a worm 62 and a worm-gear 63. The worm-gear is attached to the stub-shaft 58, which it drives. The worm 62 is preferably driven by an electric motor 64 which is outlined in part and is also attached to said framework. Said electric motor is ordinarily controlled by a variable speed-device.

The eccentric pins 52 are normally in engagement with flexible tines or shock-absorbing fingers 65 formed on undershot extensions 66 of main levers 67. A modification had added tines 68 attached to, overlying, and partly separated from the tines 65 by slots 69. Said tines 65 and extensions 66 slide in slots 70 in a comb-plate 71 which is attached to the framework 14. This comb-plate not only guides said tines and extensions, but also guides the tongues 46 to keep the associated friction disks in alignment with the friction grooves.

Near their rear ends, the main levers 67 have fulcrums 72 and resetting springs 73, while at their forward ends are pivoted connections 74, which are connected to the totalizer, not shown. Said forward ends are guided in slots 75 in a comb-plate 76, which is attached to the framework 14 by screws 77. The main levers are connected to bell-cranks 78, which actuate type-bars 79, that normally lie on a rest 80. A universal bar 81 is actuated by the type-bars to operate a usual escapement-mechanism, not shown. A

platen 82 is carried on a shaft 83 which is journaled in a usual carriage 84.

Normally the parts will lie in the positions shown in Figure 1, and rotation of the power-roller 54 will have begun in the direction of the arrow shown thereon. When a key is depressed, the rocker 19 is actuated to slide the seat 25 up and away from abutment with the ear 37, which releases said ear, and permits the disk-lever 32 to be pulled toward the power-roller by the spring 35. During the forward swing of said lever, the overlapping rounded end of the stepping lever 27 will slide along the nether edge of said ear 37 to be restrained thereby against the tension of the spring 29.

Also during the forward swing of the disk-lever, the trip 44 will be arrested by the stop-bar 45 which will rock the pawl 41 against the tension of the spring 39. Such movement of the pawl swings the detent 43 out of the notch 51, and leaves the friction disk free to revolve. The final forward swing of the disk-lever engages the friction disk with its associated friction groove, and the disk will begin rotation. At this stage, the parts will lie as shown in Figure 6.

During the rotation of the friction disk, the disk-lever 32 is gradually swung rearwardly by reason of the off-center mounting of said disk, until said lever assumes the position shown in Figure 7. In such position, the trip 44 has swung clear of the stop-bar 45, and permitted the spring 39 to swing the detent 43 against the periphery of the friction disk. Such riding of the detent does not arrest the rotation of said disk, because its thin edge meets slight resistance. A strong enough spring can therefore be used to force the detent into the notch, and securely hold the disk from inadvertent rotation.

In Figure 7 also, the ear 37 is shown as having been swung clear of the stepping lever 27 by the rotation of the eccentrically mounted friction disk. This has permitted the spring 29 to raise the stepping lever from the position shown in Figure 6. The stepping lever will then prevent a re-engagement of the friction groove by said disk when the latter is rotated to the disengaged position shown in Figure 1. Such function of the stepping lever obtains, however, only so long as the key is depressed.

When the key is released, it is restored by the spring 23 which rotates the associated rocker. The latter will then assume the position shown in Figure 1. During such restoration, the stepping lever is swung down by the rocker, due to abutment of the latter with the stop 30. This slides the stepping lever out of engagement with the ear 37, and permits the spring-pulled ear to rest against the seat 25. Until the key is again depressed, the disk-lever will therefore hold

the friction disk from engagement with the friction groove.

Figure 6 also shows the position of the eccentric-pin 52, as rotation of the friction disk begins. As said pin is revolved, the tine 65 is motivated and depressed to the position shown in Figure 7. This swings the numeral-type bar to the approximate position shown, at which position said pin will have assumed a dead-center relation with the axis of the friction disk. The momentum of the type-bar thereafter causes it to strike against the platen, or a work-sheet thereon. To insure a clean-cut impression of the type, and also to avoid the over indentation or perforation of the work-sheet, the proper amount of momentum must be assured.

The requisite momentum is experimentally ascertained, and may be obtained through variation of the ratios between the diameters of the friction groove and the friction disk. The disk can thus be given a less or greater peripheral speed to decrease or increase the revolving speed of the actuating eccentric-pin. Another method is to maintain the friction disk at a fixed diameter, and to place the eccentric-pin nearer or farther from the axis of the disk. This also respectively decreases or increases the revolving speed of said pin. Both these methods will also decrease or increase the leverage of the eccentric-pin against the tine, and can therefore be selectively used to properly move a light or a heavy mass as required.

When the type-bar has completed its stroke, the eccentric-pin will have passed the aforementioned dead-center position, and the friction disk will be rotated to gradually decrease the distance between its axis and the point on its periphery which is engaged by the friction groove. The disk-lever will concurrently and gradually be pulled toward the power-roller by the spring 35, until stopped and held by the rocker or stepping lever. As soon as this occurs, the further rotation of the disk gradually causes it to recede and become frictionally disengaged from the groove. Such disengagement might very possibly occur as the notch 51 became registered with said groove. The disk therefore would not complete its revolution, and associated members would not be in proper registration for an ensuing operative cycle. The notch therefore would defeat its own purpose.

Proper reregistration is therefore mainly accomplished through the spring-pressed main lever, when its tine forces the engaged eccentric-pin to rotate the disk still further. This force, however, becomes nearly nil through loss of leverage, as the eccentric-pin approaches its normal and upper dead-center position. A slight momentum in the disk then helps it to restored position. As such momentum may not be great enough to final-

ly position the disk, still another means is employed. This lies in the cam-action which results as the detent enters the notch, and forces the disk to rotate. To facilitate the final movement of the disk, a slight clearance may also be maintained between the eccentric-pin and tine by raising the type-bar rest 80.

During a complete revolution of the friction disk, the attached eccentric-pin will describe an ellipse which results in imparting harmonic motion to the driven members. This is accomplished because the pin at first traverses a flattened curve, and exerts but little downward thrust on the tine. As the pin progresses, its travelled curve becomes sharper, and its downward speed increases. The increase of speed is gradual, and the main lever is therefore gradually accelerated. Acceleration is also increased as the pin advances toward the fulcrum of the main lever, to shorten the leverage thereof, and increase the speed of its downward swing.

When the eccentric-pin has crossed the point on the ellipse which is nearest the fulcrum of the main lever, its travel through the succeeding lower quadrant will swing it away from said fulcrum. This in effect lengthens the leverage, shortens the travel, and will eventually reduce the imparted speed of said lever. Such reduced speed is postponed, however, because the point of contact between said pin and said lever describes an outwardly flung spiral as the pin is revolved from inert to half-way positions. This in effect lengthens the leverage of the pin, and increases the speed of the contact-point. This results because the short radius of said point, as shown by Figure 6, is gradually increased to the longer radius shown by Figure 7.

It has been found that power-driven character-type bars should be actuated only about one-half of their travelled arc by power, and the remainder by momentum, to avoid perforation of the work-sheet. In this invention such power-actuation occurs in the first quadrant traversed by the eccentric-pin, which generates sufficient momentum in the type-bar to complete the stroke. Any diminished imparting speed due to changing leverage in the second quadrant will, therefore, not adversely affect the proper functioning of said type-bar. The associated main lever may even run free ahead of the eccentric-pin without adverse effects.

When the numeral-type bars are actuated, the lessened imparted speed in the second quadrant also has no adverse result, first because they will still be actuated through the early stages of the travel therein of the eccentric-pin, and second because their heavier associated mass has more momentum to move the driven members to complete their functions. Should said members slow up a trifle they would still function properly, because

the actuating eccentric-pin can be afforded such leverage as will positively complete the operation of the typing and adding mechanisms.

5 While the friction disks used are small, they still have a relatively large circumference. When power is applied to the latter, there will therefore be sufficient leverage to drive the disks and their associated mem-
10 bers. It follows then, that with ample leverage there will be little or no slippage when the disks are driven by the power-roller. With slippage avoided or minimized, a maximum of power is transmitted to the
15 disks, whereby less propelling power is required.

Because slippage is overcome through sufficient leverage, the sides of the grooves can be formed at an obtuse angle and still afford
20 sufficient friction or "pinching". This is advantageous over grooves having sides at a more acute angle, because in the latter an equal wearing away will necessitate the disks being forced much further into the grooves
25 before sufficient friction is obtained to drive the disks. In the latter instance more frequent adjustments or replacements of the disks must be made, which are vexatious and costly.

30 In this invention the friction disks are each mounted on separate disk levers, which are supported by a shaft. The weight of the disks, levers, and pawls is nearly all transmitted to this shaft, and therefore does not
35 become a drag on other engaged parts. For this reason light and simple releasing and relocking devices can be used, which are easily operated by the keys. A further result of separate support is to minimize vibration,
40 because both said levers and shaft can be of relatively heavy construction. The disks therefore can be kept in permanent alignment with the grooves, and when contacting therewith will register perfectly, and will not
45 be ground down and faceted.

In forming the notch in the peripheries of the friction disks, it is not to be construed that they are limited to the exact shape as
50 drawn. In practice they may be formed to have the intersecting surfaces more nearly equilateral, to afford a preferable camming angle and one that will readily release the detent. In forming the main levers, those
55 associated with the character-keys can have their forward extensions cut back to save weight, as shown by 85 in Figure 5.

While two ratios only will ordinarily be used for the respective sets of friction grooves and disks, it is possible to use an additional
60 and different ratio to advantage. The latter is adaptable to character-type bars that are used most often, such as *a*, *e*, *i*, etc., and especially *e*, because this letter often occurs double in the spelling of words. When it
65 so occurs, the finger is seldom removed from

the key, and the second depression thereof may follow the first so quickly as to leave insufficient time for the type-bar to be actuated and reset. The parts therefore will be strained and get out of register. To avoid
70 these disadvantages, the operating speeds of such type-bars can be increased by decreasing the diameters of their associated disks, and increasing the diameters of the engaged
75 grooves.

The timing of the pawls 44 against the bar 45 is such that the disks 48 will not be rotated by the roller 54 until clutching pressures between the disks and the rotating roller
80 have been fully established, to prevent any possibility of the notches 51 being rotated into pressing engagement with the rotating roller.

Variations may be resorted to within the scope of the invention, and portions of the
85 improvements may be used without others.

Having thus described my invention, I claim:

1. In a key-controlled power mechanism, the combination of a power-driven friction
90 roller, a lever having a spring tension, a key-mechanism operable to restrain the tensioned lever, a friction disk rotatably mounted on said lever and disconnected from the power-
95 roller, said key-mechanism having means to release the disk-lever to its spring to frictionally connect the disk with the power-roller to be rotated thereby, said disk having
100 pivotal characteristics that render the rotating disk operable to restore the lever to its normal position, said key-mechanism having other means operable to again restrain the tensioned lever independently of the key-
105 released means, and means engageable by the disk to operate such devices as may be connected with said means.

2. In a key-controlled power mechanism, the combination of a power-driven friction
110 roller, a lever having a spring tension, a key-mechanism operable to restrain the tensioned lever, a friction-disk rotatably mounted on said lever and disconnected from the power-
115 roller, said key-mechanism having means to release the disk-lever to its spring to frictionally connect the disk with the power-roller to be rotated thereby, said disk having piv-
120 otal characteristics that render the rotating disk operable to restore the lever to its normal position, said key-mechanism having other means operable to again restrain the tensioned lever independently of the key-
125 released means, means engageable by the disk to operate such devices as may be connected with said means, a detent on the disk-lever operable to lock the disk in normal position, and stationary means operable by the move-
130 ment of the detent to disengage the detent upon a full frictional connection of the disk with the power-roller and to relock it after the key-mechanism is released.

3. In a key-controlled power-mechanism, the combination of a power-driven friction member, a lever under spring-tension, a friction disk pivoted on the lever to be operatively connected with the power-driven member for rotation thereby, key-mechanism to control the release of the disk-lever, to thereby operatively connect the friction disk with the power-member, and means mounted upon the friction disk and operable by the rotation of said disk to interruptively transmit movement to such devices as may be connected thereto.

4. In a key-controlled power-mechanism, the combination of a power-driven friction member, a lever under spring tension, a friction disk pivoted on the lever to be operatively connected with the power-driven member for rotation thereby, key-mechanism to control the release of the disk-lever, to thereby operatively connect the friction disk with the power-member, means mounted upon the friction disk and operable by the rotation of said disk to interruptively transmit movement to such devices as may be connected thereto, a detent on the disk-lever operable to hold the disk against the rotary direction of the roller, and means operable to release the detent only upon a full frictional engagement of the disk with the power-member.

5. In a key-controlled power-mechanism, the combination of a power-driven friction roller, a friction disk connectible with the roller to be rotated thereby, a lever upon which the friction disk is eccentrically mounted, said lever having a roller-engaging spring tension for the friction disk, a key, a two-part lever-detenting means connected with the key, one detent operable by the key to release the lever to its spring to bring the disk into engagement with the roller, and the other detent self-operable to relock the lever after said lever has been restored by the rotation of the disk, and means concentrically mounted upon said eccentric disk to rotate therewith and drive such devices as may be engageable therewith.

6. In a machine of the character described, the combination of a series of keys, a series of latches, each latch linked to a key to be rocked thereby, a power-driven roller, a series of rockable levers, a spring for each rockable lever tensioned to rock the lever towards the roller and against the latch, a tripping pawl carried by the latch, a series of friction disks, one disk pivotally mounted upon each rockable lever for an eccentric rotation, a stud on each disk having a concentric rotation when rotated with the disk, a series of depressible levers, one lever engageable by each rotating stud, and a series of typing devices, one typing device connected with each depressible lever, the depression of a key withdrawing its latch from a rockable lever to release said lever to its spring tension to rock

the disk thereon into frictional engagement with the power-roller and thereby rotate its stud to depress the type-device operating lever, the eccentric movement of the disk forcing the disk-lever away from the roller to be caught by the latch-pawl until the latch is restored by the release of the key.

7. In a key-controlled power-mechanism, the combination of a universal, power-driven friction roller divided into sections of different diameters and having annular friction grooves in the sections, individual friction disks, one for each groove, to be operatively connected with the power-roller for rotation thereby, a key-mechanism to control the operative connection of the friction disks, and means connected to the disks to actuate such devices as may be connected thereto.

8. In a key-controlled power-mechanism, the combination of a universal, power-driven friction roller normally rotated at constant speed and divided into sections of different diameters and having annular grooves in the sections, individual friction disks of varying diameters to be operatively connected with the power-roller to obtain different rotating speeds of the various disks with the constant speed of the power-roller, key-mechanism to control the operative connection of the friction disks, and means connected to the disks to actuate such devices as may be connected thereto at varying speeds, in accordance with the rotating speed of the disks.

9. In a key-controlled power-mechanism for typewriting machines, the combination of typing devices, a rotating friction roller, levers tensioned by springs, one lever for each typing device, means to individually restrain each tensioned lever, a friction disk eccentrically mounted on each lever and disengaged from the roller, a key-mechanism therefrom, each key operable to remove a restraining means from a disk-lever and release said lever to its spring for frictional engagement with the roller and be rotated thereby, the eccentric rotation of the roller-rotated disk operable to restore the disk-lever to normal restrained position, and a stud upon the disk having a concentric rotation with each eccentric rotation of the disk and operable during the cycle of the disk to actuate a typing device.

10. In a key-controlled power-mechanism for typewriting machines, the combination of typing devices, a rotating friction roller, levers tensioned by springs, one lever for each typing device, means to individually restrain each tensioned lever, a friction disk eccentrically mounted on each lever and disengaged from the roller, a key-mechanism therefrom, each key operable to remove a restraining means from a disk-lever and release said lever to its spring for frictional en-

gagement with the roller and be rotated thereby, the eccentric rotation of the roller-rotated disk operable to restore the disk-lever to normal restrained position, and a stud upon the disk having a concentric rotation with each eccentric rotation of the disk and operable during the cycle of the disk to actuate a typing device, each typing device becoming operable on the return movement thereof to rotate the disk to its normal position independently of the roller.

11. Power-mechanism for typewriters and the like, comprising a series of keys, a series of main levers to be actuated to actuate the typing and adding devices connected thereto, flexible extensions on the main levers to be engaged by the actuating means for the main levers, a universal, power-driven friction roller, a series of friction disks to cooperate with the power-roller to be actuated thereby, a key-mechanism for each key to operatively connect a drive disk with the power-roller to induce a single rotation of the disk by a single operation of a key, and means connected to the drive disks to engage the flexible extension of the respective main lever and actuate the main lever and the devices connected thereto.

12. In a machine of the character described, the combination of a series of keys, a series of latches, each latch linked to a key to be rocked thereby, a power-driven roller, a series of rockable levers, a spring for each rockable lever tensioned to rock the lever towards the roller and against the latch, a tripping pawl carried by the latch, a series of friction disks, one disk pivotally mounted upon each rockable lever for eccentric rotation, a stud on each disk having a concentric rotation when rotated with the disk, a series of depressible levers, one lever engageable by each rotating stud, and a series of typing devices, one typing device connected with each depressible lever, the depression of a key withdrawing its latch from a rockable lever to release said lever to its spring tension to rock the disk thereon into frictional engagement with the power-roller and thereby rotate its stud, the eccentric movements of the rotating disks and the concentric rotation of the studs co-operating to transmit accelerated forces to depress the typing-device operating levers, the eccentric rotation of the disks forcing the key-depressed disk-levers away from the roller to be caught by the latch-pawls.

13. Power-mechanism for typewriters and the like, including a series of keys, a series of typing devices, a series of main levers to actuate the typing devices, flexible extensions on the main levers, a universal power-driven friction roller, a series of friction-controlling levers, each lever having a detent, a series of friction disks, one disk on each lever and each disk engageable with the

power-roller to be rotated thereby, means mounted on the friction disks to be rotated therewith to engage the flexible extensions of the main levers, and each disk operable by its rotation to restore its released lever, and means under control of the keys operable to selectively withdraw the detent from each lever to connect the friction disks with the power-roller for a frictional cycle thereof, said key-controlled means including a second detent engageable with the disk-restored lever.

14. Power-mechanism for typewriters and the like, comprising a constantly-rotating power-roller, a lever, a drive disk eccentrically mounted on the lever to be rotated by the power-roller when engaged therewith, a spring for the lever tending to move the disk into engagement with the power-roller, a detent on the lever to hold the disk in normal rotary position out of engagement with the power-roller, key mechanism to hold the lever in normal position and to release it upon operation of the key, to thereby engage the disk with the power-roller and simultaneously release the detent from the disk, and means connected to the key mechanism to re-engage the disk-lever after the disk has cycled and hold it in normal position.

15. Power-devices for typewriters and the like, including a series of typing devices, a series of main levers to actuate the typing devices, a constantly-rotating power-roller, a series of keys, a series of rockable levers, one for each main lever, eccentrically mounted friction disks mounted on the rockable levers to be operatively engageable with the power-roller for rotation, springs for the rockable levers tending to move the friction disks into operative connection with the power-roller, a detent on each rockable lever engageable with a friction disk to hold the disk against rotation by the roller, a stationary universal disengaging means for the lever-rocked detents, each key having means to release the respective disk-lever to its spring, to frictionally connect the disk thereon with the power-roller and simultaneously release the disk from its detent, means also connected to the keys operable to re-engage the disk-lever after a single cycle of the disk, and means rotatable with the friction disk to actuate the respective main lever and such devices that may be connected thereto.

16. In a machine of the character described, the combination of a series of keys, a series of latches, each latch linked to a key to be rocked thereby, a power-driven roller, a series of rockable levers, a spring for each rockable lever tensioned to rock the lever towards the roller and against the latch, a tripping pawl carried by the latch, a series of friction disks, one disk pivotally mounted upon each rockable lever for an eccentric rotation, a stud on each disk having a concentric

tric rotation when rotated with the disk, a series of depressible levers, each lever having a shock-absorbing section to be engaged by a rotating stud, and a series of typing devices, one typing device connected with each depressible lever, the depression of a key rocking its latch to release the disk-lever to its spring-tension to force the disk thereon into frictional engagement with the roller to be rotated thereby to rotate the stud thereon to engage the shock-absorbing section of the typing-device driving lever to resiliently drive said typing device to print, the eccentric movement of the rotating disks forcing the disk-levers away from the roller until latched by the key-rocked latch-pawls.

17. In a machine of the character described, the combination of character-typing devices, numeral-typing devices, a power-roller to rotate at constant speed, character-keys and numeral-keys, and means under control of the keys to connect the typing devices with the power-roller and transmit movement of higher speed to the character-typing devices than to the numeral-typing devices.

18. In a machine of the character described, power-mechanism comprising a power-roller rotating at constant speed, a series of main levers, certain of which having means to actuate the typing devices and certain of which having means to actuate the typing and adding devices, and means to transmit movement of different speed from the power-roller to the two kinds of main levers, so that those that actuate the typing devices are actuated at a higher speed than those that actuate the typing and adding devices, while the power-roller rotates at constant speed.

19. A machine of the character described, comprising a series of main levers, certain of which actuate typing devices and certain of which actuate typing and adding devices, a constantly-rotating power-roller rotating at constant speed and longitudinally sub-divided into sections of different diameters with friction grooves in the sections, character-keys and numeral-keys, actuating means for the main levers connected to the character-typing devices, under control of the character-keys, to be connected with the sections of larger diameter of the power-roller, and actuating means for the main levers connected to the numeral-typing devices, under control of the numeral-keys, to be connected with the sections of smaller diameter of the power-roller, to thereby actuate the main levers at different speeds while the power-roller rotates at constant speed.

20. In a machine of the character described, the combination of typing mechanisms, a normally-rotating friction roller, a friction disk for each typing mechanism, a disk-supporting lever normally holding each

disk out of contact with said friction-roller, but rockable to bring its disk into frictional engagement with the roller, keys, means under control of the keys to control said levers and hold the disks in contact with the roller for the major portion of one revolution of each disk, a lock-notch provided in that section of each disk that does not frictionally engage with the friction roller, a detent on each lever and operable to engage a lock-notch when the disk is in normal position, means operable by the rocking of said levers to disengage the detents when the disks move into full frictional engagement with the friction roller, and means rotatable with the disks operable to actuate the typing mechanisms.

21. In a machine of the character described, the combination of a series of keys, a series of latches, each latch linked to a key to be rocked thereby, a power-driven roller, a series of rockable levers, a spring for each rockable lever tensioned to rock the lever towards the roller and against the latch, a tripping pawl carried by the latch, a spring between each pawl and its latch whereby the pawl may have an independent spring-pressed latching engagement with the rockable lever, a series of friction disks, one disk pivotally mounted upon each rockable lever for an eccentric rotation, a stud on each disk positioned to have a concentric rotation by the eccentric rotation of the disk, a series of depressible levers, one lever engageable by each rotating stud, and a series of typing devices, one device connected to each depressible lever, the depression of a key rocking its latch to release the disk-lever to the tension of its spring to bring the disk into frictional engagement with the roller to be rotated thereby, to rotate its stud to depress the typing-device driving lever to type, the eccentric rotation of the disk forcing the disk-lever away from the roller to be caught by the latch-pawl and held until the latch is rocked by the release of the key to displace the pawl in holding the disk-lever at its normal inoperative position.

22. In a machine of the character described, the combination of a series of keys, a series of latches, each latch linked to a key to be rocked thereby, a power-driven roller, a series of rockable levers, a spring for each rockable lever tensioned to rock the lever towards the roller and against the latch, a tripping pawl carried by the latch, a series of friction disks, one disk pivotally mounted upon each rockable lever for an eccentric rotation, a peripheral notch formed in each disk, a pawl mounted on each disk-lever and engageable with the notch in its disk to resist rotation of said disk in a roller-driven direction, a tripping bar engageable by all the pawls to withdraw the pawls from their notches, a stud on each disk, a series of levers, each lever to be engaged by a stud and de-

pressed, and a series of typing devices, one device connected with each depressible lever, the depression of a key rocking a latch to release the disk-lever to its spring tension to force the disk into frictional engagement with the roller, the rocking of the disk-lever swinging the disk-holding pawl into contact with the tripping bar to remove the pawl from the notch in the disk and free the disk for a friction-driven rotation by the roller, the rotating stud depressing the typing-device driving lever to type, the rotating disk operating to cam the disk-lever away from the roller to be caught by the tripping pawl until the key is released, and return movement of the typing-device lever engaging the stud of the disk to rotate the disk and rotate the notch therein into re-engagement with the disk-holding pawl.

23. In a machine of the character described, the combination of a series of keys, a series of latches, each latch linked to a key to be rocked thereby, a power-driven roller, a series of rockable levers, a spring for each rockable lever tensioned to rock the lever towards the roller and against the latch, a tripping pawl carried by the latch, a series of friction disks, one disk pivotally mounted upon each rockable lever for an eccentric rotation, a notch cut in each disk, a detent-pawl mounted upon each disk-lever and engageable with the notch of the disk thereon, a tripping bar engageable by all the pawls when rocked by the disk-lever to release their disks, a stud on each disk, a series of depressible levers, one lever for each disk and each lever having shock-absorbing fingers to be engaged by the stud of the disk, and a series of typing devices, one typing device connected with each depressible lever, the depression of a key releasing the disk-lever to engage the roller, the detent-pawl releasing the disk to be frictionally rotated by the roller, the disk-driven stud engaging the fingers to absorb the shock therefrom in initially depressing the typing-device lever, the eccentrically-rotating disk operating as a cam to restore the disk-lever to the control of its latches and impart an elliptical travel for the rotating stud along the extension of the typing-device driving lever, to provide an accelerating velocity for the typing device to type.

24. In a machine of the character described, the combination of a series of keys, a series of latches, each latch linked to a key to be rocked thereby, a power-driven roller, a series of rockable levers, a spring for each rockable lever tensioned to rock the lever towards the roller and against the latch, a tripping pawl carried by the latch, a series of friction disks, one disk pivotally mounted upon each rockable lever for an eccentric rotation, a notch cut in each disk, a detent-pawl mounted upon each disk-lever and engage-

able with the notch of the disk thereon, a tripping bar engageable by all the pawls when rocked by the disk-lever to release their disks, a stud on each disk, a series of depressible levers, one lever for each disk and each lever having shock-absorbing fingers to be engaged by the stud of the disk, and a series of typing devices, one typing device connected with each depressible lever, the depression of a key releasing the disk-lever to engage the roller, the detent-pawl releasing the disk to be frictionally rotated by the roller, the disk-driven stud engaging the fingers to absorb the shock therefrom in initially depressing the typing-device lever, the eccentrically-rotating disk operating as a cam to restore the disk-lever to the control of its latches and impart an elliptical travel for the rotating stud along the extension of the typing-device-driving lever, to provide an accelerating velocity for the typing device to type, the roller-driven disk, in camming its lever to be relatched, also camming itself out of frictional engagement with the roller, and the return of the stud-driven lever-extension idly rotating the stud and disk to a normal position, the disk to be re-engaged by its detent-pawl.

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