May 24, 1960 H. KUNTZEL 2,937,736

COMBINED CARRIAGE AND TYPE LEVER DRIVE

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FIG. 1

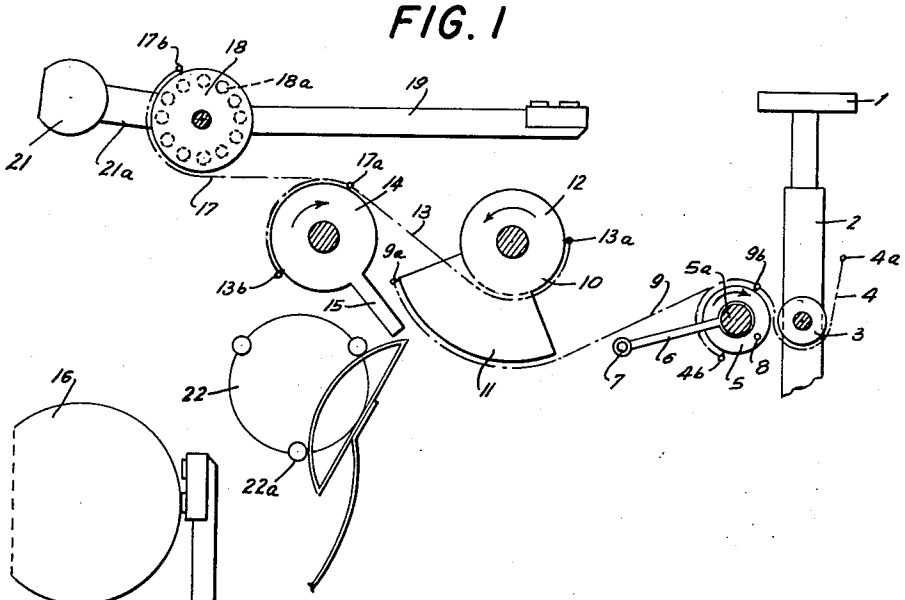


FIG. 2

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FIG. 3

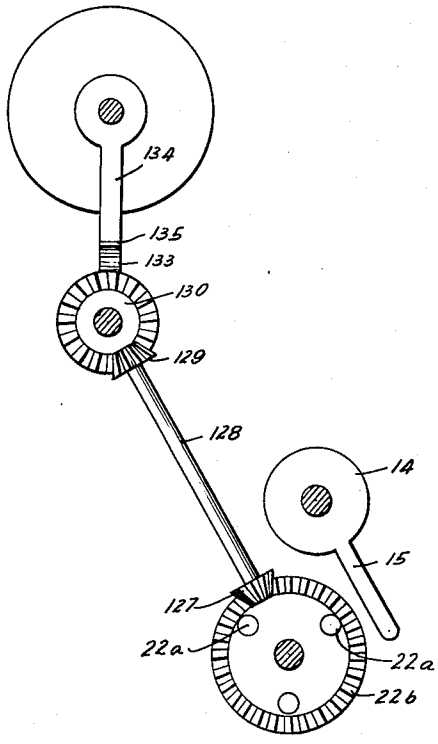
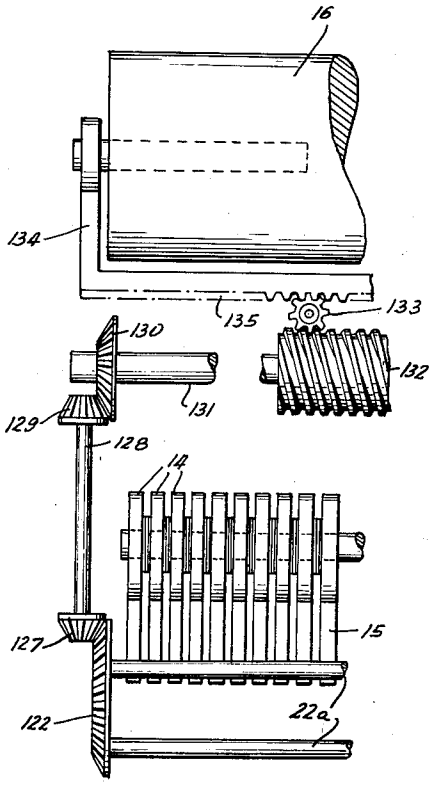


FIG. 4



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FIG. 5

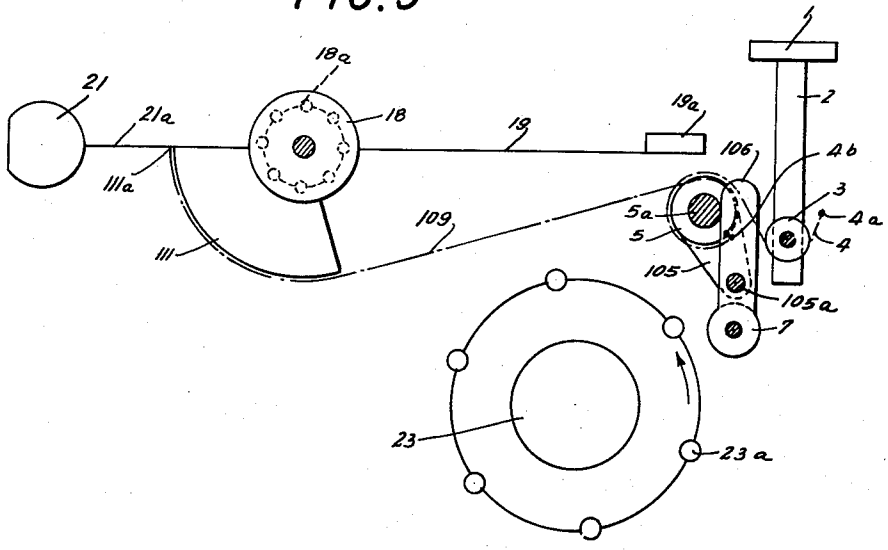
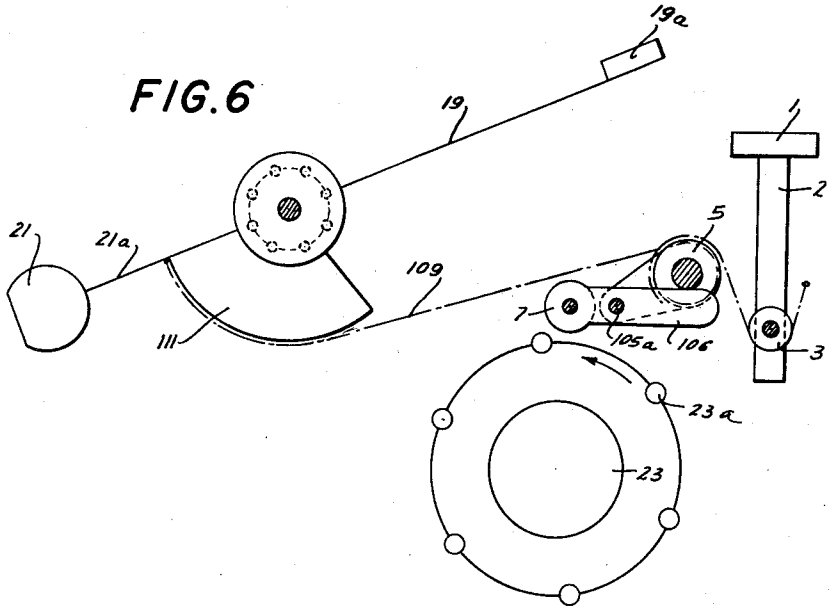


FIG. 6



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COMBINED CARRIAGE AND TYPE LEVER DRIVE

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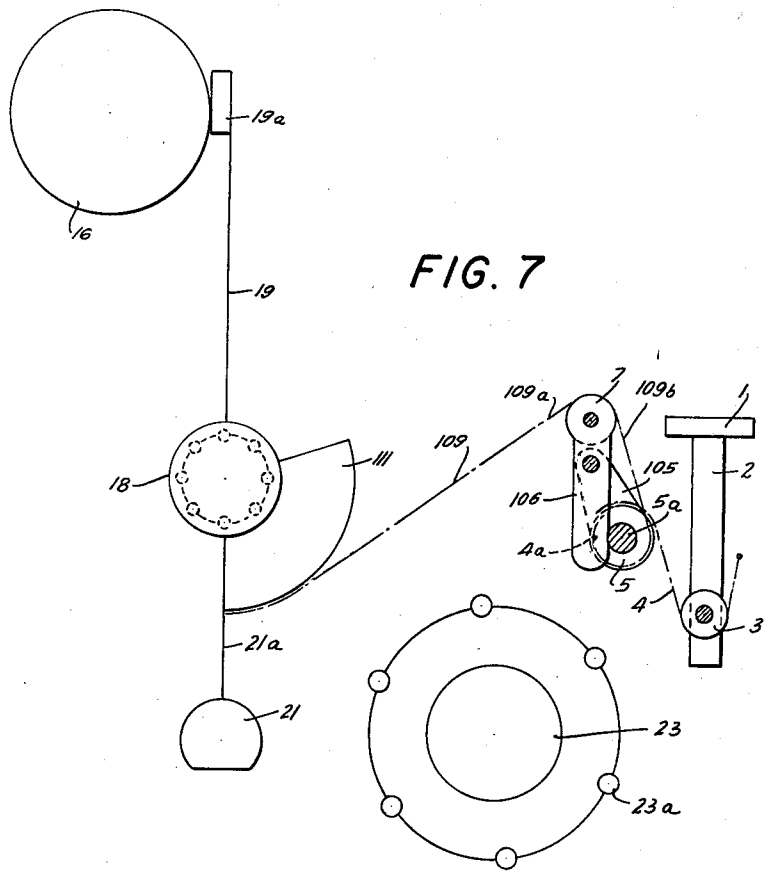


FIG. 7

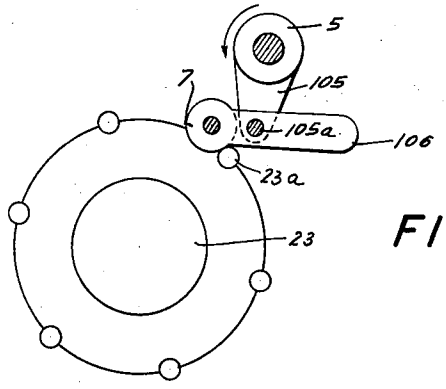


FIG. 8

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2,937,736

COMBINED CARRIAGE AND TYPE LEVER DRIVE

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Filed May 23, 1957, Ser. No. 661,137

23 Claims. (Cl. 197—22)

The present application is a continuation-in-part application of my copending application Serial No. 532,988, entitled "Typewriter," filed on September 7, 1955, now abandoned.

The present invention relates to a combined carriage and type lever drive for a typewriter or similar business machine, and more particularly to a combined carriage and type lever drive in which an actuating unit is provided for each type lever and operating key, each actuating unit simultaneously effecting actuation of the associated type lever and transporting of the platen supporting carriage.

In the known typewriter constructions, the type levers are actuated from the associated keys through a lever system so that a great striking force is required for operating the keys. The carriage transport of the known typewriters is effected by spring means which urge the carriage in one direction, and by an escapement mechanism which is operated by the keys. Consequently the friction produced by the spring means on the escapement mechanism must be overcome by the striking force acting on the keys.

The force required for key actuation in key operated business machines according to the prior art is about 400 grams. Moreover, the keys have to be depressed such a distance that the top face of the keys is located below the next lower row of keys. Thereby the fingers of the operator are forced to assume a certain position which causes strain of the finger muscles and pressure on the nerve located at the finger tips. Consequently, the operation of the known business machines causes fatigue of the operators.

It is one object of the present invention to overcome the disadvantages of the keyboard operated business machines according to the prior art, and to provide a keyboard operated business machine which can be operated without causing fatigue of the operator.

It is another object of the present invention to provide a combined carriage and type lever drive for a keyboard operated machine in which actuation of a key simultaneously effects operation of a type lever and transporting of the carriage which supports the platen.

It is another object of the present invention to provide a combined carriage and type lever drive in which the operation of the type levers and the transport of the carriage and platen means is effected by the keys through transmission means comprising a set of interconnected turnable means.

It is another object of the present invention to provide a combined carriage and type lever drive for a keyboard operated business machine, in which the keys have to be depressed a shorter distance than in a standard construction, while producing a great striking force of the type levers and a transport of the carriage.

It is another object of the present invention to provide in a combined carriage and type lever drive, a key-operated actuating means which performs the function

of accelerating the type lever in addition to the function of controlling the transport of the carriage.

It is another object of the present invention to provide a combined carriage and type lever drive by which during the first part of the movement of a key to an operative position, the carriage of the machine is transported, whereas during the second part of the movement of the key, the type lever is further accelerated to have a high impact force when striking the platen or a sheet thereof.

It is another object of the present invention to provide a combined carriage and type lever drive in which the carriage is transported by the force acting on the keys so that spring-loading of the carriage and an escapement mechanism are unnecessary.

With these objects in view, the present invention mainly consists in a combined carriage and type lever drive which comprises, in combination, movable carriage and platen means, type lever means movable to and from a printing position, a key means movable to and from an actuated position, first transmission means connecting the key means with the type lever means so that the type lever means moves to and from the printing position when the key means moves to and from the actuated position, and second transmission means for transporting the carriage and platen means. The first transmission means includes a shiftable means which moves in opposite directions during movement of the key means, and actuates the second transmission means so that the carriage and platen means is transported by operation of the key means.

According to a preferred embodiment of the present invention, the shiftable means effect the carriage transport during the first part of the movement of the key means to actuated position. In a preferred embodiment of the present invention, the first transmission means includes pulley means, rope means connected to the type lever means and to the key means and being guided on the pulley means so that the pulley means turns upon key actuation. An actuating means is connected to the pulley means and operates the transmission means for transporting the carriage and platen means during the movement of the key means to actuated position. Each key means, and each type lever means is associated with an actuating unit which includes a pulley, a rope, and an actuating means.

According to the preferred embodiment of the present invention, the actuating means includes an actuating lever carrying on the free end thereof a roller which during the first part of the movement of the key means operates the transmission means to effect carriage movement, and during the second part of the movement of the respective key means engages the rope passing over the pulley to accelerate the movement of the type lever means.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a schematic side view of one embodiment of the present invention;

Fig. 2 is a schematic side view showing the elements of Fig. 1 in another operational position;

Fig. 3 is a side view illustrating a detail of Fig. 2;

Fig. 4 is a front view of the detail shown in Fig. 3;

Fig. 5 is a schematic side view of a preferred embodiment of the present invention, with certain parts omitted for the sake of clarity;

Fig. 6 is a schematic side view of the embodiment

shown in Fig. 5 illustrating another operational position of the mechanism;

Fig. 7 is a schematic side view of the embodiment shown in Figs. 5 and 6 showing a further operational position of the mechanism; and

Fig. 8 is a fragmentary side view showing a detail of the embodiment shown in Figs. 5, 6, and 7 in a further operational position.

Referring now to the drawings, and more particularly to Figs. 1 and 2, a key 1 is mounted on a key rod 2 which is guided in the frame of the machine for vertical movement. A roller or pulley 3 is mounted on the key rod 2 for turning movement. Another pulley 5 is mounted for turning movement on a shaft 5*a* in the same plane as the pulley 3. An actuating means 6 is turnably mounted on shaft 5*a* adjacent pulley 5 and carries at the free end thereof a roller 7. A turnable member 12 is arranged in the same plane and has an arcuate peripheral portion 11. A rope 4 is secured to the frame of the machine by the pin 4*a*, and passes over the periphery of pulley 3 and over part of the periphery of pulley 5. The end of rope 4 is secured at 4*b* to the periphery of pulley 5. Another rope 9 is secured at 9*b* to the periphery of pulley 5 and at 9*a* to the arcuate peripheral portion of the turnable member 12. Member 12 has a peripheral portion 10 having a smaller diameter than the portion 11, and another rope 13 is secured at 13*a* to the portion 12. The other end of the rope 13 is secured at 13*b* to the periphery of a turnable member 14 which has a projecting arm 15. Another rope 17 is secured at 17*a* to the periphery of the turnable member 14 and secured at 17*b* to the periphery of a disk 18. Disk 18 is part of a type lever means which includes the type lever 19 and an arm 21*a* carrying a counterbalancing weight 21. Ball bearing means 18*a* are provided for supporting the type lever means in the frame of the machine. When the key 1 is depressed to an actuated position, the rope 4 turns the pulley 8, the rope 9 turns the turnable member 12, and the rope 13 turns member 14 and the type lever means 19. The speed of the turning movement of the type lever means 19 depends on the ratios between the radii of the turnable members 3, 8, 12, 14 and 18. During the second part of the downward movement of the key 1 to actuated position, a pin 8 on the pulley 5 engages the actuating arm 6 so that this arm turns with pulley 5. During turning movement of the arm 6, the roller 7 engages the rope 9, as shown in Fig. 2, whereby the ratio of the transmission is gradually varied, and the type lever means 19 is accelerated to a greater speed. Consequently the arm 19 of the type lever means moves at a great speed when engaging the platen 16.

The actuating arm 15 of the turnable member 14 cooperates with a stepwise turnable member 22. Member 22 includes two end plates preferably constructed as bevel gears 122 as shown in Fig. 4, and a set of parallel bars 22*a* which are uniformly spaced about the turning axis of the turnable member 22. When the key 1 is depressed, the actuating arm 15 engages one of the bars 22*a* and turns the member 22 one step. Such shifting of member 22 is carried out before the roller 7 engages the rope 9 and during the first part of the movement of the key 1 to actuated position.

The turnable member 22 is an element of the transmission means which is connected to the carriage and platen means of the machine. The transmission is shown in greater detail in Figs. 3 and 4. The bevel gear 122 meshes with a smaller bevel gear 127 which is supported on a turnable shaft 128. On the other end of shaft 128, a bevel gear 129 is mounted which meshes with a further bevel gear 130 secured to a shaft 131. Shaft 131 carries a worm gear 132 meshing with a worm wheel 133 which drives the rack bar 135. Rack bar 135 is part of the carriage 134 which supports the platen 16. Consequently whenever the turnable member 22 is turned one step by the actuating arm 15, the carriage and the platen 16 are transported a distance corresponding to the spacing between two letters. A resilient detent 136 engages the bars 22*a* and arrests the turnable member 22 and the carriage 134 between steps.

As shown in Fig. 4, a set of actuating means 14, 15 is provided which cooperates with associated keys 1 and type levers 19. Since the bars 22*a* extend across all actuating arms 15, operation of any key 1 will result in shifting of the turnable member 22, and in transport of the carriage and platen means 134, 16.

Referring now to the preferred embodiment illustrated in Figs. 5–8, the combined carriage and type lever drive shown in these figures is considerably simplified as compared with the previously described embodiment, inasmuch as the actuating means by which the type lever means is accelerated during the second part of its movement, also effects transport of the carriage during the first part of the movement of the keys and of the type lever.

Each operating key and each type lever is associated with an actuating unit so that a row of actuating units is arranged parallel to the platen and extends along the associated row of keys. A row of keys 1 is provided which has key rods 2 carrying pulleys 3. A rope 4 passes over pulley 3 and is secured at 4*a* to the frame of the machine, and at 4*b* to the pulley 5 which is turnable about the shaft 5*a* which is mounted in the frame of the machine. Another rope 109, which may be an extension of the rope 4 is secured to the pulley 5 at 4*b*, and secured to the arcuate segment 111 at 111*a*. The segment 111 is fixedly connected to the type lever means and to the disk 18 of the type lever means which is mounted in the machine frame by means of an antifriction bearing 18*a*. The type lever means includes a lever arm 19 carrying the type 19*a*, and a lever arm 21*a* carrying the counterbalancing weight 21. When the key 1 is depressed to an actuated position, the pulley 5 will turn and effect through the rope 109 and the segment 111 turning of the type lever means. The diameter of the pulley 5 is preferably one-fourth of the diameter of the segment 111.

An arm 105 is fixedly connected to the pulley 5 for turning movement therewith, and turnably supports an actuating lever 106 on the pin 105*a*. One end of the actuating lever 106 turnably supports a roller 7, whereas the other end of lever 106 engages the shaft 5*a* of the pulley 5 in the initial position shown in Fig. 5. Actuating lever 106 tends to assume this position under the action of the force of gravity acting on the heavier roller 7. It will be noted that the shaft 5*a* acts as a stop means limiting turning movement of the actuating lever 106 in a direction which is opposite to the direction of turning movement of the pulley 5 during movement of the key 1 to actuated position.

Similar to the previously described embodiment, the carriage and platen means of the machine is transported under the control of the operating key 1. A turnable member 23 is arranged adjacent the row of actuating units 5, 105, 106 and includes a set of six bars 23*a* which are uniformly spaced about the turning axis of the turnable member 23. The turnable member 23 corresponds to the turnable member 22 described with reference to Figs. 1–4, and is connected by transmission means including gears and worm gear means to the carriage 134 of the machine in arrangement of the type disclosed with reference to Figs. 3 and 4. In other words, the turnable member 23 is an element of transmisison means which are connected to the carriage 134 for transporting the carriage and platen means. Whenever the stepwise turnable member is turned one step which is one-sixth of one revolution in the embodiment illustrated in Figs. 5–8, and one-third of a revolution in the embodiment illustrated in Figs. 1–4, the carriage will be transported a distance corresponding to the spacing between two letters or characters printed by the type lever means 19.

In the embodiment illustrated in Figs. 5–8, the carriage is transported a distance of 2.6 mm. Assuming the turnable member **23** to have a radius of 25 mm., the chord between two bars **23***a* is also 25 mm. The arc between two adjacent bars **23***a* is approximately 26 mm. Consequently, the transmission ratio between the carirage and the turnable member **23** is one to ten.

When an operating key **1** is depressed, the pulley **5** turns in clockwise direction under the action of the rope **4**. The actuating means **105**, **106** turns with pulley **5** until the roller **7** engages one of the bars **23***a*. It will be understood that similar to the arrangement illustrated in Fig. 4, all actuating levers **106** with the associated rollers **7** are located in a row extending along the bars **23***a* so that regardless of which key **1** is actuated, the respective bar **23***a* is engaged by the roller **7** of an actuating means. Such engagement takes place during the first part of the movement of the respective selected key **1**, and the bar **23***a* is shifted through an angle of 60° so that the next following bar assumes a position corresponding to the position of the bar engaged by the roller **7**.

Fig. 6 illustrates a position in which the roller **7** of the actuating lever has just shifted the turnable member **23** through 60°. During the engagement of the actuating lever **106** with the roller **7** with a bar **23***a*, the pressure on roller **7** tends to turn the actuating lever **106** in counterclockwise direction so that lever **106** engages the shaft **5***a* and is rigidly connected for turning movement to the pulley **5**.

When the respective actuating unit has assumed the position shown in Fig. 6, the carriage has been transported a distance corresponding to the distance between two letters, for example 2.6 mm., and the platen **16** is in a position ready to receive the imprint of the type **19***a*. However, as clearly shown in Fig. 6 the type lever means **19** has only turned through the first part of its turning movement at this time.

It will be noted that the transmission ratio between the pulley **5** and the type lever means **19** is one to four, whereas the transmission ratio between the stepwise turnable member **23** and the carriage is ten to one, and that the carriage transport starts immediately upon depression of the key **1** and is completed during the first part of the movement of the type lever means **19** to printing position. Since the type lever means **19** is counterbalanced and is supported by anti-friction bearings, only very little force is required for turning the type lever means, and the force applied to the operating key **1** during the first part of the movement of key **1** is applied mainly for transporting the carriage. Due to the great transmission ratio between the turnable member **23** and the carriage, only little force is required for operation of the key. While in the known carriage transporting arrangements the release of the escapement mechanism is prepared during the last part of the movement of the type lever to printing position, and the carriage is shifted during the first part of the return movement of the type lever means, in accordance with the present invention the carriage transport is carried out during the first part of the actuating movement of the key, whereas at the end of the stroke of the type lever means **19** no additional force is required for obtaining a carriage transport. Consequently, during the second part of the stroke of the type lever means, all the force of the type lever means is used for the printing impact, and not for carriage transport.

In accordance with the present invention the type lever means **19** is further accelerated during the second part of its movement. The actuating lever **106** with its roller **7**, passing beyond the position shown in Fig. 6 during further turning of the pulley **5**, engages the portion of rope **109** intermediate the segment **111** and the pulley **5**. Since the roller **7** is spaced from the axis of the shaft **5***a* a greater radial distance than the periphery of the pulley **5**, a portion of the rope is forced to move along a

greater radius than the radius of the pulley **5** whereby the transmission ratio between the pulley **3** and the segment **111** is changed, and the type lever means **19** is accelerated. However, the transmission ratio is not abruptly changed, but gradually varied as in an infinitely variable transmission, since the roller **7** rolls along the rope **109** and divides the forces in accordance to vectors corresponding to the varying angle between the two rope portions **109***a* and **109***b* as shown in Fig. 7.

The position of the mechanism at the moment of impact of the type **19***a* on the platen **16** is shown in Fig. 7. The key **1** is in its lowest operative position, and the type lever means **19** has turned through an angle of 90°. Due to the fact that the entire type lever means **19** is counterbalanced, the impact on the platen **16** is effected under the action of the inertia of the returning system **19**, **21**. The carriage and platen means is at this time at a standstill since the transport of the carriage has been completed during the first part of the movement of the type lever means.

Fig. 8 shows an actuating unit during the return movement of the mechanism. When the key **1** is released, it returns to its initial position, and the pulley **5** turns in counterclockwise direction taking along the actuating lever **106**. During the first part of the return movement, the roller **7** is still in engagement with the rope **109**, so that the actuating lever is held in engagement with shaft **5***a*. In a position corresponding to the position shown in Fig. 6, the roller **7** releases the rope **109**, and moves into the interval between two bars **23***a*. When the roller **7** engages a bar **23***a*, the pulley **5** continues its turning movement in counterclockwise direction together with the arm **105**, whereas the actuating lever **106** is turned in clockwise direction into the position shown in Fig. 8. Movement of the pulley **5** in counterclockwise direction beyond the position shown in Fig. 8 will result in rolling of the roller **7** over the respective bar **23***a*. As soon as the roller **7** has passed over the respective bar **23***a*, the actuating lever **106** returns to the initial position shown in Fig. 5 under the action of the weight of roller **7** so that lever **106** again engages the shaft **5***a* and is ready for the next actuation. However, any other key **1** can be actuated during the return movement of the actuating unit of a previously actuated key. Assuming that a first key **1** has been actuated, and is now returning to its initial position, and that its actuating unit is in the position shown in Fig. 6, actuation of the second key will result in the movement of the actuating lever **106** of the second key into a position in which the roller **7** engages the respective bar **23***a* and effects carriage transport. Consequently the carriage transport can be effected during the return movement of any key. Even if the actuating unit of the first operated key has moved to the position shown in Fig. 8 during the return movement of the first key, it is still possible to operate a second key. The roller **7** of the second key will engage the bar **23***a* which is shown in engagement with the roller **7** of the first key in Fig. 8. Such engagement of the bar **23***a* by the actuating lever of the second key will effect stepwise turning of the turnable member **23**. The bar **23***a* can move in counterclockwise direction although it engages the roller **7** of the first operated lever, since the actuating lever is turnable in clockwise direction on the pin **105***a*. Consequently, a second key can be operated during the entire return movement of a first operated key resulting in an increase of writing speed.

From the above description of preferred embodiments of the present invention, it will become apparent that the operating keys are connected by a first transmission means to the type lever means and by a second transmission means to the carriage for transporting the same. The first transmission means includes a shiftable actuating means **5**, **105**, **106**, and **7** which actuates the second transmission to shift the carriage during the first part

of the movement of the key and of the type lever. In the embodiment of Figs. 5–8, the shiftable actuating means engages the rope 109 for accelerating the movement of the type lever during the second part of the movement of the key to actuated position.

Due to the fact that the keys of the arrangement of the present invention are guided for vertical movement in the frame of the machine, and are not at the end of levers, the fingertips of the operators move straight down resulting in less fatigue of the operator.

Another advantage of the construction of the present invention resides in that the keys move through a shorter distance for obtaining actuation of the associated type lever as compared with the arrangements of standard keyboards. Consequently, the keys of the upper rows of keys remain in fully depressed position above the top surface of the keys of the next lower row. This permits the operator to move the fingers in a more natural position since the lower keys do not interfere with the fingers when the upper keys are fully depressed. The writing finger position in the arrangement of the present invention is similar to the finger position of a pianist, and as is well known, this finger position permits rapid operation without any fatigue.

The mechanism of the present invention operates very quietly, since the noise produced by the spring operated escapement mechanism of standard typewriters is eliminated.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of keyboard operated business machines differing from the types described above.

While the invention has been illustrated and described as embodied in a combined carriage and type lever drive in which the manual operation of the keys effects the transport of the carriage and platen, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

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

1. Combined carriage and type lever drive comprising, in combination, movable carriage and platen means; type lever means movable to and from a printing position engaging said platen means; pulley means; rope means connected to said type lever means and being guided on said pulley means; operating key means connected to said rope means and being movable to and from an actuated position for moving said type lever means to and from said printing position, and for turning said pulley means in opposite directions during movement thereof to and from said actuated position; actuating means connected to said pulley means for movement in at least one of said opposite directions during turning of the same, said one direction corresponding to movement of said operating key means to said actuated position; and transmission means for transporting said carriage and platen means and connecting said actuating means with said carriage and platen means only during movement of the said actuating means in said one direction whereby said carriage and platen means is transported during movement of said type lever means to said printing position.

2. Combined carriage and type lever drive comprising, in combination, movable carriage and platen means; type lever means movable to and from a printing position engaging said platen means; pulley means; rope means connected to said type lever means and being guided on said pulley means; operating key means connected to said rope means and being movable to and from an actuated position for moving said type lever means to and from said printing position, and for turning said pulley means in opposite directions during movement thereof to and from said actuated position; actuating means connected to said pulley means for turning movement in at least one of said opposite directions during turning of the same, said one direction corresponding to movement of said operating key means to said actuated position; and transmission means for transporting said carriage and platen means in steps and connecting said actuating means with said carriage and platen means only during turning movement of said actuating means in said one direction whereby said carriage and platen means is transported during movement of said type lever means to said printing position.

3. Combined carriage and type lever drive comprising, in combination, movable carriage and platen means; type lever means movable to and from a printing position engaging said platen means; a pulley; rope means connected to said type lever means and being secured to and guided on the periphery of said pulley; operating key means connected to said rope means and being movable to and from an actuated position for moving said type lever means to and from said printing position, and for turning said pulley in opposite directions during movement thereof to and from said actuated position; actuating means connected to said pulley for turning movement in at least one of said opposite directions during turning of the same, said one direction corresponding to movement of said operating key means to said actuated position; and transmission means for transporting said carriage and platen means in steps and connecting said actuating means with said carriage and platen means only during turning movement of said actuating means in said one direction whereby said carriage and platen means is transported during movement of said type lever means to said printing position.

4. A combined carriage and type lever drive comprising, in combination, movable carriage and platen means; a set of type lever means turnable to and from a printing position engaging said platen means; a set of identical actuating units respectively associated with said type lever means, each actuating unit including a pulley, rope means connected to the associated type lever means and being guided on said pulley, and an actuating means connected to said pulley for turning movement therewith in at least one direction; a set of operating key means respectively associated with said actuating units, each operating key means being connected to the respective rope means and being movable to and from an actuated position for moving the associated type lever means to and from said printing position and for turning the associated pulley in opposite directions during movement thereof to and from said actuated position; and a transmission means for transporting said carriage and platen means and including a turnable member extending along said actuating units and cooperating with each of said actuating means to be turned by each actuating means whenever the respective associated operating key means is moved to said actuated position whereby said carriage and platen means is transported during movement of any one of said type lever means to said printing position.

5. A combined carriage and type lever drive as set forth in claim 4 wherein each of said actuating means turns said turnable member of said transmission means during the first part of the movement of the respective operating key means to said actuated position and during the first half of the turning movement of said pulley whereby

said carriage and platen means is transported during the first part of the movement of the respective type lever means to said printing position.

6. A combined carriage and type lever drive comprising in combination, movable carriage and platen means; a set of type lever means turnable to and from a printing position engaging said platen means; a set of identical actuating units respectively associated with said type lever means, each actuating unit including a pulley, rope means connected to the associated type lever means and being guided on said pulley, and an actuating means connected to said pulley for turning movement therewith in at least one direction; a set of operating key means respectively associated with said actuating units, each operating key means being connected to the respective rope means and being movable to and from an actuated position for moving the associated type lever means to and from said printing position and for turning the associated pulley in opposite directions during movement thereof to and from said actuated position; and a transmission means for transporting said carriage and platen means and including a turnable member having a plurality of bars uniformly spaced from each other around the axis of said turnable member, said bars extending along said actuating units and cooperating with each of said actuating means so that said turnable member is turned a step corresponding to the spacing of said bars by each actuating means whenever the respective associated operating key means is moved to said actuated position whereby said carriage and platen means is transported during movement of any one of said type lever means to said printing position.

7. A combined carriage and type lever drive as set forth in claim 6 wherein the distance between two adjacent bars of said turnable member is ten times the distance through which said carriage and platen means is transported.

8. A combined carriage and type lever drive as set forth in claim 7 and including a guide member connected to each of said type lever means for turning movement therewith, each of said guide members having an arcuate rim supporting the respective rope means, the radius of said arcuate rim of said guide member being four times the radius of the associated pulley.

9. Combined carriage and type lever drive comprising, in combination, movable carriage and platen means; type lever means turnable to and from a printing position engaging said platen means; a guide member having an arcuate rim and being connected to said type lever means for turning movement therewith; a pulley; rope means connected to said type lever means and being secured to and guided on the periphery of said pulley and on said arcuate rim of said guide member, the radius of said arcuate rim of said guide member being four times the radius of said pulley; operating key means connected to said rope means and being movable to and from an actuated position for moving said type lever means to and from said printing position, and for turning said pulley in opposite directions during movement thereof to and from said actuated position; actuating means connected to said pulley for turning movement in at least one of said opposite directions during turning of the same, said one direction corresponding to movement of said operating key means to said actuated position; and transmission means for transporting said carriage and platen means in steps and connecting said actuating means with said carriage and platen means only during turning movement of said actuating means in said one direction whereby said carriage and platen means is transported during movement of said type lever means to said printing position.

10. Combined carriage and type lever drive comprising, in combination, movable carriage and platen means; type lever means movable to and from a printing position engaging said platen means; a pulley; rope means connected to said type lever means and being secured to and guided on the periphery of said pulley; operating key

means connected to said rope means and being movable to and from an actuated position for moving said type lever means to and from said printing position, and for turning said pulley in opposite directions during movement thereof to and from said actuated position; an arm connected to said pulley for turning movement, said pulley and said arm turning in one direction during movement of said operating key means to said actuated position; an actuating lever turnably mounted on said arm; stop means limiting turning movement of said actuating lever on said arm in opposite turning direction; and transmission means connected to said carriage and platen means for transporting said carriage and platen means and including a stepwise turnable member actuated in steps by said actuating lever during turning movement of said arm in said one turning direction whereby said carriage and platen means is transported during movement of said type lever means to said printing position, said actuating lever turning in said one direction on said arm upon engagement with said stepwise turnable member during return movement of said operating key means.

11. A combined carriage and type lever drive as set forth in claim 10 wherein said stepwise turnable member includes a plurality of uniformly spaced elements arranged in a circle and cooperating with said actuating lever.

12. A combined carriage and type lever drive as set forth in claim 11 wherein said actuating lever includes a turnable roller cooperating with said elements of said stepwise turnable member.

13. A combined carriage and type lever drive as set forth in claim 10 wherein said stop means for said actuating lever is a shaft turnably supporting said pulley.

14. Combined carriage and type lever drive comprising, in combination, movable carriage and platen means; type lever means movable to and from a printing position engaging said platen means; a pulley; rope means connected to said type lever means and being secured to and guided on the periphery of said pulley; operating key means connected to said rope means and being movable to and from an actuated position for moving said type lever means to and from said printing position, and for turning said pulley in opposite directions during movement thereof to and from said actuated position; an arm connected to said pulley for turning movement, said pulley and said arm turning in one direction during movement of said operating key means to said actuated position; an actuating lever turnably mounted on said arm, said actuating lever having a free end radially projecting beyond the periphery of said pulley and engaging said rope means at a portion intermediate said pulley and said type lever means during turning movement of said pulley in said one turning direction for accelerating the movement of said type lever means; stop means limiting turning movement of said actuating lever on said arm in opposite turning direction so that said pulley, said arm and said actuating lever turn together in said one turning direction while said free end of said actuating lever engages said rope means; and transmission means connected to said carriage and platen means for transporting said carriage and platen means and including a stepwise turnable member actuated in steps by said actuating lever during turning movement of said arm in said one turning direction, whereby said carriage and platen means is transported during movement of said type lever means to said printing position, said actuating lever turning in said one direction on said arm upon engagement with said stepwise turnable member during return movement of said operating key means.

15. Combined carriage and type lever drive comprising, in combination, movable carriage and platen means; type lever means movable to and from a printing position engaging said platen means; a pullley; rope means connected to said type lever means and being secured to and guided on the periphery of said pulley; operating key

means connected to said rope means and being movable to and from an actuated position for moving said type lever means to and from said printing position, and for turning said pulley in opposite directions during movement thereof to and from said actuated position; an arm connected to said pulley for turning movment, said pulley and said arm turning in one direction during movement of said operating key means to said actuated position; an actuating lever turnably mounted on said arm, said actuating lever having a free end radially projecting beyond the periphery of said pulley and engaging said rope means at a portion intermediate said pulley and said type lever means during turning movement of said pulley in said one turning direction for accelerating the movement of said type lever means; stop means limiting turning movement of said actuating lever on said arm in opposite turning direction so that said pulley, said arm and said actuating lever turn together in said one turning direction while said free end of said actuating lever engages said rope means; and transmission means connected to said carriage and platen means for transporting said carriage and platen means and including a stepwise turnable member actuated in steps by said actuating lever during turning movement of said arm in said one turning direction, said stepwise turnable member and said intermediate portion of said rope means being located in the path of said free end of said actuating lever in such relative position that said free end first engages said stepwise turnable member and then engages said rope means during turning movement of said pulley and arm in said one turning direction whereby said carriage and platen means is transported during the first part of the movement of said type lever means to said printing position, and said type lever means is accelerated during the second part of its movement to said printing position, said actuating lever turning in said one direction on said arm upon engagement with said stepwise turnable member during return movement of said operating key means.

16. A combined carriage and type lever drive as set forth in claim 15 and including a roller turnably mounted on said free end of said actuating lever and consecutively engaging said stepwise turnable member and said intermediate portion of said rope means.

17. Combined carriage and type lever drive comprising, in combination, moveable carriage and platen means, type lever means movable to and from a printing position engaging said platen means; operating key means movable to and from an actuated position; first transmission means including pulley means and rope means guided on said pulley means, said transmission means connecting said operating key means with said type lever means so that said type lever means moves to and from said printing position when said operating key means moves to and from said actuated position, said transmission means including a shiftable means moving in opposite directions during movement of said operating key means to and from said actuated position, said shiftable means engaging and displacing said rope means for gradually varying the ratio of transmission of said first transmission means during the second part of the movement of the operating key means to said actuated position to accelerate the movement of said type lever means during the second part of the movement of said type lever means to said printing position; and second transmission means for transporting said carriage and platen means and being actuated by said shiftable means only during movement of said shiftable means in the direction corresponding to movement of said operating key means to said actuated position and during the first part of the movement of said operating key means to said actuated position whereby said carriage and platen means is transported during the first part of the movement of said type lever means to said printing position.

18. Combined carriage and type lever drive comprising, in combination, movable carriage and platen means; type lever means movable to and from a printing position engaging said platen means; pulley means; rope means connected to said type lever means and being guided on said pulley means; operating key means connected to said rope means and being movable to and from an actuated position for moving said type lever means to and from said printing position, and for turning said pulley means in opposite directions during movement thereof to and from said actuated position; actuating means connected to said pulley means for turning movement in at least one of said opposite directions during turning of the same, said one direction corresponding to movement of said operating key means to said actuated position, said actuating means engaging said rope means during the second part of the turning of said pulley means for accelerating the movement of said type lever means during the second part of the movement of said type lever means to said printing position; and transmission means for transporting said carriage and platen means in steps and connecting said actuating means with said carriage and platen means only during the first part of the turning movement of said actuating means in said one direction whereby said carriage and platen means is transported during the first part of the movement of said operating key means to said actuated position and during the first part of said type lever means to said printing position.

19. Combined carriage and printing means drive, comprising, in combination, movable carriage means; printing means movable to and from an operative position; pulley means; rope means connected to said printing means and guided on said pulley means; operating means operatively connected to said rope means and being movable to an actuated position for moving said printing means to said operative position and for turning said pulley means during movement thereof to said actuated position; actuating means connected to said pulley means for movement with the same during at least part of the turning movement of the same in a direction corresponding to movement of said operating means to said actuated position; and transmission means for transporting said carriage means and connecting said actuating means with said carriage means only during movement of said actuating means with said pulley means in said direction whereby said carriage means is transported during movement of said printing means to said operative position.

20. Combined carriage and printing means drive, comprising, in combination, movable carriage means; printing means movable to and from an operative position; operating means movable to an actuated position; first transmission means including pulley means, and rope means guided on said pulley means, said first transmission means connecting said operating means with said printing means for moving said printing means to said operative position when said operating means is moved to said actuated position while said pulley means turn; actuating means connected to said pulley means for movement with the same during at least part of the turning movement of the same in a direction corresponding to movement of said operating means to said actuated position; and second transmission means for transporting said carriage means and connecting said actuating means with said carriage means only during movement of said actuating means with said pulley means in said direction whereby said carriage means is transported during movement of said printing means to said operative position.

21. Combined carriage and printing means drive, comprising, in combination, movable carriage means; printing means movable to and from an operative position; operating means movable to an actuated position; first transmission means including pulley means, and rope means guided on said pulley means, said first transmission means connecting said operating means with said printing means for moving said printing means to said operative position when said operating means is moved

to said actuated position; and second transmission means for transporting said carriage means and connecting said first transmission means with said carriage means only during movement of said operating means to said actuated position whereby said carriage means is transported during movement of said printing means to said operative position.

22. In a business machine, a printing means drive comprising in combination, movable carriage means; printing means movable to and from an operative position; operating means movable to an actuated position; transmission means including pulley means, and rope means guided on said pulley means, said transmission means connecting said operating means with said printing means for moving said printing means to said operative position when said operating means is moved to said actuated position; and means connecting said transmission means with said carriage means for moving said carriage means during movement of said operating means to said actuated position and of said printing means to said operative position.

23. Type lever drive comprising, in combination, movable carriage and platen means, type lever means movable to and from a printing position engaging said platen means; operating key means movable to and from an actuated position; transmission means including pulley means and rope means guided on said pulley means and connecting said operating key means with said type lever means so that said type lever means moves to and from said printing position when said operating key means moves to and from said actuated position, said transmission means including a shiftable means moving in opposite directions during movement of said operating key means to and from said actuated position, said shiftable means engaging and displacing said rope means for gradually varying the ratio of transmission of said transmission means during the second part of the movement of the operating key means to said actuated position to accelerate the movement of said type lever means during the second part of the movement of said type lever means to said printing position; and means connecting said shiftable means with said carriage and platen means for moving the latter during movement of said operating key means to said actuated position.

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