Jan. 20, 1931. M. SCHULZE 1,789,661

TYPEWRITING MACHINE WITH POWER DRIVES

Filed June 18, 1925 4 Sheets-Sheet 1

Fig. 1

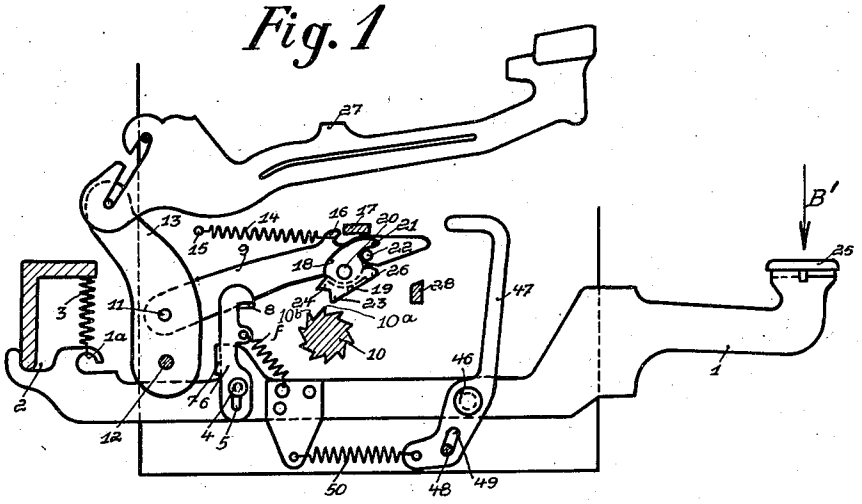
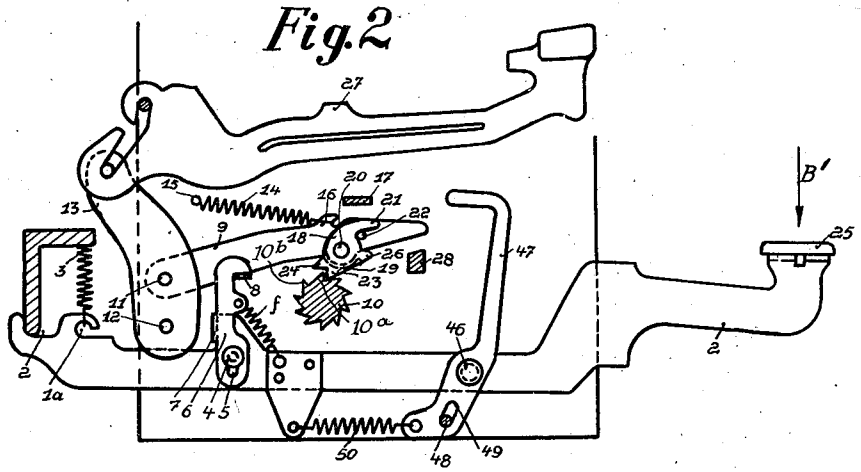


Fig. 2



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Fig. 3

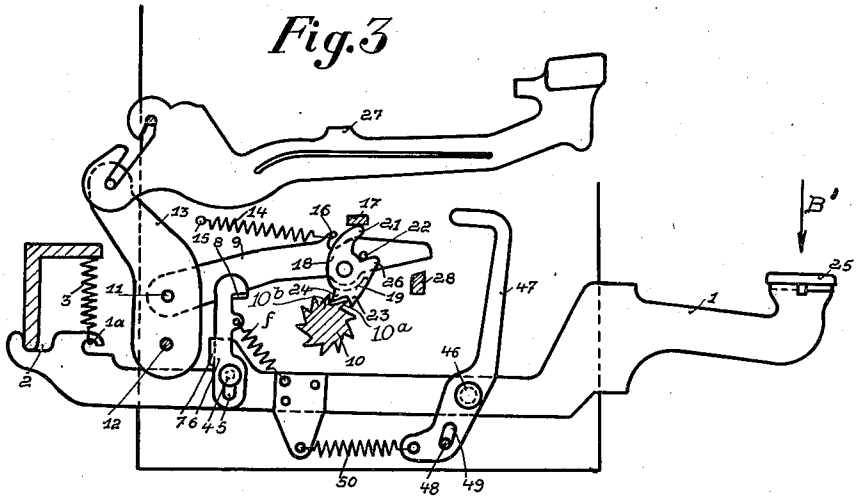
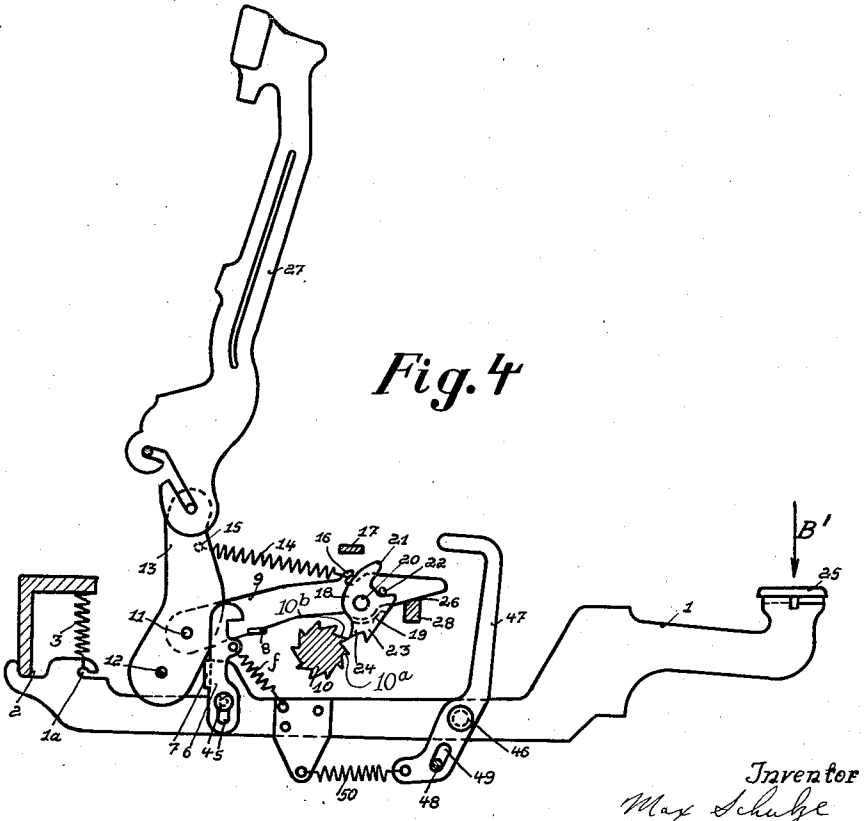


Fig. 4



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TYPEWRITING MACHINE WITH POWER DRIVES

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Fig.5

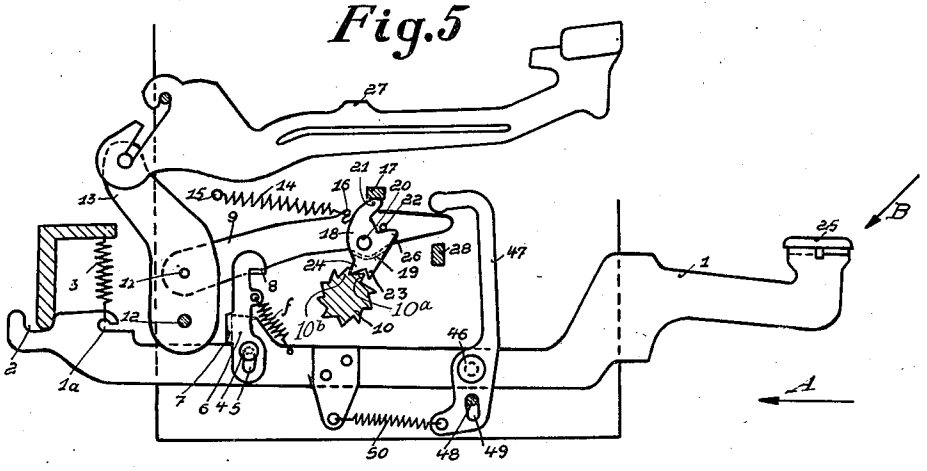
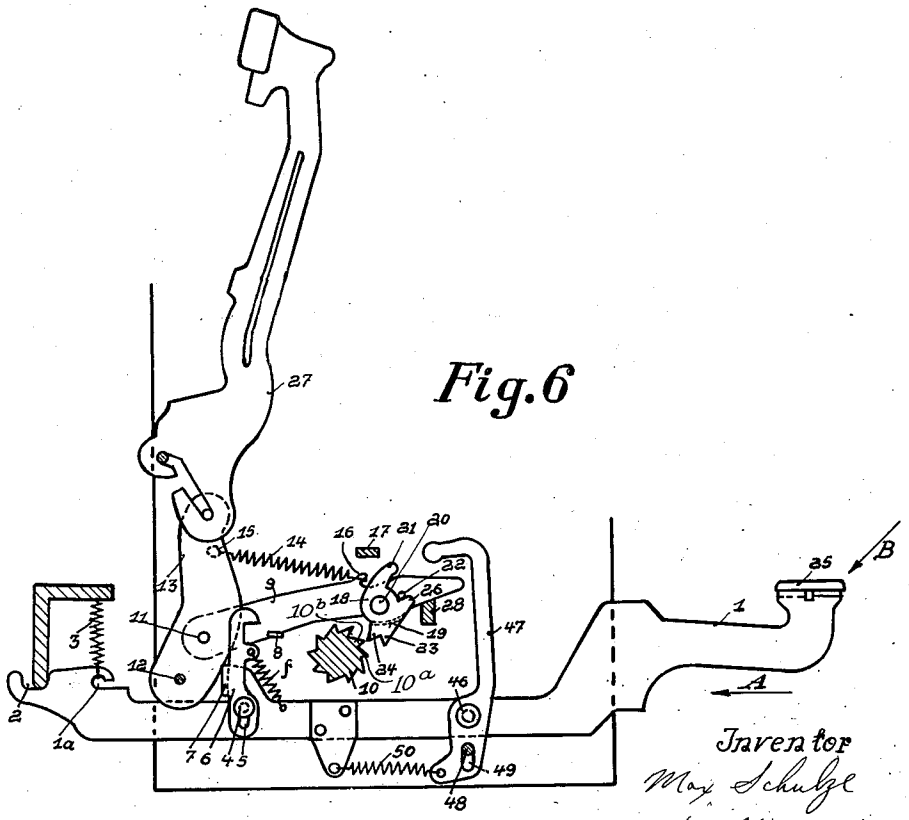


Fig.6



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Fig. 8

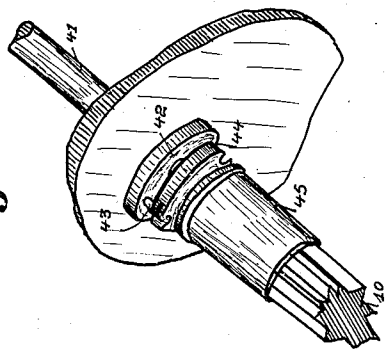
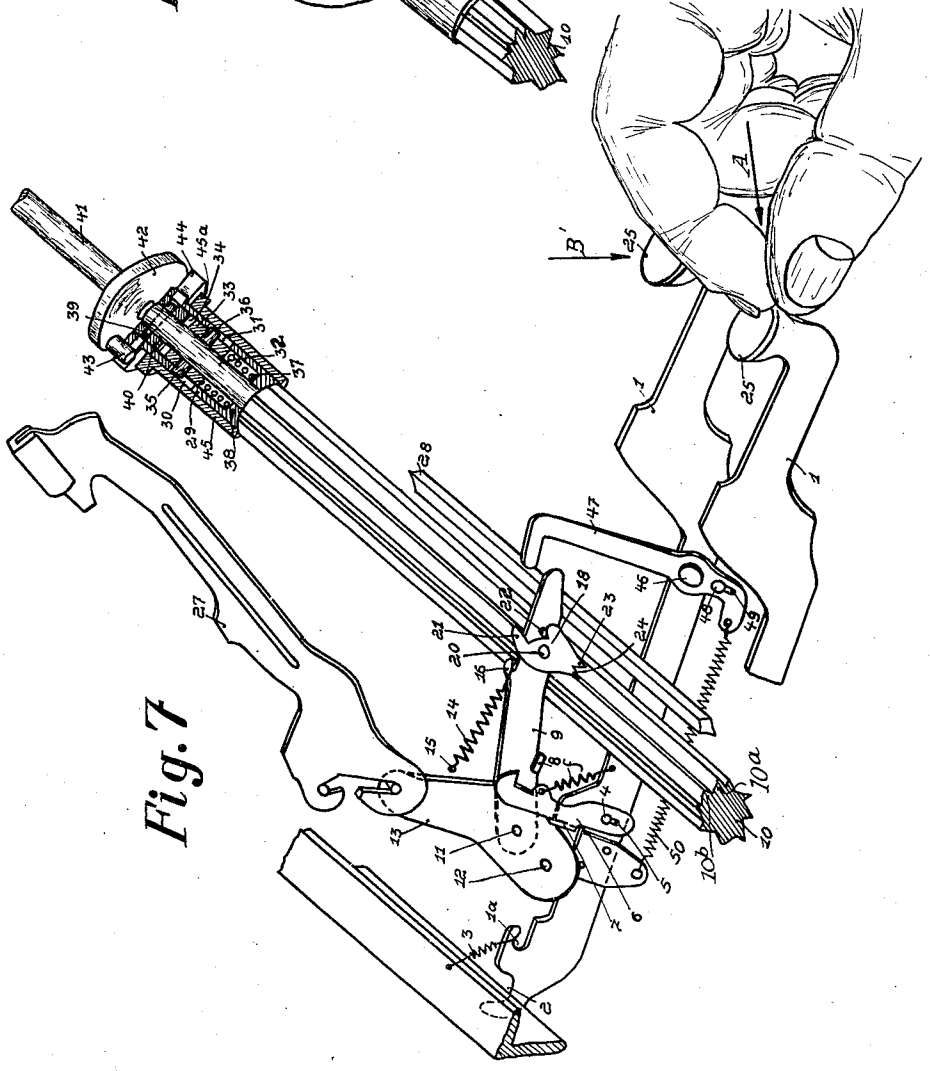


Fig. 7



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UNITED STATES PATENT OFFICE

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TYPEWRITING MACHINE WITH POWER DRIVES

Application filed June 18, 1925, Serial No. 37,964, and in Germany June 18, 1924.

This invention has reference to power-operated type-bar actuating means in writing machines and the like, and in particular to controlling means for the coupling device to be used in connection therewith, and it is a further object of the invention to regulate the strength of the touch in the striking of the keys by the operator and to provide for permanent subs'antial uniformity of touch in the operation of the key levers. The operating mechanisms for the type-bars of power-driven type writing machines of the character described and the like, as heretofore constructed have failed to satisfy the demands for a uniform repetition of the impact of the types so that in view of this serious drawback the advantage of a reduced pressure of the types to be overcome, and other advantages of the power-driven operating means for the type-bars are very considerably diminished.

The causes of this difficulty were first thought to be due to variations in the number of revolutions of the source of power, or to be accounted for by an improper arrangement of the coupling member between the source of power and the operating member for the direct or indirect driving of the type-bars. While the elimination of this objection improved conditions the objection was not removed to an extent to insure the satisfactory working of the machines, and the still remaining considerable lack of uniformity of the touch of one and the same type was, therefore, to be accounted for by other causes. Now, it has been ascertained that this lack of uniformity may be entirely removed in accordance with this invention by providing means to insure the coupling of the type-bar with the driving mechanism to take place always at the same position of the coupling member with relation to the driving member. In the practice of my invention, and in view of the fact that the driving member is commonly constituted by a permanently rotated cam shaft it has become necessary to so regulate and control the coupling member by a suitable controlling device and in such a manner that the coupling member will always assume the operating position at an unvarying distance with relation to each individual cam or projection of the shaft.

It is a further object of the invention in connection therewith to insure the reliable operation of this coupling means. Whenever the mechanism is operated in the manner just described, and if any obstacle is projected into the path of the type-bar before its impact upon the platen and at a time at which one of the teeth of the power transmission member is still engaged with the cam shaft this tooth is likely to be broken off. In order to eliminate this danger an "overload"- or overstraining coupling is disposed intermediate the source of power and the cam shaft, the said overstraining coupling becoming active in the emergency referred to, whereby the breaking off of the teeth of the driving member is prevented.

In further pursuance of my invention it is an additional object thereof to provide means of obtaining permanently uniform touching of any one of the type-bars of a power-operated writing machine. A coupling member otherwise known is ordinarily made to engage a permanently rotated driving member upon the depression of a key, so that said coupling member is carried along in the movement and imparts the necessary motion to the type-bar. A throwing-off or wiping bar is provided to insure the disengagement of the coupling member from the driving member at the proper time, and a tensional spring is provided to return the coupling member just referred to to its normal position and towards a so-called impact or stopping bar and in combination with the dropping back of the type-bar in such a manner that the coupling member is prevented from becoming engaged with the driving member before the next succeeding depression of the key.

In order to repeatedly connect the coupling member with the driving means and to produce a permanently uniform touch, means are provided in accordance with this invention for causing the coupling member to be raised or moved back only so far that the engagement will always take place again with security, after it has become disengaged from the driving member by means of the throwing-off bar. The change for the repeat-touch stroke is preferably effected by means of the same key which has to be depressed for the writing of the particular type under consideration. But it is also admissible within the scope of this invention to provide special auxiliary means for this purpose.

The invention will be further and more fully described with reference to the accompanying drawing showing an embodiment of the principles thereof as applied to a Mercedes-type writing machine Elektra, but without restricting my invention to this particular machine, and it should be understood that it may be embodied in other writing or similar machines of the general type hereinbefore referred to.

In the drawings forming part of this specification Figure 1 is a side elevation of the improvement in the inoperative position, with parts in section. Figure 2 is a view similar to Figure 1, and illustrates the engagement of the coupling member upon the depression of the key in the single-stroke position. Figure 3 shows the momentary controlling or steering device for the coupling in the engaging position and corresponding to the single-stroke position. Figure 4 shows the same controlling member for the coupling at the moment of disengagement of the coupling. Figure 5 shows the controlling and steering means for the coupling according to Figure 3 in the repeat-stroke position to be referred to. Figure 6 shows said controlling or steering means according to Figure 4 in the repeat-stroke position. Figure 7 is a perspective view with parts in section, showing the different operating parts in the position in which the overstraining coupling is to become operative, provided any obstacle has been unintentionally thrown into the path of movement of the type-bar, and it also shows the manner of actuation of the key levers for the purpose of respectively producing either a single stroke touch or a repeat stroke touch. Figure 8 is a perspective view of the "overstraining"-coupling.

The key lever 1, as appears from Figure 1, is journaled at 2 in a key-lever-bearing fixedly secured to the machine frame, and it is retained in the position shown in Figure 1 by a spring 3 secured to the bearing, and in engagement with the eye 1^a of the key lever, this being the normal position of the parts. To the key lever and by means of a bolt or rivet 4 an operating lever 6 is pivoted which is provided with a longitudinal slot 5, so as to be able to be displaced at right angle relatively to the key lever 1. By means of a spring *f* secured between the key lever and the lever 6 its shoulder or projection 7 is forced against a projection of the key lever (Figure 1). With its upper hook-shaped projection or nose the operating lever 6 engages over the lug 8 of the pulling lever 9. Upon the descent of the key-bar 1 the pulling lever 9 is accordingly moved and is caused to become engaged with the cam shaft or driving shaft 10 which is continuously moved in the clockwise direction. The pulling lever 9 is linked at 11 to the intermediate lever 13, pivoted to the stud 12, and is maintained in contact with the relatively stationary stop bar 17 by means of a spring 14 which is secured at 15 to the frame and engaged in an eye 16 of the pulling-bar 9 (Figure 1). The member 18 is pivoted on a stud 20 and is slotted from its top down to the dotted line 19 to correspond with the thickness of the pulling bar on which it is snugly straddled. The center of gravity of the member 18 is so arranged that it will maintain its position, shown in Figure 1 independently of the stop bar 17, and in this position its projection 21 will rest against the pin 22 on the pulling lever 9. The said member 18 is, moreover, provided with two teeth 23 and 24 the pitch of which is less than the pitch of the teeth of the cam shaft or operating shaft 10.

The mode of operation of these parts of the device is substantially as follows:—As a result of the depression of the key 25 the latch or moving lever 6 carries the pulling bar 9 downwards in its movement and moves the tooth 23 of the member 18 into engagement with a tooth on the shaft 10 (Figure 2). If in this movement the point of the tooth 23 impinges against the head of a tooth on the shaft 10, the latch lever 6 in consequence of the longitudinal slot 5 will be momentarily deviated contrary to the action of the spring *f*. By means of this spring *f* the pulling bar 9 and the apex of the tooth 23 will then be moved into the path of a tooth on the shaft 10. In consequence of the continued rotation of this shaft 10 the member 18 is then in the first place turned on its pivot 20, until its upper extension 21 is forced against the stopping or abutment bar 17 (Figure 3), thereby insuring the engagement and the revolving of the tooth 23 with and upon the tooth of the shaft 10. Immediately thereafter the lower projection 26 of the member 18 has come in contact with the stop pin 22. At this moment the tooth 10^a of the shaft 10 (Figure 3) is ready to become disengaged from the tooth 23 of the member 18, while between the tooth 24 of the member 18 and the tooth 10^b of the shaft 10 a certain play has been produced which preferably amounts to about

one thirty-second of an inch (one millimeter). This play creates a momentum for the striking force which, the same as the conditions for the engagement of the tooth 24, is always uniformly provided by the tooth 23 for any one of the teeth of the shaft 10. In the position shown in Figure 3 the pulling bar 9 and the member 18 constitute a rigid system, so that upon the engagement of the tooth 10^b of the shaft with the tooth 24 of the member 18 the pulling bar 9 is moved and thereby causes the intermediate lever 13 to be rocked on its stud 12 in the clock-wise direction, which results in the type-bar 27 being struck against the platen in the well known manner (Figure 4). Inasmuch as the last stage of the movement of the type-bar is produced by means of kinetic energy a throwing-off bar 28 is arranged in such a manner as to cause the pulling bar 9 and the tooth 24 to become disengaged from the tooth of the shaft 10 shortly before the striking of the type-bar against the platen roller whereupon the action of the spring 14 returns the pulling bar 9, the intermediate lever 13 and the type-bar and, with the intermediary of the abutment bar 17, the member 18 to their position of rest, indicated in Figure 1 of the drawing. If, however, before the last stage of the movement of the type-bar, whole the tooth 24 is still engaged with the cam shaft 10, the movement of the type-bar is interrupted, the tooth 24 is liable to be broken off. In order to obviate this eventuality, an "over-straining" coupling is provided, as shown in Figures 7 and 8, which comprises a sleeve 29 provided with a tappet flange and having slots 30 and 31 in its wall and mounted upon the stud 32 of the cam shaft 10. Within the sleeve 29 another sleeve 33 is readily displaceable which on one of its front ends is provided with ratchet teeth 34 and on which two pins 35 and 36 are laterally disposed which project into the slots 30 and 31 of the sleeve 29. By this means the sleeve 33 is axially displaceable with relation to the sleeve 29 and secured against rotation. By means of the spring 37 which is disposed between the projection 38 of the sleeve 29 and the sleeve 33 the latter one is always forced in the direction of the arrow. Upon the stud 32 of the cam shaft 10 another sleeve 40 is mounted by means of the pin 39, the said sleeve 40 being likewise provided at its front side with ratchet teeth adapted for engagement with the teeth of the sleeve 33 by the action of the spring 37. The connection of the coupling member or of the cam shaft 10 with the source of power is effected in the usual manner by means of a pin 43 fixed on a disc 42 eccentrically with relation to the driving shaft 41 and engageable with a notch of the flange 44 (Figure 8). If, now, by carelessness or from any other cause the movement of the type-bar is interrupted, while the tappet tooth of the member 18 is still in engagement with the cam shaft 10, which otherwise would result in over-straining of the driving mechanisms, the sleeve 33 by the action of the inclined faces of the ratchet teeth will slide contrary to the action of the spring, so that the rigid connection between the cam shaft and the source of power remains released, until the impediment has been removed. The sleeve 45 constitutes the bearing member in which the coupling member and the cam shaft are disposed. Whenever the coupling member is in the operative or in the inoperative position, there is no axial pressure upon the shaft 10, inasmuch as the pressure is absorbed by the flange 45^a of the sleeve 45.

Upon every key lever 1 the corresponding type-bar of which is designed to perform a repeat-touch stroke a pawl 47 is mounted by means of a bolt or rivet 46. Below the keys 1 and transversely to the typewriting machine a bar 48 is stationarily disposed which is passed through the slot 49 of the pawl 47. The key 1 is horizontally displaceable and for this purpose it is provided at the point 2 with a considerably wider indentation than usual. By the depression and simultaneous longitudinal displacement of the key 1 in the direction of the arrow A the pawl 47 is moved into the position shown in Figures 5 and 6 with a view of producing the repeat-stroke position. By the operation of the key the clutch or coupling member 18 is caused to become engaged, as above described, with the operating shaft 10 and by the longitudinal displacement of the key the pawl 47 is rocked on the bar 48 anti-clockwise. In this position the pawl 47 causes the coupling member 18 to be kept away from the stationary stopping or abutting bar 17 and to be swung back upwardly only so far until a new engagement with the driving member 10 is to take place (Figure 5). As long as the pawl 47 is in this position, provided the key remains depressed and displaced, the coupling member will therefore be caused to become re-engaged after the operation of the throwing-off member, and by this means the desired repeat stroke of the type-bar is produced. Upon the release of the key 1 the pawl 47 follows its upward movement and, at the same time, it is pulled back from the coupling member 18 by the spring 50 and into the position of Figure 1. By means of the spring 50 the key lever 1 is also restored from its displaced position into the normal position of Figure 1. The arrows B shown in the several figures of the drawing indicate the direction in which the operating pressure has to be produced upon the key in the particular position desired. In Fig. 7 of the drawing the representation of the hand of the operator is intended to illustrate more clearly the manner of operation of the key

for the repeat-stroke position, while with the normal manner of operation in the direction of the arrow B′ only the single-stroke operation is produced.

It should, of course, be understood that the invention is not limited to the particular arrangement and relative sizes of the operating parts, and it is susceptible of modifications and changes as may suggest themselves to the expert operator in accordance with his convenience and with the type of machine to which the invention is applied, and without deviating from the spirit and scope of the invention, as particularly pointed out in the claims hereunto appended.

I claim:—

1. In a power driven typewriting machine having a continuously rotating toothed drive shaft, a type bar, and a pulling bar connected thereto, a tooth on said pulling bar adapted to be engaged by the teeth of said drive shaft, means for normally holding said tooth in non-engaging position, and means for moving said tooth into position to be engaged by a tooth of said drive shaft at a constant distance in front of said drive shaft tooth.

2. In a power driven typewriting machine having a continuously rotating toothed drive shaft, a type bar, a pulling bar connected thereto, a key lever, and a connection between said key lever and said pulling bar, a tooth capable of limited rotation on said pulling bar adapted to be engaged by the teeth of said drive shaft in one limit position, and means engageable by the teeth of said shaft upon movement of said pulling bar by said key lever for rotating said tooth into said limit position.

3. In a power driven typewriting machine having a continuously rotating toothed drive shaft, a type bar, a pulling bar connected thereto, a key lever, and a connection between said key lever and said pulling bar, a coupling member mounted for limited rotation on said pulling bar, two teeth on said coupling member, one of said teeth in the normal position of said coupling member being adapted to be engaged by a tooth of said drive shaft upon depression of said key lever, to cause said coupling member to be rotated into a limit position, the other tooth of said coupling member being thereby rotated into a definite position in front of a succeeding tooth of said drive shaft.

4. A power driven typewriting machine in in accordance with claim 3 in which the pitch of the teeth on said coupling member is smaller than the pitch of the teeth of the drive shaft.

5. A power driven typewriting machine in accordance with claim 3 in combination with a stationary bar, and a nose on said coupling member adapted to engage said bar in the limit position of said coupling member to hold said other tooth in position in front of said succeeding tooth.

6. A power driven typewriter in accordance with claim 3 in combination with a stationary stop bar, yielding means tending to hold said pulling bar in contact with said stop bar, and a cam nose on said coupling member adapted to cooperate with said stop bar to positively force said pulling bar toward said drive shaft upon rotation of said coupling member by said drive shaft, and to rotate said coupling member back to normal position upon movement of said pulling bar toward said stop bar.

7. In a power driven typewriting machine having a continuously rotating toothed drive shaft, a type bar, a pulling bar connected thereto, a key lever, and a connection between said key lever and said pulling bar, a coupling member pivoted for limited rotation on said pulling bar, two teeth on said coupling member, the pivot of said coupling member being so located with respect to the center of gravity of said coupling member as to cause said member to stand normally in one limit position with one of said two teeth in position to be engaged by a tooth of said drive shaft upon depression of said key lever, said coupling member being rotatable upon such engagement into its other limit position to bring the other tooth of said member into a definite position in front of a succeeding tooth of said drive shaft.

8. A typewriting machine in accordance with claim 1 in combination with a rotary source of power, and an overload clutch between said source of power and said drive shaft.

9. In a power driven typewriting machine of the type having a continuously rotating drive shaft, a type bar, a pulling bar connected thereto, means on said pulling bar adapted to engage said drive shaft, a key lever, a connection between said key lever and said pulling bar adapted to be released upon actuation of said type bar, and yielding means for returning said pulling bar to non-engaging position, the combination of a stop adapted to be moved into position to prevent the return of said pulling bar to non-engaging position, whereby the actuation of said type bar will be repeated.

10. A typewriting machine in accordance with claim 9 in which said stop is connected to said key lever and adapted to be actuated thereby.

11. In a power driven typewriter of the type having a continuously rotating drive shaft, type bars, pulling bars connected thereto, means on said pulling bars adapted to engage said drive shaft, key levers, connections between said key levers and said pulling bars adapted to be released upon actuation of said type bars, and yielding means for returning said pulling bars to non-engaging position,

the combination of individual stops cooperating with certain of the pulling bars and adapted to be moved into position to prevent the return of their respective pulling bars to non-engaging position, whereby the actuation of the corresponding type bar will be repeated.

12. A typewriting machine in accordance with claim 9 in which the stop comprises a pawl pivoted on a stationary member and also pivoted to said key lever, said key lever being longitudinally shiftable to rock said pawl into stopping position.

13. In a typewriter, a type bar, a power drive, an actuator connected with said type bar for connecting said type bar with said power drive, a stop for disengaging said actuator from said power drive at the close of a printing operation, means for restoring said actuator after disconnection, means for engaging said actuator to guide it into contact with said power drive when moved by said restoring means, and a repeat key for controlling said engaging means.

14. In a typewriter, the combination with a power drive, a type carrier, a key lever, means operated by said key lever for effecting connection between said type carrier with said power drive, means for disconnecting said type carrier from said power drive, and means for re-engaging said type carrier with said power drive, said re-engaging means being held in operative position by said key lever to produce repeated action of said type carrier when said key lever is held in depressed position.

15. In a typewriter, the combination with a continuously operative power driven member, of a type carrier, an actuator for connecting said type carrier with said power driven member, a key lever, and means on said key lever arranged to engage said actuator when said key lever is depressed to move said actuator into engagement with said power driven member, means for disengaging said actuator from said power driven member at the close of an operation thereof, and a repeat tappet being held by said key lever when said key lever is depressed in position to cause said actuator to re-engage said power driven member when said actuator is released from said power driven member.

16. In a typewriter having type bars and key levers, a continuously operating power drive, means controlled by said key levers for connecting said type bars with said power drive, means for automatically disengaging said connecting means after a single operation of a type bar, and means controlled by the operator for effecting re-engagement of said connecting means after each operation of a type bar when the corresponding key is retained in depressed position.

17. In a typewriter having type bars and key levers, a power drive for operating said type bars, means controlled by said key levers for connecting said type bars with said power drive, and means for effecting repeated operation of a type bar when the corresponding key lever is held depressed comprising means on the key levers and movable therewith when the same are depressed to retain the connecting means between the power drive and type bars in position to re-engage the power drive after each operation of a type bar.

The foregoing specification signed at Zella-Mehlis, June 4, 1925.

MAX SCHULZE.

CERTIFICATE OF CORRECTION.

Patent No. 1,789,661. Granted January 21, 1931, to

MAX SCHULZE.

It is hereby certified that in the grant and heading to the above numbered patent the residence of the patentee was erroneously described and specified as "Hammerhohle, Germany", whereas said residence should have been described and specified as Zella-Mehlis, Germany, as shown by the records of the office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of April, A. D. 1931.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)