M. E. BLUME.

APPARATUS FOR PRODUCING TYPOGRAPHIC RECORD SHEETS.

APPLICATION FILED JULY 27, 1911.

1,016,201.

Patented Jan. 30, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

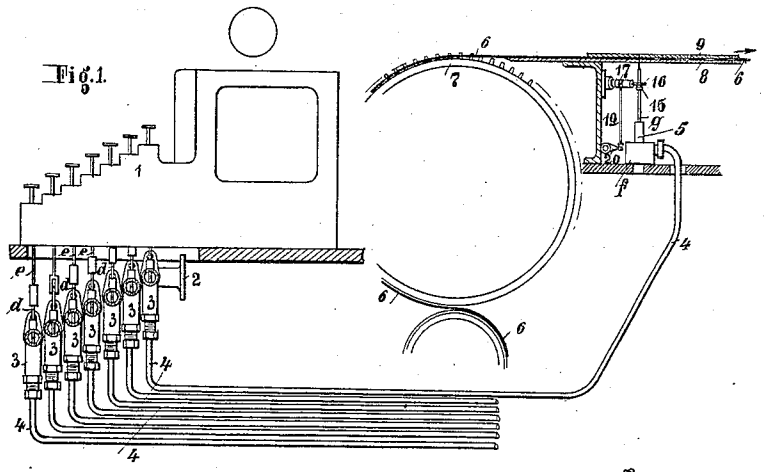


Fig. 2.

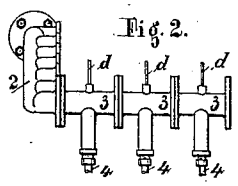


Fig. 3.

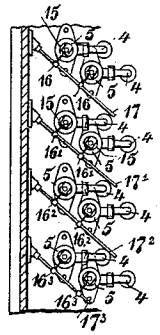


Fig. 4.

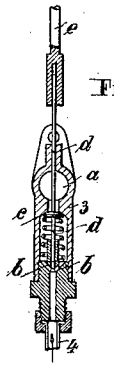


Fig. 8.

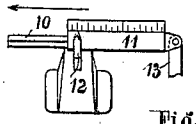


Fig. 5.

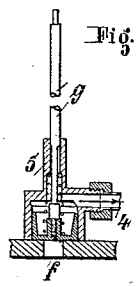


Fig. 6.

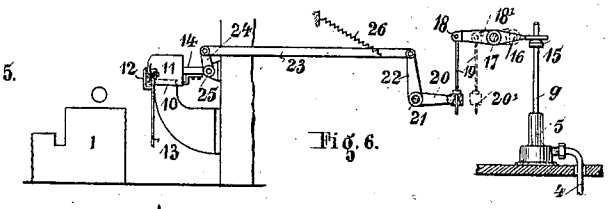
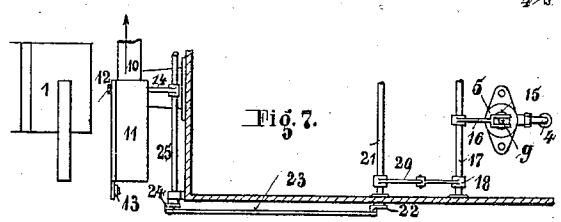


Fig. 7.



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APPLICATION FILED JULY 27, 1911.

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2 SHEETS—SHEET 2.

Fig. 9.

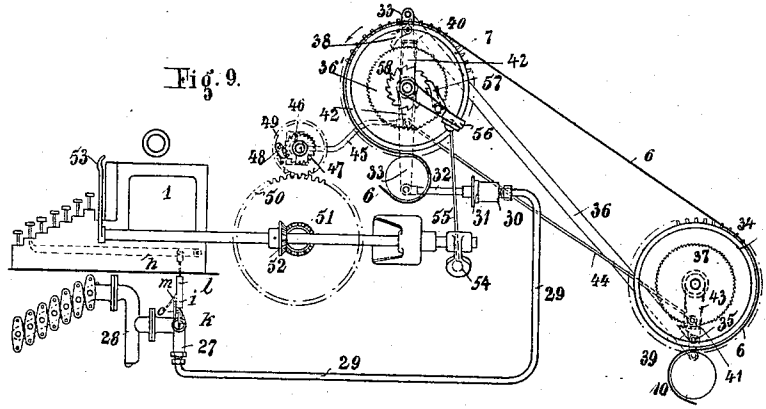
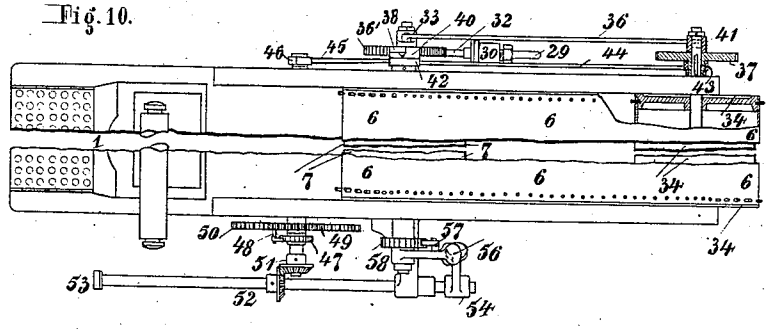


Fig. 10.



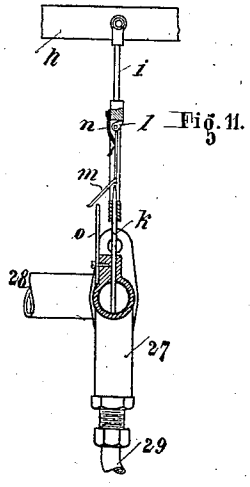
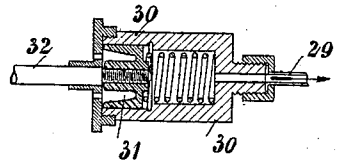


Fig. 11.

Fig. 12.



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APPARATUS FOR PRODUCING TYPOGRAPHIC RECORD-SHEETS.

1,016,201. Specification of Letters Patent. Patented Jan. 30, 1912.

Application filed July 27, 1911. Serial No. 640,905.

To all whom it may concern:

Be it known that I, MAX ERICH BLUME, a subject of the King of Saxony, residing at Leipzig-Connewitz, in Germany, have invented a certain new and useful Improvement in Apparatus for Producing Typographic Record-Sheets, of which the following is a specification.

The object of this invention is to provide apparatus for producing perforated record sheets for use in typographic machines having mechanism which can be actuated with the aid of such sheets, for example typographic stamping machines adapted to impress letters in sheets of metal. According to the present invention these perforated records are produced by means of pneumatically actuated punches, the action of which is controlled by the type-keys of a typewriter, so that in copying a manuscript any errors made by the operator become apparent in the written copy, and the perforated record can be corrected accordingly.

The invention is illustrated in the accompanying drawings in which:—

Figure 1 is a longitudinal section of the apparatus with parts broken away; Fig. 2 is a plan of some of the valves actuated by the typewriter. Fig. 3 is a plan of some of the punching devices for perforating the record sheet; Fig. 4 is a section of one of the key-controlled valves, on a larger scale and Fig. 5 a section of one of the punching devices, also on a larger scale. Fig. 6 is a side-view of a space indicating mechanism, Fig. 7 being a plan of Fig. 6, and Fig. 8 a front elevation of part of the indicating device; Fig. 9 is a side elevation of the mechanism for moving the record sheet after the punching of each perforation. Fig. 10 is a plan of this mechanism with part broken away. Figs. 11 and 12 show details of the sheet moving mechanism drawn to a larger scale.

The mechanism for perforating the record sheet will now be described with reference to the drawing.

Below the key board of the typewriter 1 are arranged suction pipes 2 connected with valves 3. The valves 3 communicate with pipes 4 which lead to the mechanism 5 for punching holes in the record sheet 6 traveling over the drum 7 and perforated plate 8; a similar plate 9 holds the sheet in position from above. Each valve 3 comprises a casing having a port *a* open to the respective pipe 2 and port *b* open to the pipe 4. The ports *a* and *b* are separated by a spring loaded valve *c* mounted on a valve stem *d* which can be depressed, against the action of the spring, by one of the typewriter keys. The connection to the key is such that the valve *c* is not moved until the key has been depressed a short distance. For this purpose the lever *e* actuating the valve terminates in a sleeve which embraces the upper end of the valve stem with such amount of endwise play that it only begins to depress the valve stem *d* after the key has been depressed to a certain extent. The spring of the valve closes the valve rapidly after the actuation. Other keys, besides the type-keys may be provided for operating other movements, for instance, for changing the type and so forth. The punching device shown best in Fig. 5, comprises the casing 5 connected to the pipe 4 and containing the spring-loaded piston *f* with rod *g;* the upper end of the latter forms the punch guided in the plate 8. Atmospheric air has access to the bottom of the piston. The rod *g* is provided with grooves which admit air to the space above the piston *f* when the latter has risen to a certain height, namely as soon as the perforation of the record sheet has been effected. The entrance of air above the piston causes the latter to descend quickly with the result that the perforations are cleanly cut in the sheet without possibility of tearing. This arrangement is also conducive to rapid working of the whole apparatus. The operation of the hereinbefore described punching device is as follows: A vacuum is maintained in the pipe 2 by means of an air pump or suction bellows. When a key of the typewriter is depressed, suction is produced in the pipe 4, connected with the corresponding valve 3, and also in the chamber above the piston *f* of the respective punching device. This results in the piston *f* being driven upward by atmospheric pressure and the perforation is effected.

The length of the line of writing written by the typewriter in accordance with the uniform feed-movement of the carriage, differs from the length of the line to be stamped, owing to the stamped letters varying in width. The characters and signs to be stamped are for this reason divided into

groups, as for instance into five groups as follows:

I. w—m—and the capitals.
II. c—a—g—h—k, etc.
III. q—e—f, etc.
IV. o—b—p—r—s, etc.
V. !—.—,—;—:—etc.

The punching devices 5 are grouped in accordance with the grouping of characters, the arrangement being such that each of these groups is capable of rotating a shaft which is arranged to operate an indicating device.

The indicating mechanism shown in Figs. 6, 7 and 8 comprises a fixed pointer 12 and a guide rail 10 on which is mounted a slide 11 provided with a scale. The slide 11 is pulled in one direction, indicated by the arrow in Figs. 7 and 8, by a spring, weight or the like, and can be moved back by means of a lever 13 actuated directly by hand or by suitable mechanism. The forward movement of the slide 11, in the direction indicated by the arrow, is normally prevented by a dog 14 and a rack or equivalent device. The slide 11 travels automatically, under the action of its spring or weight, while the dog 14 is disengaged, and the length of the movement is indicated by the pointer 12. The dog is disengaged at each key movement so that when a large letter is written by the typewriter and a corresponding hole is punched in the record sheet 6, the slide 11 moves a comparatively long distance. When, however, a full stop, comma or the like is typed, and a corresponding hole punched in the record sheet 6, the slide is moved to a comparatively slight extent. A plurality of dogs and racks may be used, instead of only one, or some other form of escapement may be used.

In the apparatus illustrated each punch g is provided with an abutment 15 adapted to lift a lever when the punch rises; the levers belonging to the various groups of punches are marked 16, 16^1 etc. in the drawing. All the levers 16 of the first group of punches (corresponding to the first group of characters) are mounted on a common shaft 17, and all the levers 16^1 of the second group are mounted on a common shaft 17^1, and so forth. Each of the shafts 17, 17^1 etc., carries a lever 18, 18^1 and so forth, the levers 18, 18^1 etc., being of different lengths and being connected by rods 19, 19^1 etc. to levers $20, 20^1$ etc. The latter are of different lengths and are mounted on a common shaft 21 connected to the dog 14 by the levers 22, 23 and 24 and shaft 25. A spring 26 acts on the lever 23 so as to normally hold the dog 14 engaged, but when either of the punches is lifted and rocks the shaft 21, the dog is disengaged until the punch g goes down again. As the shaft 21 is rotated to a different extent by each group of punches owing to the different lengths of the levers 18, 18^1 and 20, 20^1, the dog 14 is held out of engagement for different periods by the different groups, and the slide is allowed to move correspondingly through varying distances, so that the position of the slide always indicates the amount of space still available in the line to be stamped with characters.

It will be understood that the construction of the punching and indicating mechanism may be modified in detail without departing from the principle of the invention.

The device for moving the record sheet after each perforation will now be described; the mechanism for this purpose is such as to enable the feed movement to take place in either direction, backward and forward, as the stamping device is not intended to work in one direction only.

Reference will now be had to Figs. 10, 11, and 12. The type-keys and also the spacer key are connected by lever mechanism with a valve 27, the connection between the latter and the spacer key being shown in Fig. 9. The valve 27 connects a suction pipe 28 with a pipe 29. In the pipe 28 a constant vacuum is maintained by means of a suction bellows or an air pump, so that when the valve 27 is opened the air in the pipe 29 is exhausted. The pipe 29 leads to a cylinder 30 containing a spring loaded piston 31 which is moved toward the right in the cylinder by atmospheric pressure when the valve 27 is opened. For this purpose the cover of the cylinder is provided with apertures adjacent to the guide for the piston rod 32, (see Fig. 12). The movement of the piston must be rapid, and for this purpose the valve 27 is provided with the following mechanism. The key-actuated lever h, operating the valve 27, carries a rod i, the end of which is slotted. The end of this rod i provides a guide for the valve stem k which projects some distance into the slot. The valve is opened when the stem is depressed. Pivoted in the slot is a double armed lever $l\ m$ acted on by a spring n so that the arm l normally abuts against the rod i at the upper end of the slot.

The arm m extends straight downward for some distance, and is then bent aside to form a shoulder just above the stem k. A vertical projection or abutment o extends from the valve 27 to within a short distance of the part m. When the lever h is moved downward the valve stem is depressed down by the shoulder of the lever arm m and the valve is opened, but is quickly closed again by its own spring when the part m striking the projection o moves aside and removes the shoulder from the top of the valve stem k. The valve is thus only open for a very short period and the piston rod 32 is only moved to a slight ex-

ing the action of the first-mentioned sheet-feeding mechanism.

3. Apparatus for the purpose set forth comprising a typewriter having type-keys, motor cylinders normally closed at one end and open at the other end to the atmosphere, pistons in said cylinders, springs thrusting said pistons toward the open ends of said cylinders, punches connected to said pistons, valves severally controlled by said type-keys, pipes severally connecting the closed ends of said cylinders to said valves, suction pipes severally connected to said valves so that the latter can place them in communication with the first-mentioned pipes, pneumatically actuated reversible feed mechanism controlled by the keys, for feeding a sheet through the machine in position to be punched by said punching devices, sheet-feeding mechanism actuatable independently of the key action, and means actuated by the second-mentioned sheet-feeding mechanism for reversing the action of the first-mentioned sheet-feeding mechanism.

4. Apparatus for the purpose set forth comprising a typewriter having type-keys, motor cylinders normally closed at one end and open at the other end to the atmosphere, pistons in said cylinders, springs thrusting said pistons toward the open ends of said cylinders, punches connected to said pistons, valves severally controlled by said type-keys, so that said valves are opened during the latter part of the depression of said keys, pipes severally connecting the closed ends of said cylinders to said valves, suction pipes severally connected to said valves so that the latter can place them in communication with the first-mentioned pipes, pneumatically actuated reversible feed mechanism controlled by the keys, for feeding a sheet through the machine in position to be punched by said punching devices, sheet-feeding mechanism actuatable independently of the key action, and means actuated by the second-mentioned sheet-feeding mechanism for reversing the action of the first-mentioned sheet-feeding mechanism.

5. Apparatus for the purpose set forth comprising a typewriter having type-keys, motor cylinders normally closed at one end and open at the other end to the atmosphere, pistons in said cylinders, springs thrusting said pistons toward the open ends of said cylinders, piston rods projecting from said cylinders and having grooves adapted to admit air at the normally closed cylinder ends when the pistons are moved toward said closed ends, punches connected to said pistons, valves severally controlled by said type-keys, pipes severally connecting the closed ends of said cylinders to said valves, suction pipes severally connected to said valves so that the latter can place them in communication with the first-mentioned pipes, pneumatically actuated reversible feed mechanism controlled by the keys, for feeding a sheet through the machine in position to be punched by said punching devices, sheet-feeding mechanism actuatable independently of the key action, and means actuated by the second-mentioned sheet-feeding mechanism for reversing the action of the first-mentioned sheet-feeding mechanism.

6. Apparatus for the purpose set forth comprising a typewriter having type-keys, pneumatically actuated punching devices severally controlled by said type-keys, pneumatically actuated reversible feed mechanism controlled by the keys, for feeding a sheet through the machine in position to be punched by said punching devices, an indicator, means tending to continuously move said indicator in one direction, means normally preventing movement of said indicator, means actuated by the punching devices for releasing said indicator for periods proportionate to the widths of the types represented by the actuated keys, sheet-feeding mechanism actuatable independently of the key action, and means actuated by the second-mentioned sheet-feeding mechanism for reversing the action of the first-mentioned sheet-feeding mechanism.

7. Apparatus for the purpose set forth comprising a typewriter having type-keys, pneumatically actuated punching devices severally controlled by said type-keys, pneumatically actuated reversible feed mechanism controlled by the keys, for feeding a sheet through the machine in position to be punched by said punching devices, an indicator, means tending to continuously move said indicator in one direction, a movable dog normally locking said indicator to prevent movement thereof, levers actuated by the punches for disengaging said dog from the indicator, said levers varying in length so that the periods of disengagement vary according to the widths of the types represented by the actuated type-keys, sheet-feeding mechanism actuatable independently of the key action, and means actuated by the second-mentioned sheet-feeding mechanism for reversing the action of the first-mentioned sheet-feeding mechanism.

8. Apparatus for the purpose set forth comprising a typewriter having type-keys, pneumatically actuated punching devices severally controlled by said type-keys, reversible feed mechanism for feeding a sheet through the machine in position to be punched by said punching devices, a motor cylinder for actuating said feed mechanism, a valve, a pipe connecting said cylinder to said valve, a suction pipe connectible by said valve to the first mentioned pipe, a rod

tent, whereupon it returns to its position of rest, so that a double armed lever 33, to which the piston rod 32 is connected, is rocked rapidly to and fro. The lever 33 rocks on the spindle of the drum 7 over which the record sheet 6 passes. The sheet 6 passes over a second drum 34 on the axle of which is mounted a lever 35 connected by a rod 36 to the lever 33, so that the levers 33 and 35 rock in opposite directions. The drums 7 and 34 are provided with pin racks, which engage holes at the edges of the record sheet 6, whereby the latter is moved. The drums 7 and 34 are also provided respectively with ratchet wheels 36^1 and 37, the teeth of which are engaged with pawls 38 and 39 pivoted to the levers 33 and 35 respectively. Hence, when the lever 33 is rocked by the piston rod 32 the pawls 38 and 39 are also moved so as to be capable of rotating the ratchet wheels 36^1 and 37 and the drums. These movements, however, take effect in opposite directions, and provision is made to insure that only one of the ratchet wheels 36^1 and 37 is actuated at a time. Each time the carriage of the typewriter is pushed back, that is to say each time a new line is to be begun, one of the pawls 38 or 39 is lifted out of engagement and the other is rendered operative. The disengagement of the pawls 38 and 39 is effected by cover plates 40 and 41 which are adapted to be moved over the peripheries of the ratchet wheels 36^1 and 37 so as to render the respective pawls inoperative.

In the drawing the cover plate 41 is shown located between the pawl 39 and ratchet wheel 37, so that this pawl is inoperative, while the pawl 38 is free to move the drum 7 in the direction indicated by the arrow.

The cover plates 40 and 41 are mounted on levers 42 and 43, respectively, which rock about the axles of the drums 7 and 34, and the levers 42 and 43 are connected by a rod 44 in such manner that when one of the cover plates is under its pawl the other one allows its pawl to operate. The lever 42 is rocked by an eccentric 46 and rod 45, said eccentric being mounted on the shaft of a ratchet wheel 47 engaged by a pawl 48 with a pinion 49, so that the latter can drive the ratchet wheel in one direction, but not in the other. The pinion 49 is meshed with a pinion 50 which can be rotated from the typewriter by means of a pair of bevel wheels 51, 52, and a lever 53. The actuation of the latter also serves to move back the carriage of the typewriting machine to the position for beginning a fresh line, the said carriage being connected in a suitable manner with the shaft of the lever 53.

When the time comes to perforate a line on the record sheet 6 backward, in order to be able to stamp lines backward as well as forward, in the stamping machine, it is necessary, before beginning the rearward series of perforations, to shift the record sheet forward to a corresponding extent, as otherwise the sheet would be punched twice at the same place. This shifting movement of the record sheet 6 is also effected by means of the manually controlled lever 53, and takes place after the punching of each line, inasmuch as after the punching of the rearward series the sheet must be shifted again for the purpose of beginning a fresh forward series at the place where the rearward series started. The shaft of the lever 53 carries a lever 54 connected by a ball joint with a rod 55, which is connected by a ball joint with a lever 56 pivoted to the axle of the drum 7; said lever 56 carries a pawl 57 engaging a ratchet wheel 58 fixed to the drum, so that the latter can be rotated for feeding the sheet forward, by rocking the lever 56. This arrangement enables the sheet to be fed through the machine step by step, in steps corresponding to the length of a line, and at the same time the pawls 38 and 39 are alternately put into and out of gear, so that the feed during the punching operation is alternately forward and backward.

It will be understood that the constructional details may be varied within the scope of the subjoined claims, and that the drawing is diagrammatic.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. Apparatus for the purpose set forth comprising a typewriter having type-keys, pneumatically actuated punching devices severally controlled by said type-keys, pneumatically actuated reversible feed mechanism controlled by the keys, for feeding a sheet through the machine in position to be punched by said punching devices, sheet-feeding mechanism actuatable independently of the key action, and means actuated by the second-mentioned sheet-feeding mechanism for reversing the action of the first-mentioned sheet-feeding mechanism.

2. Apparatus for the purpose set forth comprising a typewriter having type-keys, pneumatically actuated punching devices severally controlled by said type-keys, pneumatically actuated reversible feed mechanism controlled by the keys, for feeding a sheet through the machine in position to be punched by said punching devices, an indicator controlled by said punching devices so that it moves proportionately to the widths of the types represented by the actuated type-keys, sheet-feeding mechanism actuatable independently of the key action, and means actuated by the second-mentioned sheet-feeding mechanism for revers-

movable by the typewriter keys, a spring pressed lever carried by said rod for opening said valve, a fixed abutment arranged in the path of said spring pressed lever so that said lever is moved aside immediately after the opening of the valve and allows the valve to be re-closed, sheet-feeding mechanism actuatable independently of the key action, and means actuated by the second-mentioned sheet-feeding mechanism for reversing the action of the first-mentioned sheet-feeding mechanism.

9. Apparatus for the purpose set forth comprising a typewriter having type-keys, pneumatically actuated punching devices severally controlled by said type-keys, two feed drums for feeding a sheet through the machine in position to be punched by said punching devices, two pawl and ratchet devices severally adapted to rotate said feed drums in opposite directions, means controlled by the keys for collectively moving the two pawls, sheet-feeding mechanism actuatable independently of the key action, and means actuated by the second mentioned sheet-feeding mechanism as and for the purpose specified.

10. Apparatus for the purpose set forth comprising a typewriter having type-keys, pneumatically actuated punching devices severally controlled by said type-keys, two feed drums for feeding a sheet through the machine in position to be punched by said punching devices, two pawl and ratchet devices severally adapted to rotate said feed drums in opposite directions, means controlled by the keys for collectively moving the two pawls, sheet-feeding mechanism actuatable independently of the key action, an eccentric rotated by the second-mentioned sheet-feeding mechanism, and two plates collectively reciprocated by said eccentric so that during rotation of the eccentric the two pawls are alternately thrown out of action by interposition of said plates between the pawls and the ratchet wheels.

11. Apparatus for the purpose set forth comprising a typewriter having type-keys, pneumatically actuated punching devices severally controlled by said type-keys, two feed drums for feeding a sheet through the machine in position to be punched by said punching devices, two pawl and ratchet devices severally adapted to rotate said feed drums in opposite directions, means controlled by the keys for collectively moving the two pawls, a third pawl and ratchet device for rotating said drums, a rod, a lever, ball and socket joints connecting said rod to said lever and to said third pawl and ratchet device, a manually controlled shaft for actuating said lever, and means actuated by said shaft for alternately throwing out of action the first-mentioned pawl and ratchet devices during successive actuations of the third pawl and ratchet device.

In witness whereof I have signed this specification in the presence of two witnesses.

MAX ERICH BLUME.

Witnesses:
REINHOLD GÖLLNITZ,
RUDOLPH FRICKE.