No. 886,447. PATENTED MAY 5, 1908.

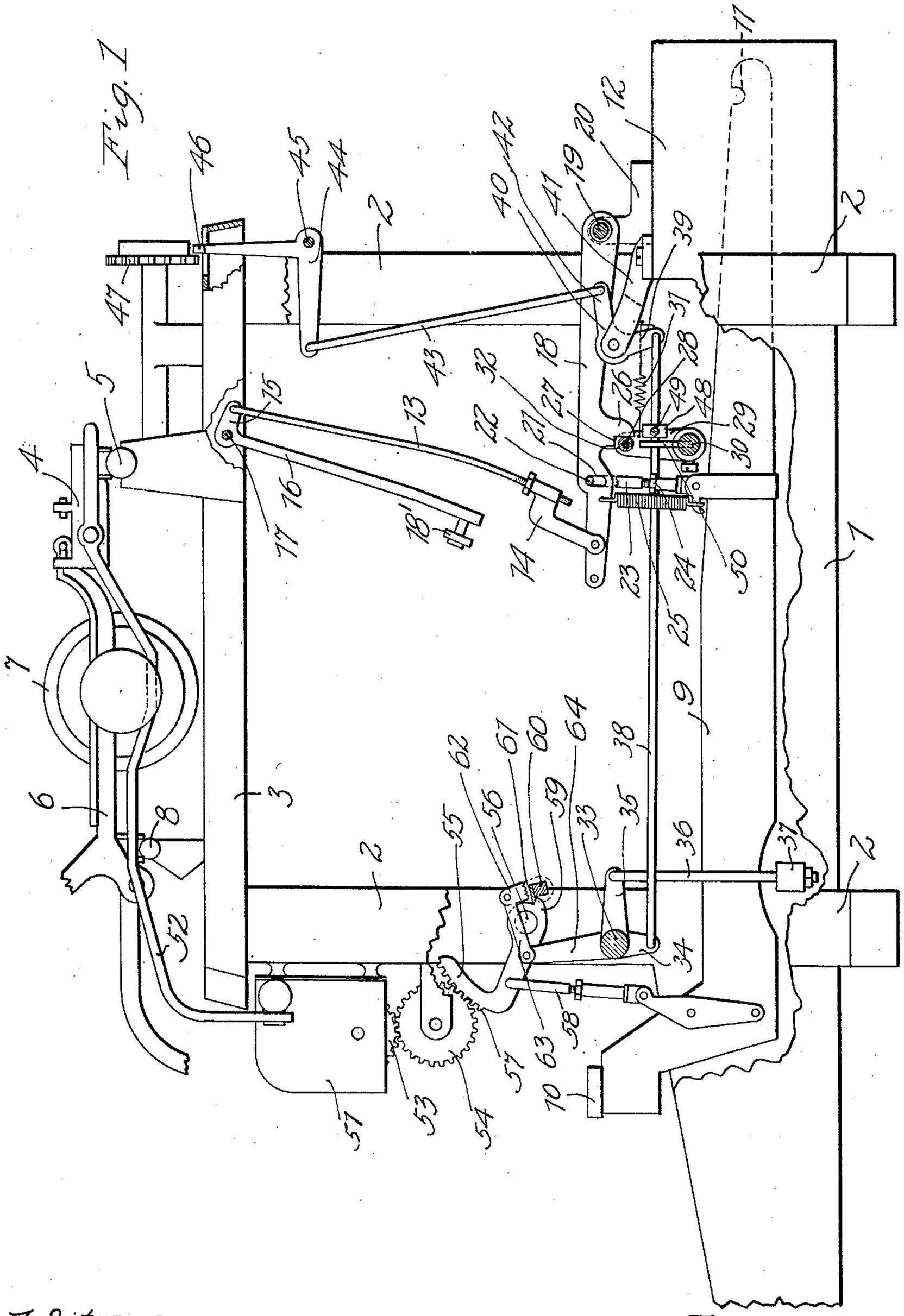
J. C. WAHL.

KEY ACTION.

APPLICATION FILED AUG. 1, 1907.

2 SHEETS—SHEET 1.

Fig. 1.



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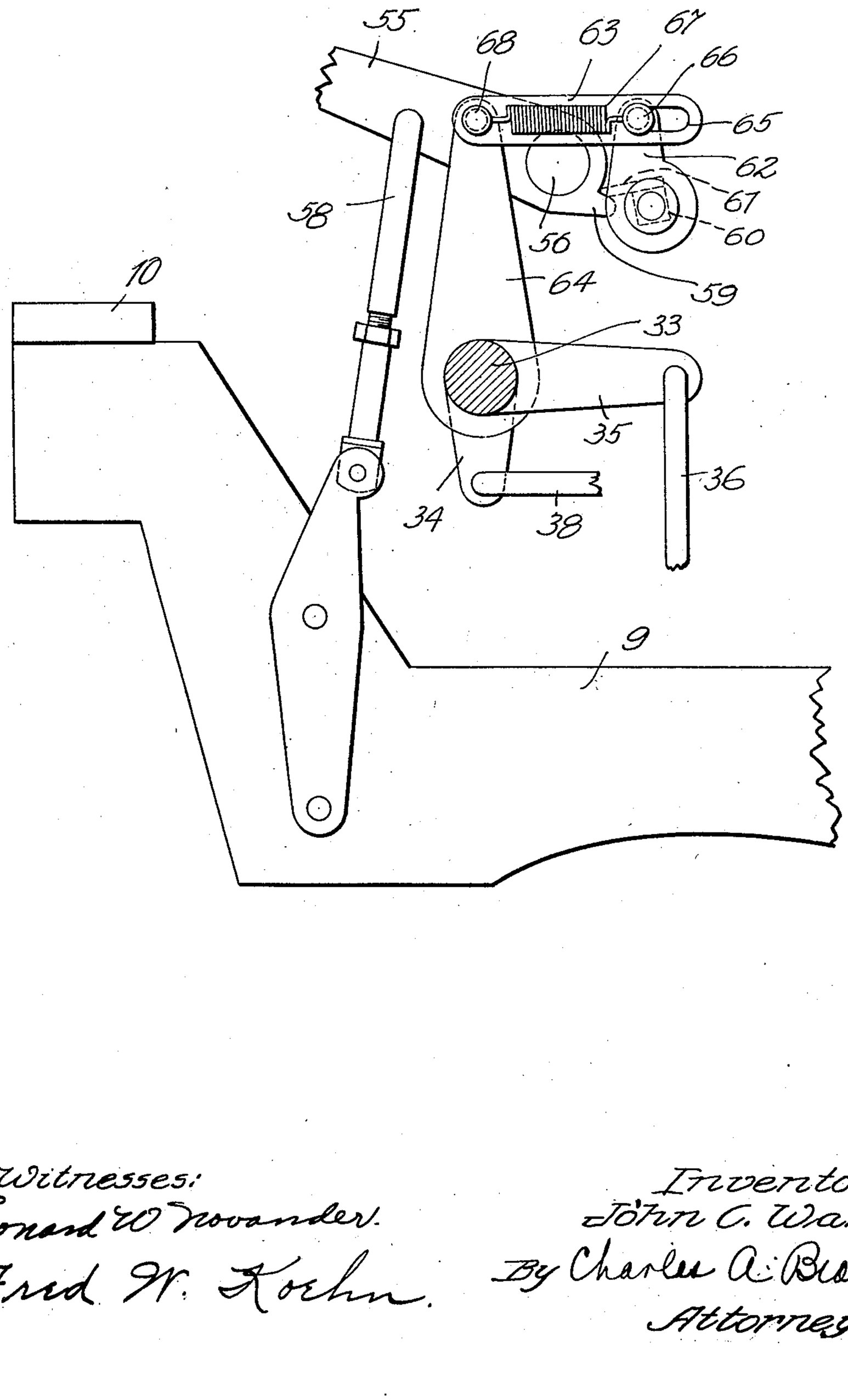
2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

JOHN C. WAHL, OF CHICAGO, ILLINOIS.

KEY-ACTION.

No. 886,447. Specification of Letters Patent. Patented May 5, 1908.

Application filed August 1, 1907. Serial No. 386,504.

To all whom it may concern:

Be it known that I, JOHN C. WAHL, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Key-Actions, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to typewriting, calculating or kindred machines, its object being to provide improved key action therefor.

In machines of this kind where the type is thrown against a platen upon striking of keys, there is apt to be non-uniformity in the appearance of the printing on the paper. If a light fingered person manipulates the keys, the printing is apt to be more or less faint, while if a heavy fingered person strikes the keys, the printing is very heavy and perhaps the paper is cut by the type.

The main object of my invention, therefore, is to provide improved action mechanism intervening between the keys and the type, which mechanism will automatically cause the type to strike the platen with uniform force independent of the pressure or force exerted upon the keys. In typewriting machines, for instance, in the well known Remington typewriting machines, the type bars or rods are connected directly with the key levers so that the pivoted bars carrying the type are thrown against the platen with a force dependent upon the force with which the keys are struck. Instead of having this direct connection, I interpose a spring mechanism between the type rods and the key bars which spring mechanism is primarily actuated upon depression of the keys without causing movement of the type rods, but which mechanism is tripped after the key has been depressed so that the force of the spring alone will cause the type bar and type to be thrown against the platen, and no matter what the force exerted on the keys may be, the force which throws the type against the platen is produced by the spring mechanism, and the spring mechanisms are made uniform for the various keys, so that the printing will all be uniform and of equal strength. The tripping mechanism is also associated with the escapement mechanism of the typewriter carriage, the adjustment being such that tripping takes place to cause the type to strike the platen before the escapement mechanism may operate to allow the carriage to escape.

My invention will be clearly understood when described with reference to the accompanying drawings in which—

Figure 1 is a more or less diagrammatic view, showing part of a typewriter frame and the arrangement for one key, the equipment being the same for each key; Fig. 2 shows a modified arrangement of driving mechanism for a calculating attachment which may be applied to the typewriter.

1 represents the base of the frame of the well known Remington typewriting machine from which extend the uprights 2, 2, supporting the table or top plate 3. The escapement carriage body 4 travels on the track 5, and the rotatable front part of the carriage 6 carrying the platen roller 7 rests on the track 8, as is well known.

9 shows a key bar having at its front end the finger plate 10, being pivoted at its rear end 11 in the pivot case 12 of the typewriter frame.

13 shows a type rod adjustably connected with the coupling member 14. The upper end of this type rod connects with the arm 15 of the bell crank-shaped type bar 16 pivoted at 17 and which carries at its end the type block 18. The centers of the pivot 17 and of the platen roller 7 are a distance apart so that the type blocks of the various type bars which are spaced about the platen, will all strike the platen at a certain central point, as is well known. In the Remington and other machines now on the market, the coupling members 14 are connected directly with the key bar 9, and when a key is struck, the type block will strike the platen with a force in proportion to the force with which the key is struck.

According to my invention, the connection between the type levers and the key bars is not direct, but I interpose mechanism which will cause the type blocks to all strike the platen with uniform force. This intermediary mechanism comprises a plurality of levers 18 pivoted to a shaft 19 supported in the bearings 20 mounted on the pivot case 12, and the front end of each lever is connected with the coupling member 14 of the corresponding type lever mechanism. To the rear of the connection of each lever with the coupling 14, the lever has a slot 21 in which engages the hooked end 22 of a coupling

member 23 having adjustable engagement with a companion coupling member 24 which is pivoted to a corresponding key bar 9. Also connected between the lever 18 and the key bar 9 is a tension spring 25. A tongue 26 extends downwardly from the lever 18 and provides a stop shoulder 27 which normally engages the stop or tripping bar 28 which extends across the typewriting machine and which is supported at its ends on the arms 29 which extend from a shaft 30 pivoted in the side walls of the frame part 1 of the machine. A tension spring 31 connected between this rotatable frame and the machine frame serves to normally hold the tripping bar 28 against the tongues 26 and under the shoulders 27 of the various levers 18. Upon depression of a key, therefore, there can be no corresponding movement of the lever 18 and of the typewriter mechanism as long as the bar 28 is below the shoulder 27 of the struck key, but the spring 25 will be extended and a downward pull exerted upon the lever 18. Mechanisms, however, are provided for rotating the shaft 30 and therewith the arms 29 to withdraw the shaft 28 from the shoulder 27, and the spring 25 will then shut and will pull down the lever 18, consequently causing rotation of the type bars 16 and engagement of the type block 18′ with the platen, the force with which the type bar strikes the platen being determined by the strength of the spring 25, and the springs for the various keys may all be of equal strength, so that the type bars will all strike with uniform force. To lessen the friction, the shaft 28 may be provided with a roller 32.

The mechanism for rotating shaft 30 and for tripping levers 18 may be of various forms. As shown, a pivot shaft 33 may be pivoted between the front supporting posts 2 of the machine frame from which shaft extend the arms 34 and 35. The arm 35 connects through rod 36 with the escapement bar 37, arranged below the key bars 9 of the machine in a well known manner, this bar being struck by the key bars after they have been actuated sufficiently to cause the type bars controlled thereby to strike the platen. The arm 35 extends horizontally, and the arm 34 extends vertically downward, and from the end of the arm 34 I have shown a bar 38 extending rearwardly and connecting with the arm 39 of the bell crank lever 40 pivoted at the end of the arm 41 extending forwardly from the casing 12. The other arm 42 of this bell crank lever is connected to a rod 43 which extends upwardly and which is connected with the bell crank lever mechanism 44 pivoted at 45, which at its upper end carries escapement teeth 46 for engaging with the escapement teeth of the escapement pinion 47 which connects with the escapement carriage in a well known manner, so that each rotation of the bell crank mechanism 44 allows an escapement of the paper carriage. On the rod 38 is secured the block 48 as by means of a set screw 49, and extending upwardly from the shaft 30 is a pin 50.

The operation of the mechanism thus far described is as follows: Upon depression of the key, the spring 25 is extended, the lever 18 remaining stationary as the tripping bar 28 is below the shoulder 27. When the key reaches the escapement bar 37 and depresses said bar, the arm 35 will be swung to rotate shaft 33 and to swing arm 34 forwardly, thereby drawing bar 38 forwardly and causing rotation of the bell crank lever 40. However, before the escapement mechanism connected with the lever 40 can be actuated sufficiently to release the paper carriage, the block 48 will engage the pin 50 to rotate shaft 30 to swing bar 28 from under the shoulder 27 to release the bar 18 which is thereupon jerked down by the collapsing spring 25 and the type block will be thrown against the platen. The position of the block 48 and the adjustments of the various levers is such that the escapement mechanism will be actuated directly after the type bar has struck the platen and the paper carriage may escape. The length of the slot 21 in the lever 18 is such that the lever 18 will be tripped before the hooked end engages the lower end of the slot, and the hooked end then mainly serves the purpose of checking or limiting the downward travel of the bar 18, when the bar is tripped. The force of the spring 25, therefore, absolutely controls the force with which the type bar strikes the platen, and no matter how lightly or how heavily the key is struck, the printing of the type will be uniform.

Calculating attachments are also being provided for typewriting machines, which attachments are directly connected with the number keys of the machine, as shown, for example, in my copending applications. On the drawings I have diagrammatically represented such calculating mechanism by the reference character 51 which calculating mechanism is shown connected with the paper carriage part 4 by means of the connecting bar 52. This calculating mechanism or totalizer mechanism has the totalizer gear wheels represented by 53, which are adapted for engagement with the intermediary gearing mechanism 54. This intermediary gearing mechanism is associated with driving mechanism connected with each key of the machine. This driving mechanism I have shown as comprising a gear frame 55 pivoted on a shaft 56 and having teeth 57 along its front edge for engaging with the intermediary gearing mechanism 54. Coupling mechanism 58 connects each gear frame 55 with the corresponding key bar 9 so that upon depression of the key, the gear frame 55 is rotated, and the gearing mechanism 54

given a rotation dependent upon the number of teeth 57 on the gear frame 55. Each gear frame 55 also has a cam extension 59, while to the rear of these extensions is a bar 60 pivoted at its ends in the machine frame. Extending from this bar is the cam web 61 to be engaged by the cam extensions 59 upon rotation of a gear frame 55. A lever 62 extends upwardly from the bar 60 and is connected through link 63 with the upper end of the arm 64 extending upwardly from shaft 33. When a key is depressed, the gear frame 55 connected therewith through the coupling mechanism 58 is rotated, and its gear teeth 57 causes a rotation of the intermediate gearing mechanism 54 and the engaged totalizer gear 53 corresponding to the number of the key depressed. The bar 60 is also rotated by the cam extension 59, and its motion transmitted through lever 62, link 63, arm 64, shaft 33, arm 34, bar 38 and block 48 to the pin 50 to cause rotation of the tripping frame and operation of the lever 18 by the spring 25 to cause the type bar to strike the platen and to print the number corresponding to the depressed key. The movement of the bar 38 also rotates the bell crank lever 40 and thereby causes actuation of the escapement mechanism to allow escape of the paper carriage. The lost motion between the block 48 and pin 50 and the adjustments of the various lever mechanisms and cam extension engagements is such that the totalizer mechanism action will have been completed before the tripping frame is actuated to allow operation of the type bar, and the escapement mechanism is actuated after the type bar has struck the platen. When this arrangement is used, the adjustment is also such that the tripping of the type mechanism and operation of the escapement mechanism is independent of the escapement bar 37, the operations taking place before the key lever 9 engages the escapement bar. Accurate and complete operation of the totalizer or calculating mechanism is, therefore, accomplished and assured before the result is printed and before the paper carriage is allowed to escape.

In Fig. 2 is shown a modified arrangement for causing operation of the type and escapement mechanism. In Fig. 1 the link 63 gives a positive and rigid connection between the arms 62 and 64, and the shaft 33 begins to rotate almost immediately upon deprsssion of the key, but is not rotated far enough to cause action of the type mechanism or escapement mechanism until the calculation has been performed. In Fig. 2, however, a yielding connection is afforded between the arms 62 and 64, the link 63 having a slot 65 engaged by the pin 66 extending from arm 62, and a spring 67 connects this pin with the pivot point 68 which connects the other end of the link 63 with arm 64. With this arrangement when the key is struck, the shaft 33 will not be rotated immediately, but the spring 67 will be extended upon rotation of the bar 60, and when the gear frame has been rotated sufficiently to cause complete actuation of the calculating mechanism, the pin 66 will engage the end of slot 65 and start rotation of the shaft 33 whose rotation will then be completed by the force of the closing spring 67 and the tripping mechanism, and then the escapement mechanism will be actuated promptly. This arrangement is perhaps more reliable than that shown in Fig. 1 which is inclined to be more or less sluggish in its operation.

My invention thus described renders the printing of the type entirely independent of the striking force on the keys, the printing of the type bars being at all times uniform. If lighter or heavier printing is desired, adjustment can easily be made by changing the force of the springs 25.

I do not wish to be limited to the exact arrangements which I have shown, as changes may readily be made within the scope of my invention, the main and broad feature being the means for causing the uniform striking and printing of the type.

I desire to secure the following claims by Letters Patent:

1. In a machine of the class described, the combination of keys, type bars, spring mechanism connecting each type bar with one of the keys, and mechanism for preventing operation of the type bars by the spring mechanism upon actuation of a key until said key has been actuated a predetermined distance.

2. In a machine of the class described, the combination of a key, a type bar, and elastic connection between the type bar and the key, and means for preventing operation of the type bar by the elastic connection until the key has been actuated a predetermined distance.

3. In a machine of the class described, the combination of a key, a type bar, elastic connecting mechanism between the key and the type bar, means for storing energy in the elastic connecting mechanism upon actuation of the key, and means for allowing actuation of the type bar by the stored-up energy and the elastic connecting mechanism when the key has been actuated a predetermined distance.

4. In a machine of the class described, the combination of a key, a type bar, energy-storing means connected with the type bar, means for storing energy in the energy-storing means upon actuation of the key, and means for allowing the stored energy to operate the type bar after an interval of actuation of the key.

5. In a machine of the class described, the combination of a key, a type bar, and elastic mechanism connected with the key and with the type bar for determining the operation

of the type bar independently of the key action.

6. In a machine of the class described, the combination of a key, a type bar, and elastic mechanism intervening between the key and the type bar, said elastic mechanism being energized upon actuation of the key, and then allowed to direct its accumulated energy to operate the type bar.

7. In a machine of the class described, the combination of a key, a type bar, elastic mechanism between the key and the type bar, actuation of the key causing storing of energy in the elastic mechanism, means for preventing movement of the type bar during the storing of energy in the elastic mechanism, and means for subsequently allowing the stored energy in the elastic mechanism to operate the type bar.

8. In a machine of the class described, the combination of a key, a type bar, an elastic member connecting the key with the type bar, actuation of the key causing storing of energy in the elastic member, tripping mechanism for preventing movement of the type bar during such storing of energy, and means for actuating the tripping mechanism to allow the elastic member to direct its stored energy toward operating the type bar.

9. In a machine of the class described, the combination of a key, a type bar, an elastic member connecting the type bar with the key, tripping mechanism for normally preventing movement of the type bar, actuation of the key causing operation of the elastic member whereupon energy is stored therein, and means controlled by the movement of the key for actuating the tripping mechanism to release the type bar whereby the energy stored in the elastic member becomes effective to operate the type bar.

10. In a machine of the class described, the combination of a key, a type bar, a spring connecting the key with the type bar, tripping mechanism normally having engagement with the type bar to prevent operation thereof, actuation of the key causing the storing of energy in the spring while the type bar is held by the tripping mechanism, and means for actuating the tripping mechanism to allow the energy in the spring to operate the type bar.

11. In a machine of the class described, the combination of a key, a type bar, a spring connecting the key with the type bar, tripping mechanism normally having engagement with the type bar to prevent operation thereof, actuation of the key causing the storing of energy in the spring while the type bar is held by the tripping mechanism, and means controlled by the movement of the key for actuating the tripping mechanism to allow the type bar to be operated by the energy stored in the spring.

12. In a machine of the class described, the combination of a key, a type bar, and elastic connecting mechanism between the key and the type bar for determining the force with which the type bar is operated independently of the force with which the key is actuated.

13. In a machine of the class described, the combination of a key, a type bar, and connecting mechanism between the key and type bar for determining the force with which the type bar is operated independently of the force with which the key is actuated.

14. In a machine of the class described, the combination of keys, type bars connected with the keys, and means for transforming the variable forces with which the keys may be struck into uniform force for actuating the type bars.

In witness whereof, I hereunto subscribe my name this 9th day of July A. D., 1907.

JOHN C. WAHL.

Witnesses:
CHARLES J. SCHMIDT,
LEONARD W. NOVANDER.