(No Model.)

2 Sheets—Sheet 1.

J. M. FAIRFIELD.

TYPE WRITING MACHINE.

No. 536,022. Patented Mar. 19, 1895.

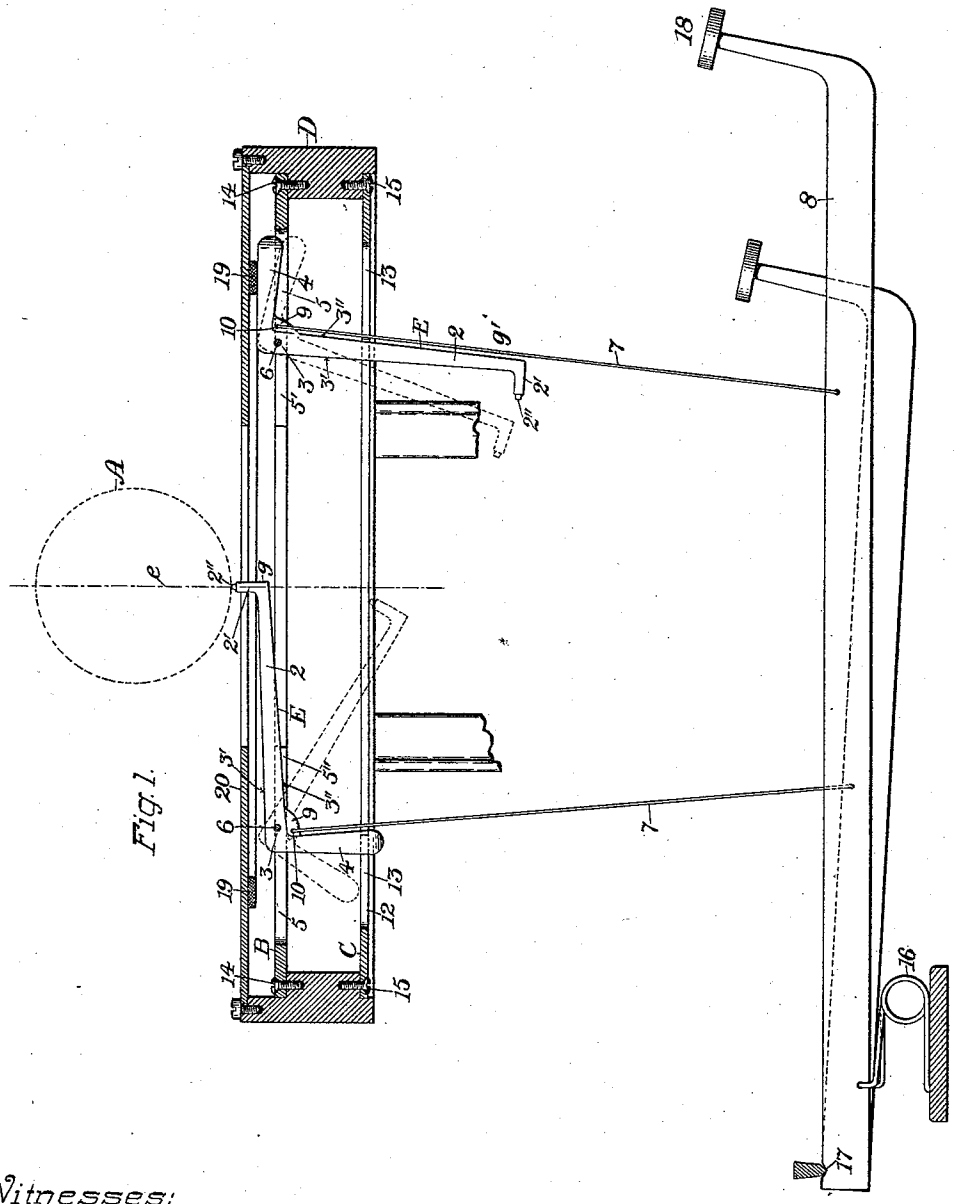

Fig. 1.

Witnesses:
F. L. Edwards Jr.
Fred. J. Dole.

Inventor:
John M. Fairfield.
By his Attorney,
F. H. Richards

(No Model.) 2 Sheets—Sheet 2.

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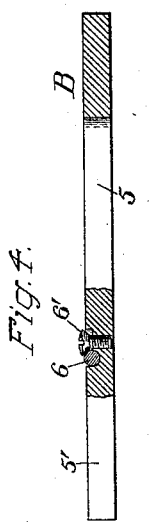

Fig. 4.

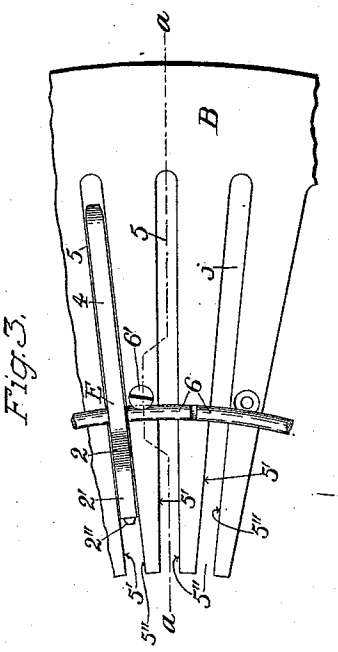

Fig. 3.

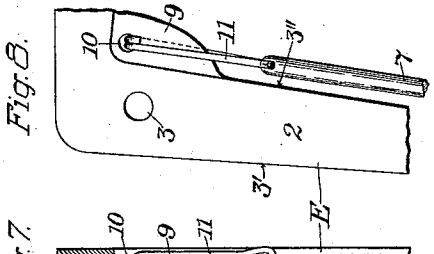

Fig. 8.

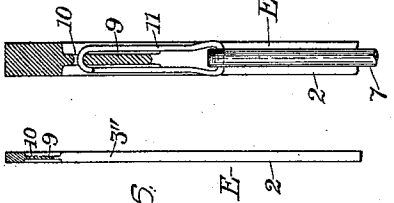

Fig. 7.

Fig. 6.

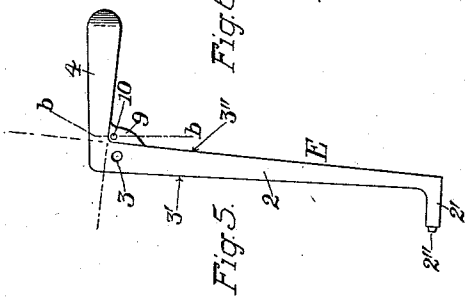

Fig. 5.

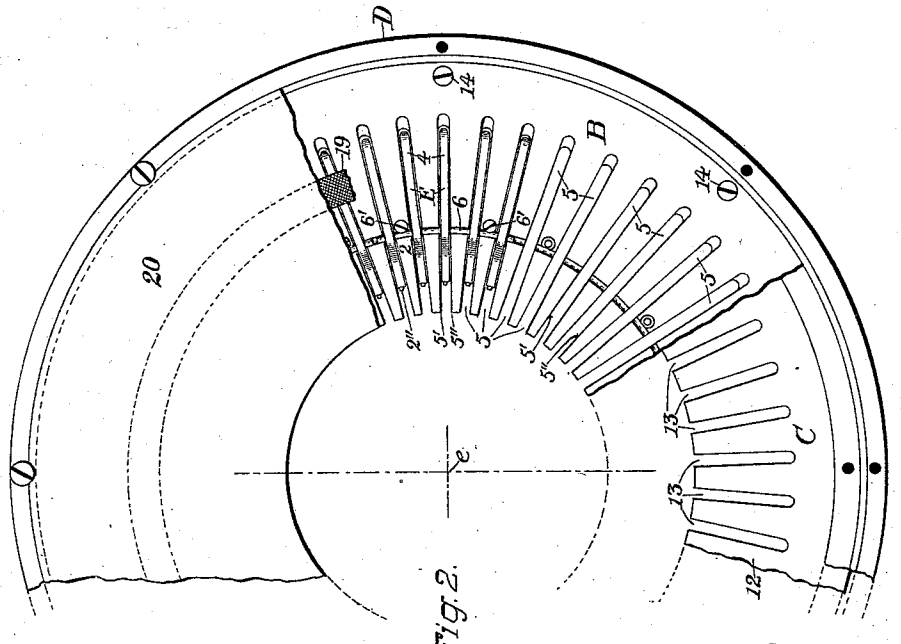

Fig. 2.

Witnesses:
F. L. Edwards Jr.
Fred. J. Dole.

Inventor
John M. Fairfield,
By his Attorney,
F. H. Richards

UNITED STATES PATENT OFFICE.

JOHN M. FAIRFIELD, OF HARTFORD, CONNECTICUT.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 536,022, dated March 19, 1895.

Application filed September 19, 1893. Serial No. 485,741. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. FAIRFIELD, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

This invention relates to that class of writing-machines which are provided with swinging type-bars supported to swing toward a common center; the object being to provide an improved writing-machine having permanent alignment, of simple construction and adapted to be manufactured on the interchangeable method without adjustments, and having improved means for positively controlling the type-bar during the working-stroke thereof.

In the drawings accompanying and forming a part of this specification, Figure 1 is a sectional side elevation of a portion of a writing-machine of the class specified, constructed according to my present invention. Fig. 2 is a plan view of a portion of the type-writer mechanism, showing some parts broken away for more fully illustrating the construction and arrangement of the principal details. Fig. 3 is an enlarged view similar to a portion of Fig. 2, for further illustrating certain features of the mechanism. Fig. 4 is a sectional view, in line *a*—*a*, Fig. 3. Fig. 5 is a side view of one of the type-bars. Fig. 6 is an edge view, and a sectional view in line *b*—*b*, of the type-bar shown in Fig. 5. Fig. 7 is an enlarged view similar to the upper portion of Fig. 6, showing the type-bar-actuating rod, or connection, in operative connection with the type-bar. Fig. 8 is a side view of that portion of the type-bar and connecting-rod shown in Fig. 7, as seen from the left-hand in Fig. 7.

Similar characters designate like parts in all the figures.

One of the principal objects of my present invention is to furnish a type-mechanism for writing-machines so organized and constructed that the parts may be made and assembled strictly on the interchangeable method. According to my present improvements, therefore, the type-bars are side-guided, being controlled as to their position laterally of the plane of their swinging movement entirely by the side-walls between which the bars are mounted, these being supported upon fixed pivots fixed in position transversely of said guide-walls.

The carrier-guide B, is made in the form of a plate having the slots, 5, extending to the inner edge thereof, and support said plate upon some suitable framework, as, for instance, the ring D, which constitutes a portion of the frame of the writing-machine; and I also prefer to make the stationary, supplemental guide, C, in the form of a plate and support this upon the under side of said frame-ring D, both said plates B and C being shown fixed to said framework by means of ordinary binding-screws, 14 and 15, respectively.

The type-bar, E, is of angle-form, it comprising the type-arm, 2, which is furnished at its outer end with the usual type, 2″, and has at the rearward end thereof the pivot-bearing, 3; and the angle-arm, 4, extending from the type-arm from a point thereon adjacent to the pivot-bearing in a direction crosswise to said type-arm. The type-bar is pivotally supported for swinging movement toward and from the paper-carrier of the type-writing machine, said carrier being represented in the present instance by the ordinary cylinder, A, which may be supported in the machine by an ordinary type-writer carriage, in any well-known manner. The type-bar is fitted to swing freely but closely within a slot, 5, between the opposing guide-walls, 5′ and 5″, of the type-bar carrier-guide B, which is or may be in the nature of a frame, usually of circular form, extending around the common center (indicated by the dotted line *e*), which coincides with the printing-point. Said type-bar is pivotally supported on a pivot or journal, 6, which is suitably supported transversely of the type-bar slot 5 by some suitable holding device, preferably by a bevel-head screw, 6′, as indicated in Fig. 4. Said pivot 6 is located at a relatively considerable distance rearwardly from the forward or inner ends of the guide-walls 5′ and 5″, so that when the type-bar is in its printing-position as shown at *g*, Fig. 1, said arm will be positively controlled as against any lateral swinging movement in the plane of the axis of its working-stroke.

The type-bar E is not only angle-form as

set forth, but is "counter-balanced" in the following manner: When the type-bar is in its normal idle position, as illustrated in Fig. 1, the type-arm thereof extends downwardly, being located nearly under the pivotal point 3 thereof, and at this time the angle-arm 4 of the type-bar extends rearwardly, or outwardly, from said pivotal point, so as to have its greatest effect as to weight for normally throwing the type-arm inwardly toward the printing-point. This natural action of the weighted or counter-balance type-arm is opposed or counteracted by means of the return-spring, 16, (see Fig. 1) which is suitably supported on the framework of the writing-machine and bears against the key-lever, 8, at a point some distance from the fulcrum-bearing, 17, of said lever and in a direction to elevate the key-end of the lever, and, through the connecting-rod, 7, hold the type-bar in its fully retracted position shown in said Fig. 1. On the working stroke of the type-bar, the type-arm thereof is carried from its non-effective position shown in Fig. 1, to its printing-position shown in Fig. 1, in which latter position, the type-arm being substantially horizontal, the weight of this arm tends most strongly to carry the same downwardly, away from the paper-carrier; and this downward movement is at this time the least counteracted by the weight of said angle-arm, which at this moment stands below the pivotal point 3 of the type-bar.

It will be remembered that in this class of type-writers it is deemed necessary that the type-face 2″ be formed or fixed on the end of the terminal arm, 2′, at the outer end of the type-arm, for the purpose, among others, of avoiding any contact of the type-arm itself with the ribbon of the machine or with the devices for holding the ribbon in place adjacent to the paper-carrier. By reason of this feature of the type-bar, it is evident that any rotation of the type-bar about an axis longitudinally of itself during the later portion of the working-stroke of the type-bar would result in a lateral movement of the type-face and thereby produce a misalignment of the printing. Such rotary movement, however, is prevented by the means herein described therefor, the same consisting of the angle-arm 4 of the type-bar, and a stationary, supplemental guide therefor in position for engaging the same prior to and during the moment of printing. When the type-bar returns to its normal idle position shown at *g′*, Fig. 1, the angle-arm 4 which extends rearwardly therefrom (in a direction crosswise thereto) swings upwardly into the rearward or outer portion of the aforesaid type-bar slot 5, and thereby rigidly controls the type-bar as against any rotative movement about an axis longitudinally of the type-arm. By this means the type-arm is held against movement during the operation of scrubbing or brushing the types, and is maintained in a truly normal idle position ready for beginning its working-stroke in the true plane of said stroke; this stroke being accomplished by means of the connection 7 between the type-bar and the key-lever 8. For the purpose of making connection between said rod 7 and the type-bar, this is reduced in thickness at 9, and has a pivot-bearing, 10, in said thinned portion. A space is thus provided at one or both sides of the type-bar for the upper end 11, of said connecting-rod 7, so that on its upward stroke, as in Fig. 1, said connecting-rod end stands within the type-bar slot, 5. This feature here described may, however, be modified in any desirable manner without affecting the principal features of my present invention.

On the working-stroke of the type-bar, the type-arm thereof comes to a substantially horizontal position, while the angle-arm, or guide-arm 4 thereof approaches a vertical position, as indicated in Fig. 1; and for restraining the type-bar at the moment of printing, (that is, during the later portion of its working-stroke,) from rotative movement about an axis longitudinally of the type-bar, a stationary, supplemental guide is provided and is located in position to receive the end of said angle-arm prior to the completion of said working-stroke and thereby positively restrain the type-bar from having any rotative movement such as described. For this purpose, when the type-arm is, as it preferably will be, in the plane of the type-bar, said supplemental guide is located in the plane of the type-bar slot 5, and will usually be of the same width, since it is more convenient, in practice, to make said angle-arm 4 of the same thickness througout its length, and of the same thickness as the type-arm 2.

The supplemental guide, 12, is similar, in a general way, to the carrier-guide, and, series of type-bars are arranged about a given center as usually done in type-bar writing-machines, may consist of an annular frame or plate, designated in a general way by C and having therein a series of guide-slots, 13.

When the type-bars are in their normal idle position as shown at *g′*, Fig. 1, the operating-rod 7 stands close behind the type-arm of said bar; and when the type-bar is swung upward to its printing-position shown at *g*, Fig. 1, said operating-rod stands close to the forward side of the angle-arm 4 of said bar. It will, therefore, be obvious that the operating-rod of the machine occupies the space usually required for a type-bar rest to support the type-provided ends of the type-arms when the type-bars are in their idle position. In view of the described arrangement of the parts, and also to avoid the necessity for using a separate type-rest such as referred to, I provide a type-rest cushion, 19, which is affixed to the under side of a guard-plate or cover, 20, that is fixed to the framework D of the writing-machine. Said cover 20 protects the working parts of the type-mechanism from falling dust and dirt, and also prevents the ribbon (which will be of the ordinary description extending

across the machine underneath the paper-carrier A and over the type-mechanism) from falling into the central type-bar space and thus interfering with the proper action of the type-bars.

The connecting-rod standing in the plane of the swinging movement of the type-bar, does not tend, either on its pulling or pushing movement, to deflect or draw the type-bar out of its true course. This peculiar organization of the parts, therefore, avoids any tendency of the type-bar to wear away its guide-walls unequally, and does not at any time bring any undue pressure against said walls. By this means those wearing surfaces are protected and their durability greatly enhanced, the type-bars are relieved from extraneous resistance, and the power is applied to the type-bar with the highest efficiency.

The guide-surfaces 5′ and 5″ are made narrow in a vertical direction and of relatively great length in a horizontal direction, so that the type-arm 2 in its working-stroke passes over the entire area of said guide-surfaces, the forward edge, 3′, of the type-arm passing above said guide-surfaces. By this means those guide-surfaces are subjected to equal wear throughout their entire width, and are thereby maintained in correct parallelism and condition for use; also, the rearward edge, 3″, of the type-arm passes above the lower edge of the guide-surfaces 5′ and 5″, so that the entire width of said type-arm is subjected to wear and is thus maintained in perfect alignment and condition for use. In those older kinds of writing-machines in which a type-bar has a reciprocatory movement from and into a slot which the bar does not pass through, there is, as is well known, a greater wear of the guide-surfaces at the open side of the slot, and of the type-bar on the edge which enters the slot; so that while the slot is widened on one edge, the bar is worn thinner on the opposite edge and the proper fit of the parts thereby entirely destroyed. By means of the features which I have herein particularly shown and described, such unequal wear and the disadvantages arising therefrom are avoided, and the mechanism is made to naturally keep itself in perfect working condition for long periods of time, without expense for repairs or renewal of the parts.

By the term "side-guided," as applied herein to the type-bar, I refer to a type-bar of that class in which the control of the bar against lateral movement, or movement in directions other than in the plane of the working-stroke, is effected by means of guide-surfaces or walls parallel to said plane, and operating in this respect independently of the pivot of the lever; said pivot necessarily being fitted, in practice, too freely in the pivot-bearing of the lever to have any control of the type-bar (within the required limits) as against such lateral movements.

In operating the machine, when the operator strikes the key, 18, with the finger, the force or pressure of the finger on the key is assisted by the weight of the angle-arm 4 to set in motion the type-bar and carry the same with an increasing velocity upwardly to its printing-position; the connecting-rod pivot 10 in the meantime coming downwardly to a point nearly underneath the pivot 3 of the type-bar. On the release of the key, the return-spring 16, operating through the key-lever 8 (this being usually of some light material, as, for instance, wood) and the connecting-rod 7, co-operates with the weight of the type-arm 2 to rapidly carry the type-bar downwardly toward its normal idle position; the later part of this return movement being opposed with an increasing force by the weight of the angle-arm of the type-bar as this is carried outwardly and upwardly to its horizontal position. Said return movement is also in part effected or accelerated by the reaction of the blow of the type against the paper-carrier.

Heretofore it has been customary, in type-writers having side-guided type-bars, to make the side-bearing of the type-bar substantially circular in outline and of a diameter several times the width of the type-arm, so as to obtain sufficient control of the type-arm to insure the proper movement thereof; but according to that plan the areas of the bearing-surfaces are excessive, and besides having a tendency to drive the lubricating material from the center to the periphery of the bearing-surfaces, are subject to a peculiar suction or sticking of the one part upon the other so as to materially interfere with the free action of the type-bar, unless this shall have too great a play for maintenance of the required accuracy in the working of the mechanism. By making the side-bearing surfaces, as herein shown and described, of narrow width in a vertical direction and of a length several times the width of the same, and by making the type-arm to pass entirely over the side-guide surfaces, and these to pass entirely over the surfaces of the said side-guide surfaces, the suction or sticking referred to is entirely overcome, the lubrication is rendered more permanent and effective, and the type-arm is made to operate perfectly free while fitting closely between the opposing guide-surfaces at the side thereof. In order to secure these results, however, said guide-surfaces 5′ and 5″ are too narrow to prevent such rotative movement of the type-arm about an axis longitudinally thereof as would destroy proper alignment of the printing; so that in connection with the aforesaid features I employ a stationary, supplemental guide for engaging the laterally-projecting arm of the type-bar during the later portion of the working-stroke of said bar, for preventing the described rotative movement thereof and thus maintaining the precision and the proper alignment of the printing notwithstanding the relative narrowness of the prin-

cipal guide-surfaces 5′ and 5″ which are relied upon to insure the longitudinal alignment of the type-arm at the moment of printing.

By means of the peculiar organization and combination of the type-writer mechanism herein shown and described, the operation of the same is not only made certain in action and adapted for repeated action, but the "touch" is made smooth and easy, so that the type-bars may be worked with extreme rapidity and a high degree of efficiency by the application of only moderate force to the key-levers. The effect of the improvements described is to bring the mechanism to a higher and more sensitive organization, resulting in greater efficiency combined with durability and ease of operation. At the same time, the improvements are such as to reduce the cost of manufacture, and permit the same to be made and assembled strictly according to the interchangeable method.

Having thus described my invention, I claim—

1. In a type-writer, the combination with the paper-carriage and with a key-lever, of a type-bar carrier-guide substantially in the line of the type-bar when said type-bar is in the printing position and said guide extending forward of pivotal movement of said type-bar and adapted to positively hold the type-bar against lateral movement immediately preceding and at the printing moment, an angle-form type-bar pivotally supported in the carrier-guide in position for its angle-arm to engage a stationary supplemental guide on the working stroke of the type-bar, a stationary supplemental type-bar guide in position and adapted to be engaged by the angle-arm of said type-bar and to positively hold the free end of said angle-arm during the later part of the stroke of the type-bar against movement transversely of the normal path of movement of the type-arm, whereby immediately preceding and at the printing moment said type-arm is held against rotative movement about its longitudinal axis, and a connection between the key-lever and the type-bar, substantially as described.

2. In a type-writer, the combination with the key-lever and paper-carrier, of the counterbalanced angle-form type-bar supported for an oscillating movement of about ninety degrees, an operating-connection from the type-bar to the key-lever, means for limiting the movement of the type-bar to bring the same on the return-stroke thereof with its type-arm extending downward and the counterbalance-arm extending horizontally, and a spring for returning the lever and type-bar, substantially as described and for the purpose specified.

3. In a type-writer, the combination with a side-guided angle-form type-bar substantially as described, of a type-bar carrier having a slot for receiving said type-bar and a pivot for supporting the same, said slot being substantially in the line of the type-bar when said type-bar is in the printing-position and said slot also extending forward of pivotal movement of said type-bar, a supplemental guide having a slot in alignment with the type-bar slot and in position for receiving one arm of the type-bar when the other arm is longitudinal of the type-bar slot, a key-lever, and a connection from the key-lever to the type-bar, as set forth.

4. The combination with a type-bar plate having radially-disposed type-bar slots in series, of a series of side-guided type-bars in said slots respectively, a pivot-rod extending through the series of type-bars and supported on the guide-fingers of said plate, and means for fixing said pivot-rod to the terminal fingers of the series, whereby the pivot-rod is held rigidly in place and serves to connect the guide-fingers for preventing vertical deflection of the same.

5. In a type-writer, the combination with an annular frame having radially-disposed slots each with its opposing walls in parallelism and having means thereon for carrying the type-bars in said slots each of said slots being substantially in the line of its type-bar when said type-bar is in the printing position and said slot also extending forward of pivotal movement of said type-bar, of a supplemental annular frame located below said type-bar-carrying frame and having radially-disposed slots in circumferential coincidence with the slots of the type-bar-carrying frame, and angle-form type-bars supported on said carrying-frame to swing in the slots thereof and having combined counterbalance and guide-arms engaging in the slots of said supplemental frame on the approach of the type-bar near the end of its working-stroke, substantially as set forth.

JOHN M. FAIRFIELD.

Witnesses:
FRANCIS H. RICHARDS,
FRED. J. DOLE.