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KEYBOARD OF TYPE WRITING MACHINES AND THE LIKE.

APPLICATION FILED DEC. 17, 1909.

1,146,331.

Patented July 13, 1915.

2 SHEETS—SHEET 1.

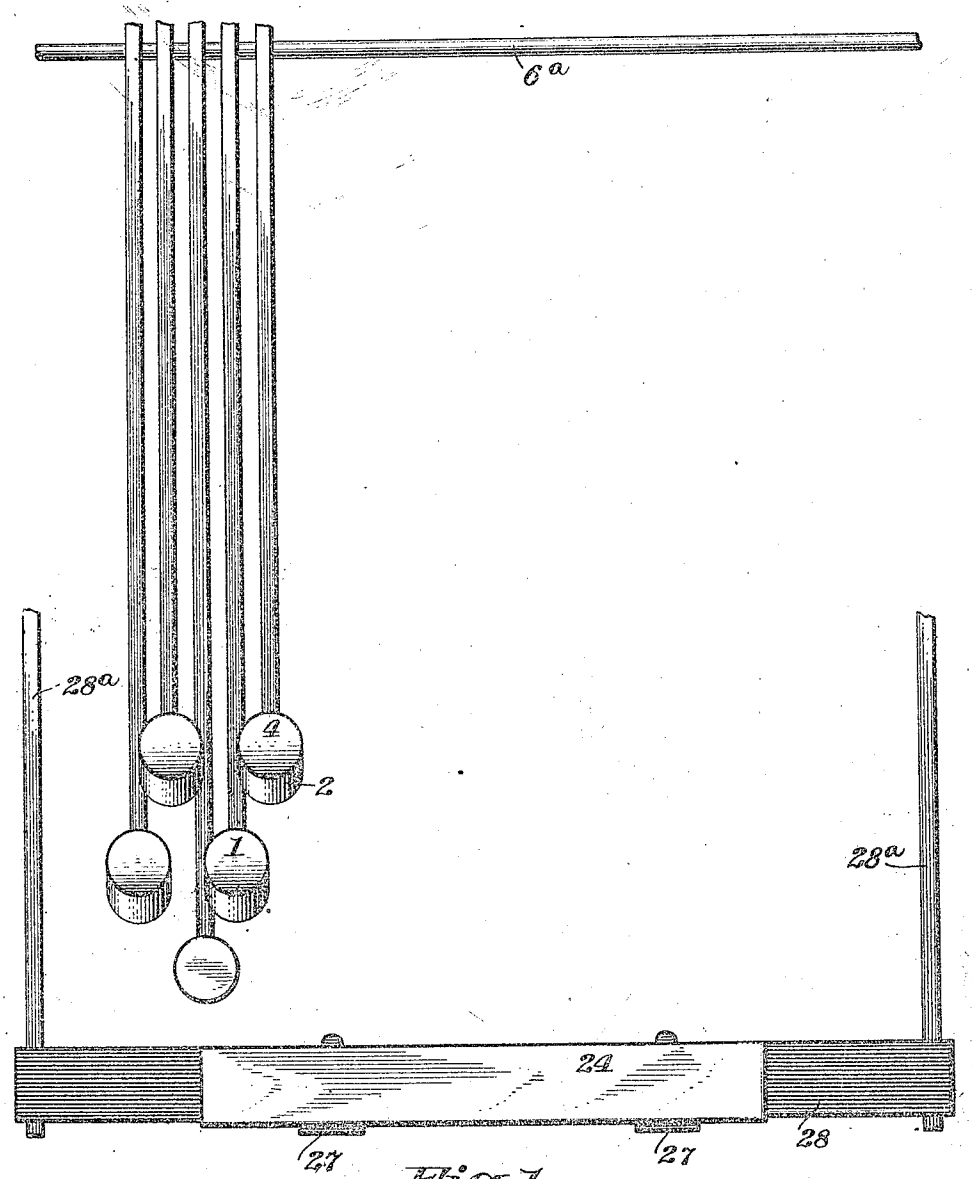



Fig. 1.

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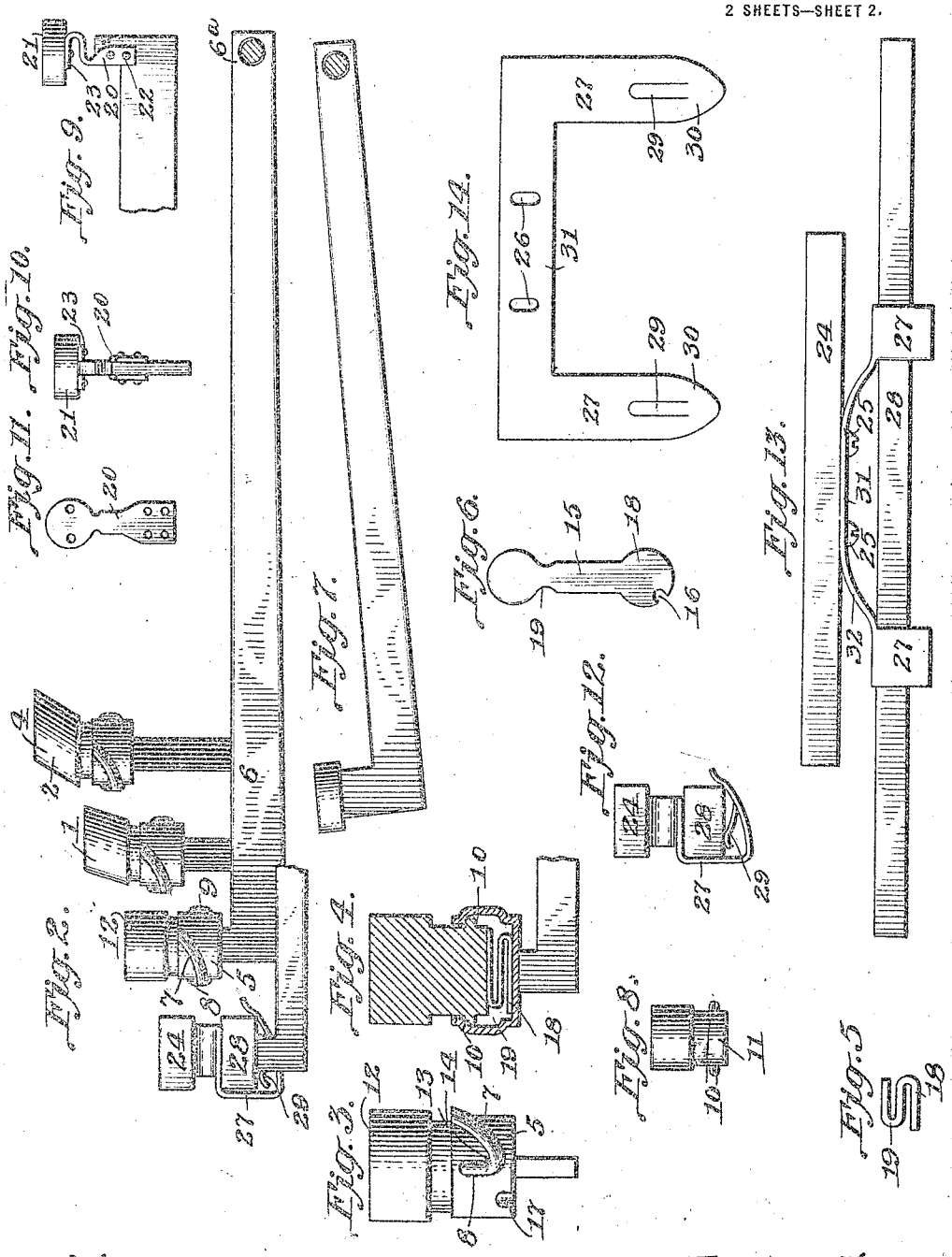
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# UNITED STATES PATENT OFFICE.

JOHN H. HOTSON, OF BROOKLYN, NEW YORK, ASSIGNOR TO TYPEWRITER SPEED KEY COMPANY, A CORPORATION OF NEW YORK.

## KEYBOARD OF TYPE-WRITING MACHINES AND THE LIKE.

1,146,331. Specification of Letters Patent. Patented July 13, 1915.

Application filed December 17, 1909. Serial No. 533,521.

*To all whom it may concern:*

Be it known that I, JOHN H. HOTSON, a citizen of the United States of America, and a resident of the borough of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Keyboards of Type-Writing Machines and the like, of which the following is a specification.

This invention relates to keys and their related parts, for typewriters and other key-operated printing or adding machines.

One object of my invention is to provide keys for typewriters and other similar key operated machines of a shape which will enable the striking surfaces of keys in one cross row or bank to be spaced more widely apart from the striking surfaces of adjacent cross rows or banks, while still providing means to prevent the fingers of the operator from slipping down between the rows of keys.

Another object of my invention is to provide, in connection with typewriter keys mounted on levers, pivoted at their rear ends, means for counteracting the forward tilt of the striking surface of the key which normally occurs when the key mounted on such a lever is depressed.

Further objects and purposes of my invention will appear from the following specification and the accompanying drawings, of which—

Figure 1 is a plan view of part of a typewriter keyboard embodying my improvements. Fig. 2 is a side elevation of the same. Fig. 3 is a front elevation of a key mounted upon its lever. Fig. 4 is central sectional view of the same. Fig. 5 is a view of a detail of my invention. Fig. 6 is a view of another detail. Fig. 7 is a side view of a lever and key thereon, illustrating the incline of the upper surface of the key when depressed. Fig. 8 is a detail view of a key. Fig. 9 is a side view of a lever, spring and key thereon, illustrating a modification of my invention. Fig. 10 is a front elevation of the same. Fig. 11 is a detail view of the spring shown in Figs. 9 and 10. Fig. 12 is a side elevation of a superimposed space-bar mounted upon a permanent space-bar. Fig. 13 is a front view of the same. Fig. 14 is a detail view of the clamp forming part of the superimposed space-bar.

By referring to the drawings, it can be readily seen, for instance, that when the finger aims at the key 1, and strikes a little too far beyond or behind it, the slope 2 prevents the finger from going down between the keys 1 and 4, and has a tendency to throw the finger forward on to 1, the key aimed at. Thus, it is seen that by the employment of this simple slope, the striking parts 1 and 4 of the keys (which is the part of the key that the operator aims to strike) can be located a greater distance apart without incurring the disadvantage of leaving a gap between the keys into which the fingers of the operator would tend to slip. The practical effect of this slope on the front of the key is to increase the efficiency of each key to the rear of which there is another key with a slope, because, when the finger accidentally strikes a little to the rear of such first-mentioned key, the slope on the front of the key to the rear of it assists to guide the finger back on to the key aimed at.

I do not propose to limit myself to any particular degree or character of slope or slant on the front side of the keys, although the slope must be of such steepness that it will cause a downwardly descending finger to glance off without operating the key bearing the slope. I prefer to make a smooth and regular slant, and also prefer, on the more rearwardly rows, to make the slant from the vertical more pronounced than on the more forwardly arranged rows of keys. The slanting of the forward side of the key enables me to displace the striking or top surface rearward with reference to the key lever, as shown in Fig. 2, thus increasing the distance between the striking surfaces of the transverse rows of keys.

It is well known in the art that typewriter operators prefer keys of various substances, shapes or sizes. Furthermore, it is frequently desired, without the use of tools or appliances other than the fingers, to remove a worn or damaged key and quickly insert another in its place, or to quickly remove a key bearing a certain character on its face and readily insert another key bearing a different character. I provide simple and efficient means for meeting these wants. In carrying out this part of my invention, I prefer to provide cups or sockets attached to the key levers of a typewriter, adapted to have typewriter keys easily and quickly inserted in them and securely retained therein,

right side front, and easily and quickly removable therefrom at will, by the fingers and without the use of tools.

With the further object of softening the stroke of the finger on the key and lessening the shock of contact, I provide a resilient support on which the key proper is seated, and means enabling the key to freely ride down in the retaining cup or socket when the resilient support is contracted by the blow of the finger on the typewriter key, and to ride freely up again when the pressure is released. At the same time, I provide means to prevent the key from turning around from its proper position toward the operator.

Other advantages of my plan will appear from the following detailed description: Referring to the drawings, 5 represents the retaining cup or socket portion which is securely attached to the lever 6, which is pivoted at $6^a$. This cup or socket portion is preferably formed or stamped up out of flat material. I prefer to construct the cup or socket with a groove in the inside of its circumference, which is preferably stamped into it and shows as a ridge 7 on the outer surface of the cup. Or, a slot in the side of the socket portion may be made, instead of a groove. Said groove runs partly around the inside of the cup or socket portion, slanting in a downwardly direction, terminating in a short upright portion 8. A similar groove 9 is made on the opposite side of the cup. Protuberances 10, on the opposite sides of the typewriter key (Fig. 8) are adapted to fit into the said grooves, so that when the key (which is made at the part 11 slightly less in diameter than the interior diameter of the socket portion 5) is inserted in the socket, the protuberances 10 may enter the grooves 8, 9, and by turning the key 12 in the direction of inserting a screw, the key is introduced into the socket. As the key descends in the socket, it impinges upon a resilient member. I prefer to make this resilient member a spring of flat stock, of which the blank is preferably in the shape shown in Fig. 6, which is bent over upon itself preferably in the form of a flattened S. This spring and the aforesaid grooves and protuberances are so arranged as to height, that the key begins to press down on the spring before the protuberance 10 passes around under the shoulder 13 (Fig. 3). The object of this is so that when the protuberance passes beneath the shoulder 13, the protuberance is, by the upward pressure of the spring against the key, pushed upward in the upright part of the groove 8, until pressed up against the top wall or termination of the groove and held steady in said upright groove. I would add that I construct the spring of such a form and strength that it requires strong finger pressure to force the protuberances around the shoulder 13 and into the upright part of the groove 8, the object of this being so that the ordinary stroke of the finger on the key may not force the protuberance down below the shoulder 13 and thus cause it to stick there or to work out through the outlet section 7 of the groove. When it is desired to remove the key from the socket, the key is pressed down on the spring and the key is given a partial turn and the protuberance pushed around the shoulder 13 and into the part of the groove 7, and by further unscrewing the key—the protuberance following the groove to its outlet 14—the key is released from the cup or socket, when another key, if desired, having its lower part corresponding in shape and size to the lower part of the key here shown, and bearing corresponding protuberances, may be inserted in its place.

It will be readily understood that I do not limit myself to the particular means here shown of retaining the key from turning in the socket, or of enabling it to ride up and down in the socket. Other means will readily suggest themselves to any one skilled in the art, which come under the spirit and scope of my invention. The scope of my invention is designed to cover, for example, the construction of the key with a socket and the lever with a male portion mounted thereon, for insertion into and sliding engagement with the socket portion of the key.

As previously mentioned, I prefer to construct this resilient cushion underneath the key, of a flat piece of metal as 15, which is bent over upon itself to form two loops. The ends of the spring are made rounded to conform to the shape of the socket (Fig. 6). In one of these ends a notch 16 is left, and a protuberance made in the inside circumference of the socket near its bottom is adapted to engage the notch, so as to prevent it from turning. This shows on the outside of the socket portion as a dent, 17 (Fig. 3). I prefer to construct the socket and the under end 18 of the spring of such relative size that when the said end 18 of the spring is forced into the socket, it may be firmly retained therein by frictional engagement therewith. I prefer to have the length of this spring disposed from front to rear. One object of this location is to avoid any undesirable side tilt of the keys when the operator chances to strike a key on the side, instead of squarely in the middle, inasmuch as it is plain that a side tilt of the key could only be effected by a strong twisting force exerted on a spring of this shape.

An important feature of the construction of this resilient means lies in providing a differential stiffness in its different parts, so that the spring is more resisting under the

front portion of the key than under the rear portion of it. The purpose of this relative stiffness is so that when the operator's finger strikes the key near the center of the striking surface, which is the normal stroke of the finger, it may tend to yield or tilt a little to the rear. The objects accomplished by this rearward tilt are two-fold: (1) It is more agreeable to the operator to feel the key tilting a little to the rear, than to the front, as a tilt to the rear tends to keep the operator's fingers from slipping off the key forward. (2) It can be readily seen that keys mounted, as commonly, on depressible levers pivoted at their rear ends, and having when in normal and undepressed position their upper or striking surfaces substantially level, tend, when depressed to have their upper surfaces thereby brought out of the horizontal and tilted a little toward the front, as seen in Fig. 7. Now, by having a spring under the key weaker at the rear end, so as to cause a further depression at the rear end than at the front, the tilt toward the front caused by the depression of the key on the lever turning on the pivot is counteracted by the tendency to tilt to the rear, beneath which the weaker resilient pressure is exerted, and thus the two opposite tendencies neutralize each other and the striking surface of the key remains substantially level throughout the operation of depressing the key.

In the construction shown here, the weakening of the spring toward the rear is accomplished preferably by making the spring narrower at the part 19 (Figs. 4 and 6.) Other methods of weakening the resilient member at the rear of the key, within the spirit and scope of my invention, will readily suggest themselves to any one skilled in such matters. I desire to claim broadly the resilient means for producing this result, so as to cover variations thereof which may readily suggest themselves to any one skilled in the art. I show a modification of this part of my invention in Figs. 9, 10 and 11, where the same effect or action is secured in a slightly different way, but still within the spirit and scope of my invention. In this case a spring 20, formed in the shape there shown, is fastened to the lever of a typewriter by rivets 22, and a key 21 is mounted on the spring and attached thereto by rivets 23. Other means of attachment will readily suggest themselves to any one skilled in the art. Fig. 11 shows the blank from which this form of spring is made, and Fig. 10 is a front elevation of the lever, with spring and key mounted thereon. I desire to adapt the above construction so that it may be attached to the key levers of machines already in use or existence, and as this arrangement may necessitate a somewhat higher key than is ordinarily used on typewriters, I desire to attach to the regular space-bar a superimposed spacing key or bar of simple and novel construction, in order to raise the upper surface of the spacing key or bar to correspond with the heightened location of the striking surface of the new keys. Such a superimposed space-bar as I have constructed may also be used in conjunction with various kinds of superimposed typewriter key-tops in common use, the top surfaces of which present a new striking surface higher than the striking surface of the corresponding permanent keys of the machine upon which they are superimposed.

My superimposed space-bar has features of novelty which will more plainly appear from the following description: To a bar 24 constructed of wood or other suitable material, I securely attach a clamp by means of screws or brads 25, or other suitable connecting means, passing through the elongated openings 26 in the cross piece 31 of the clamp. I prefer to construct this clamp out of a piece of flat stock, as shown in Fig. 14. The arms 27 are bent as seen in Figs. 12 and 13 and adapted to be sprung on from the front to the permanent space-bar 28, mounted on spacing levers $28^a$, the clamp having its gap or mouth considerably smaller or closer when the spring is at rest than when clamped over the permanent space-bar, and so as to be sprung apart when pushed on the permanent space-bar and so grip it tightly.

The clamps are constructed so as to have enough spring in them to take up considerable variation in thickness of space-bars, in order to adapt them to be fitted on to permanent space-bars of various thicknesses on machines in ordinary use. In order to hold the clamp and the superimposed space-bar mounted thereon, steady and in proper position on the permanent space-bar, I construct a spring arm or tongue 29 which may be cut out of the arms 27 (Fig. 14), being left attached at the points 30, and bent into proper form so as to exert spring pressure against the under side of the permanent space-bar at its rearward side, and thereby hold the clamp and the superimposed space-bar steady on the permanent space-bar.

In order to enable the superimposed space-bar to be adjusted more backwardly or forwardly with respect to the permanent space-bar, and at the same time with respect to the typewriter keys, I make the holes 26 through which the screws 25 pass, elongated, so that the superimposed space-bar may be set more forwardly or rearwardly on the clamp, and hence more forwardly or rearwardly with respect to the permanent space-bar which the clamp firmly grips. This allows an operator to shift his space-bar toward the keys or away from them,

according to his personal preference. I provide also means for making the superimposed space-bar adjustable as to height, and also adjustable as to the inclination of the top surface of the superimposed space-bar, *i. e.*, either horizontal or sloping down from the horizontal toward the back or toward the front. The cross-piece 31 is given a certain amount of pliability, so that it may be bent by the exercise of force, although not so pliable as to lose its shape under ordinary use as attached to the machine. To lower the height of the superimposed space-bar, the parts 32 are bent flatter. To raise the superimposed space-bar, the said bends are made more round. To cause the superimposed space-bar to lie with its top surface sloping down toward the front of the machine, or horizontal, or sloping down toward the rear, a corresponding twist is given to the cross piece 31 at 32.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent of the United States:

1. A key cap or button for typewriter keys having a sloped glancing surface on its forward side of such steepness as to deflect mis-directed downwardly-descending finger strokes and to prevent such strokes operating the key provided with the cap.

2. The combination with a key lever of a key-cap having its top or striking surface offset rearward relatively to the key and its forward side sloping steeply downward and forward.

3. A key cap or button for typewriter keys, having its front side slanting downwardly and forwardly, such slant beginning at the edge of the striking surface of the key and terminating at a point approximately on a level with the top surface of the adjacent keys in front of said slanted key.

4. In a typewriter keyboard, transverse rows of keys having caps or buttons with their front sides slanting downward and forward, the said slant of the sides of the caps of one row being greater than the corresponding slant of the key-caps of the next row in front.

5. In a typewriter key, a cap or button and a cushion spring for transmitting the force of the finger blow from said cap to the part operated thereby, said spring offering different degrees of resistance to depression at front and rear.

6. In a typewriter, the combination of a key lever, a button, and a resilient member between said key and button, said resilient member being constructed and arranged to offer different degrees of resistance to depression at its forward and rearward sides.

7. A key construction comprising a supporting part, a cap or button, an interposed cushion member for transmitting the force of the finger blow to the supporting part, said cushion member being constructed and arranged to offer less resistance to depression of the cap at the back than at the front, and means for holding said member against shifting.

8. A typewriter key having an approximately S-shaped cushion spring, said spring being made from flat stock bent to present two loops ranging fore and aft.

9. A key cap or button for typewriters having a yielding resilient support comprising a flattened S-shaped spring formed of a strip of metal bent to present two loops disposed longitudinally with reference to the front and back of the said cap or button.

10. The combination of a key lever, a cap or button yieldable bodily under a finger blow, an interposed approximately S-shaped spring made of a strip of metal bent to present two loops, and means for retaining said spring with its loops ranging forwardly and rearwardly with reference to the key lever and key-cap or button.

11. In a key, the combination with a striking portion, of an approximately S-shaped cushion spring beneath said striking portion for yieldingly transmitting the force of the finger blow to the part to be operated, said spring being weaker at one of its bends than at the other.

12. A typewriter key lever having a socket mounted thereon, and a cap or button removably inserted in said socket, one of these parts having a lateral protuberance and the other a groove or slot receiving said protuberance constructed and arranged to admit the cap or button into the socket and to lock it therein against dislodgment.

13. In a typewriter, the combination of a key lever, a socket portion mounted thereon, a key removably inserted in said socket portion, a resilient member located between said key and said socket portion, protuberances on said key engaging against shoulders in the socket so as to retain the key in the said socket.

14. In a typewriter, the combination of a key lever, a socket portion mounted thereon, a key inserted in said socket portion, a resilient member located between said socket portion and said key, protuberances on said key engaging in an upright groove in the inside wall of said socket portion, and adapted to ride down in the groove when the resilient member yields under pressure brought to bear upon it by the key, and ride up again when such pressure is removed.

15. In a typewriter, the combination of a key lever, a socket portion mounted thereon, a key fitting slidingly in said socket portion, grooves in the inside walls of said socket portion, running from the upper edge of the socket downward and terminating in an upright part, and adapted to receive pro-

tuberances on the key and guide the same down into the socket portion, a resilient member located between said socket portion and said key, exerting pressure to force the key upward until the protuberances on the key are stopped by the upper wall of the upright portion of the groove.

16. In a typewriter, the combination of a key lever, a socket portion mounted thereon, a key slidably inserted in said socket portion, a spring interposed between said socket portion and the bottom of said key, and constructed of flat material folded upon itself, said spring arranged in said socket portion with the length of the spring disposed from front to rear, and retaining means for retaining the spring in that position.

Signed at New York, this 16th day of December, 1909.

JOHN H. HOTSON.

Witnesses:
JOHN D. JACOBS,
SAMUEL SCHWARTZMAN.