(Model.)

J. H. BUNNELL.

Telegraphic Key.

No. 237,808. Patented Feb. 15, 1881.

Fig: 1.

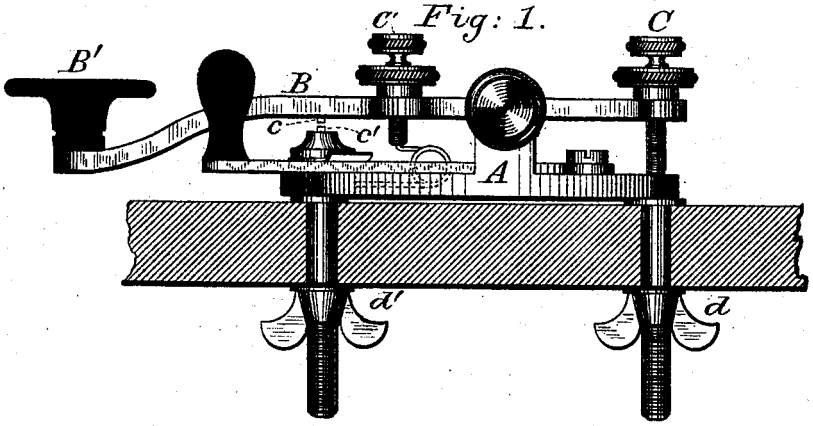


Fig: 2.

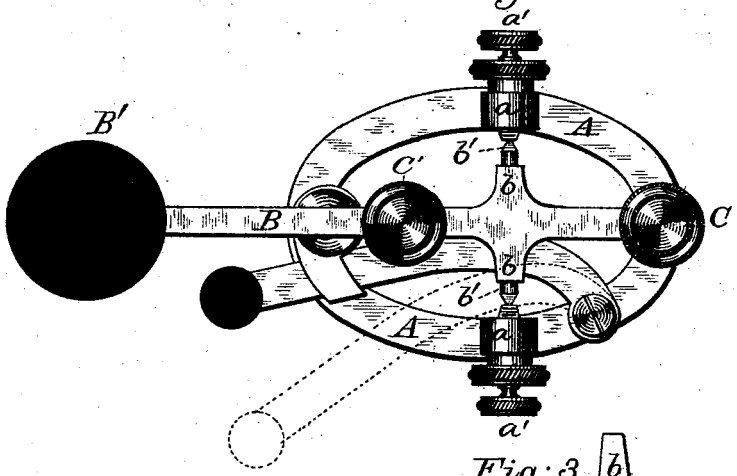


Fig: 3.

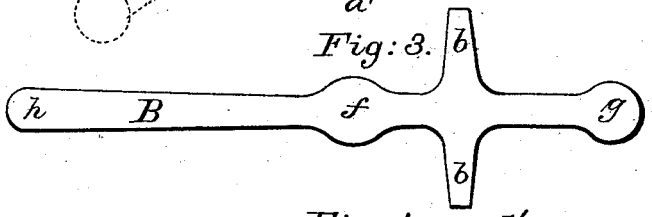


Fig: 4.

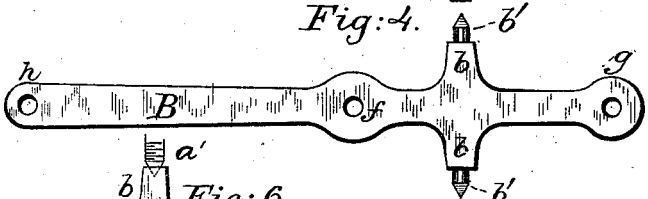


Fig: 6.

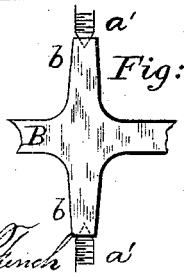
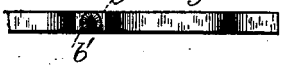


Fig: 5.



Witnesses;

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UNITED STATES PATENT OFFICE.

JESSE H. BUNNELL, OF NEW YORK, N. Y.

TELEGRAPHIC KEY.

SPECIFICATION forming part of Letters Patent No. 237,808, dated February 15, 1881.

Application filed October 15, 1880. (Model.)

To all whom it may concern:

Be it known that I, JESSE H. BUNNELL, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Telegraphic Keys; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings.

My invention relates more especially to that class of keys which are employed for the purpose of closing and breaking an electric circuit with rapidity and convenience in the transmission of telegraphic signals according to the Morse or other analogous system of telegraphy.

My invention consists, first, in an improved telegraphic-key lever possessing the following characteristics: First, the key-lever and the trunnions on which it oscillates are formed entire from a single piece of wrought metal; second, the key-lever is constructed of a breadth much greater than its depth or vertical thickness. By this mode of construction the key is rendered at the same time light and strong, it is better adapted to resist lateral flexure, and can be manipulated more rapidly than keys of the construction heretofore used, while at the same time its durability is greatly increased.

The form of telegraphic key which has heretofore been found preferable for general use consists of a horizontal beam or lever having a slight vertical oscillatory movement upon a transverse axis secured thereto, which axis terminates in pivots or trunnions turning in suitable bearings. In keys of this construction the horizontal beam or lever is made of cast metal, usually brass, while the transverse axis is of wrought-steel, the latter being made separately and afterward inserted into the brass lever at right angles thereto. Suitable contact-points and adjustable stops, together with a knob or button for the convenient manipulation of the key-lever, are afterward affixed thereto in a manner well understood.

With a key constructed in the manner just described it has not been found possible to secure sufficient lateral rigidity in the lever and its axis without increasing the weight of metal in the lever to a degree which renders the key too cumbersome to allow of rapid manipulation.

In the operation of transmitting telegraphic signals the operator is required to oscillate the lever of the key upon its axis in a vertical direction at the rate of ten or fifteen, or even more, movements per second. It is therefore highly important that the vertical play of the key-lever between its limiting-stops should be reduced to the least possible amount, and also of equal importance that the lever itself should be made of as little weight as possible. If, however, the play of the key is made too small, any lateral motion of the contact-points causes them to fail to break the circuit with certainty when separated—an effect which is technically termed "sticking," and which interferes materially with the correct and speedy transmission of signals. I have found that in the absence of any lateral motion between the contacts the play of the key may be made very much smaller than would otherwise be possible without injurious results. I have also found that the lateral motion between the contact-points which gives rise to the difficulty referred to is itself caused partly by the working of the key-lever upon its transverse axis and partly by the springing or flexure of the axis itself when formed in the usual manner from a cylindrical rod of steel. In my invention both these sources of difficulty are completely overcome, and I am enabled to construct a key-lever possessing much greater lateral rigidity than those hitherto in use, while at the same time its weight is very much less.

In the accompanying drawings, Figure 1 is a side elevation of a key embodying my improvements, and Fig. 2 is a plan view of the same. Fig. 3 shows the blank punched from solid metal, from which the key-lever and its axis are formed, and Fig. 4 shows the same in its completed state. Fig. 5 shows the transverse axis in elevation, and Fig. 6 is a modification in the construction of the bearings of the lever.

In the drawings, A represents the base or frame of the key, which may be of brass or other suitable metal, having upright standards *a a* formed upon it, which support adjustable set-screws *a' a'*. These set-screws constitute bearings upon which the key-lever B oscillates vertically, its downward motion being limited by the contact-point *c* on the key-lever striking

upon a similar point, c', mounted upon the base A, but insulated therefrom. Its upward motion is limited by an adjustable stop, C, by means of which the vertical play of the key-lever B may be made greater or less, at pleasure. B′ is a knob or button by which the operator takes hold of the key in order to manipulate it. All these several parts are old and well known, and form no part of my present invention, which relates solely to the particular construction of the key-lever B and its axis, as hereinafter described.

In constructing the lever B according to my improved method, I first punch a blank of substantially the form shown in Fig. 3, by means of suitable dies, from a solid plate of metal of sufficient thickness to afford the requisite vertical stiffness. I prefer to make the lever B of steel, as this material gives the greatest amount of strength with the least weight of metal; but nevertheless I do not propose to confine myself to the use of any particular material. The blank thus prepared is shown in Fig. 3, and is in the general form of a cross whose longitudinal portion B has a thickness—as seen, for example, in Figs. 1 and 5—considerably less than its breadth, as seen in Fig. 3, and a transverse portion, $b\,b$, of similar proportions, the latter being designed to support the trunnions of the key. I prefer to form the longitudinal portion of the lever with lateral enlargements, as seen at f and g in Figs. 4 and 5, in order to form seats for the check-nuts of the adjusting-screws C and C′, the former of which regulates the vertical play of the key-lever and the latter the tension of the reacting-spring, both of which are the same as in keys of the usual construction. A similar enlargement may be formed at u, to provide a bearing for the knob B′, if desired. By this mode of construction the amount of metal in the key, and consequently its weight, may be reduced without impairing its efficiency. Cylindrical or conical trunnions or pivots $b'\,b'$ are then formed upon the ends of the transverse portions $b\,b$ of the lever by means of a lathe or otherwise, as shown in Fig. 4, together with the necessary apertures for securing the knob B′, the adjusting-screw C, the contact-point c, &c. The lever, with its attachments, is then mounted between the adjustable set-screws $a'\,a'$ upon the base A, in the usual manner, said set-screws being, of course, provided with a conical recess or bearing in their ends for receiving the pivots $b'\,b'$.

A modification of the method of forming the bearings is shown in Fig. 6, in which the pivots are formed upon the points of the set-screws $a\,a$, and corresponding conical recesses are provided in the ends of the transverse arms of the lever; but I consider this form less advantageous than the one hereinbefore described.

It will be observed that the form of my improved key-lever is such as to give it great lateral rigidity, the thickness of the metal in the direction required to resist lateral flexure being greatest at the intersection of the longitudinal and transverse portions of the lever, which is the weakest point in a key constructed in the ordinary manner. So, also, the process of forming the blank by punching it from a solid piece of metal not only produces a much more rigid lever than the ordinary method of casting, even when the same metal is used, but also renders it possible to construct the entire lever of light and strong material—such as steel—which does not admit of being melted and cast in the form required to produce a key-lever of the form herein shown and described, and which could not therefore be successfully employed for that purpose.

I claim as my invention—

A telegraphic key-lever constructed, substantially as hereinbefore set forth, from a single piece of wrought metal in the form of a cross, of a breadth greater than its depth or vertical thickness, and provided with trunnions formed upon the extremities of the transverse arms of the cross.

In testimony whereof I have hereunto subscribed my name this 13th day of October, A. D. 1880.

JESSE H. BUNNELL.

Witnesses:
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MILLER C. EARL.