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W. R. FOX & G. J. BARRETT.

KEY LEVER FOR TYPE WRITERS.

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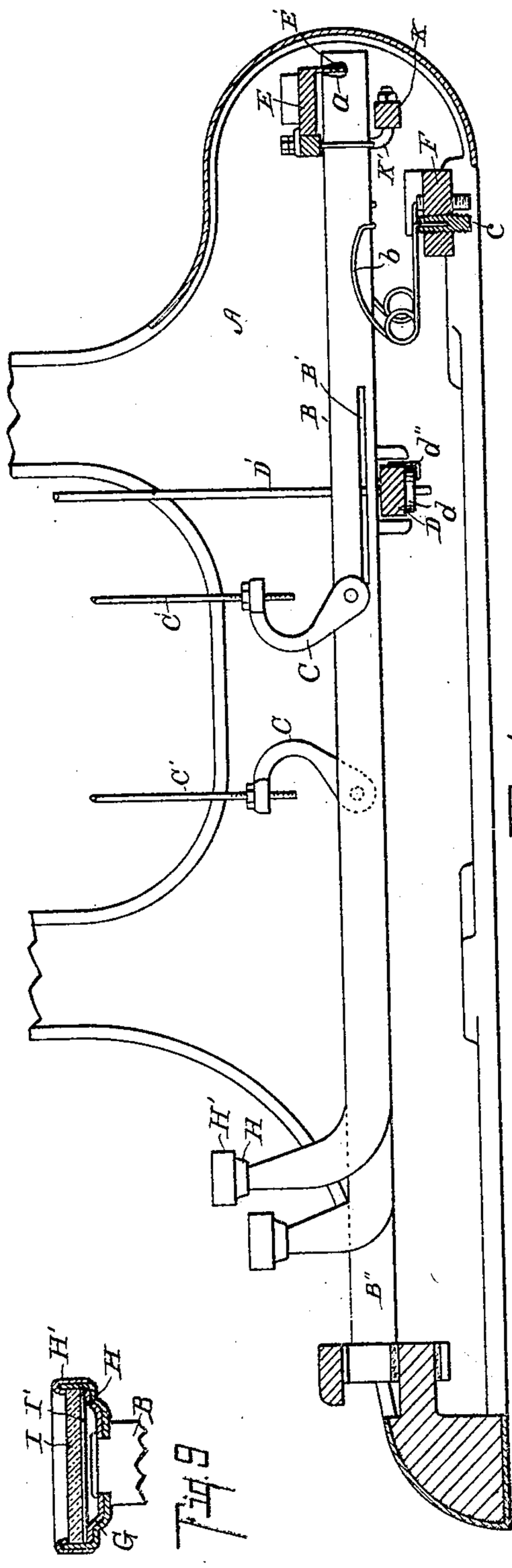

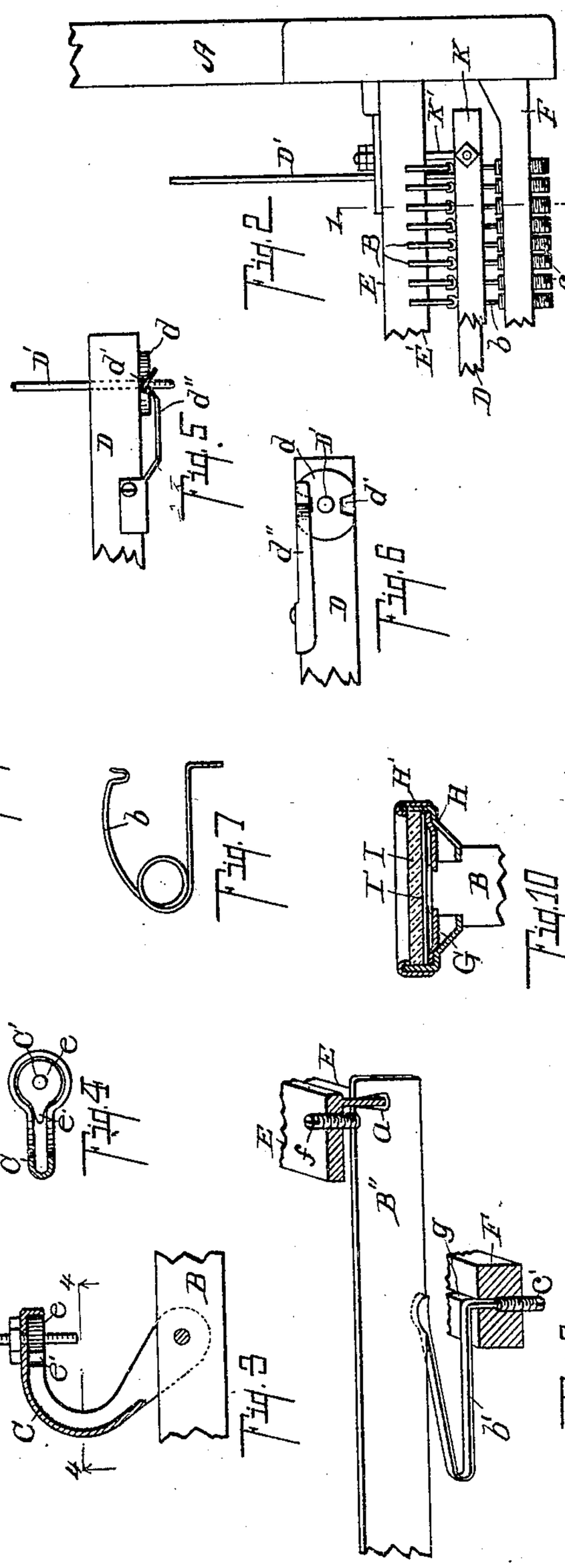

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UNITED STATES PATENT OFFICE.

WILLIAM R. FOX AND GLENN J. BARRETT, OF GRAND RAPIDS, MICHIGAN, ASSIGNORS TO FOX MACHINE COMPANY, OF GRAND RAPIDS, MICHIGAN.

KEY-LEVER FOR TYPE-WRITERS.

No. 800,733. Specification of Letters Patent. Patented Oct. 3, 1905.

Application filed July 31, 1902. Serial No. 117,776.

To all whom it may concern:

Be it known that we, WILLIAM R. FOX and GLENN J. BARRETT, citizens of the United States, residing at the city of Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Key-Levers for Type-Writers, of which the following is a specification.

This invention relates to improvements in type-writers.

It relates particularly to improvements in key-levers and their connections and adjuncts.

The objects of the invention are, first, to provide an improved construction of key-lever where it is possible and practical to make use of aluminium or other soft metal; second, to provide an apparatus for such levers whereby the individual parts of the system can be correctly and properly adjusted and their connections properly adjusted to secure the best results in the operation of the type-bars upon the platen; third, to provide an improved construction of key-lever whereby its external contour may be readily conformed and adjusted to contact with the universal bar which actuates the escapement, thereby avoiding an elaborate adjustment of the bearings, securing the proper relation of the keys on the keyboard and the levers to such bar; fourth, to provide an improved adjustable connection from the respective key-levers to the type-bars of the machine.

Further objects will definitely appear in the detailed description to follow.

We accomplish the objects of our invention by the devices and means described in the following specification.

The invention is clearly defined, and pointed out in the claims.

A structure embodying the features of our invention is fully illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a sectional view through the lower part of a type-writing machine, taken on a line corresponding to line 1 1 of Fig. 2. Fig. 2 is a detail rear elevation view of the rear connection of the key-levers, showing the connection of the escapement-bar D. Fig. 3 is an enlarged detail sectional view through the adjustable connection of the key to the type-bar of the machine. Fig. 4 is a detail sectional view on line 4 4 of Fig. 3. Fig. 5 is a detail view of the adjustable connection for the escapement-bar. Fig. 6 is an enlarged detail plan view of the parts illustrated in Fig. 5. Fig. 7 is an enlarged view of one of the adjustable springs for the key-levers. Fig. 8 is a detail view of the spring connection to the rear of the spacer-bar lever B″. Fig. 9 is an enlarged detail sectional view of a finger-key. Fig. 10 is a slight modification of the same where the layers of metal forming the body are slightly separated to give additional support.

In the drawings all of the sectional views are taken looking in the direction of the little arrows at the ends of the section-lines, and similar letters of reference refer to similar parts throughout the several views.

Referring to the lettered parts of the drawings, A is the main frame of the machine, in which the series of key-levers are supported.

B is one of the key-levers bearing a finger-key H′ at its forward end. This is notched at *a* at its rear end and engages a transverse downwardly-projecting thin blade E′ on a transverse bar E, which all the key-levers engage. This notch is slightly enlarged at the bottom to permit a free movement of the levers at this point and secure the effect of a pivotal center at the top edge of the bar where the opposite angularly-projecting sides of the U-shaped slot *a* contact with the blade E′.

The lever-spring *b* (see Fig. 1) engages the under side of the lever B about one inch and a-half to the front of its fulcruming-point to hold the key constantly up in position. A transverse bar, however, is arranged a little beneath the rear ends to prevent the keys from being disengaged from the blade E′ when the springs are not present. The tension of the springs *b* is adjustable by the set-screw *c*, the lower end of the spring being bent square down to enter a socket in this screw.

We show in Fig. 8 in connection with the spacer-lever, which is also a finger-lever, a spring *b*′, which is a flat spring that engages a groove in the bar F, the screw *c*′ turning up against the same. In that structure the spring serves to lock the set-screw, so when it is once located it always remains securely in position. However, with the spring ten-

sion on the screw as it appears in Fig. 1 there is very little danger of its becoming displaced.

In connection with the spacer-lever we provide a set-screw *f*, which set-screw extends down through the bar E over the lever B″ to regulate the height of the key-lever at that point and on which the lever B″ fulcrums.

In the type-key lever B opposite the escapement-bar we form a slot B′ well down toward the lower edge and find where the key-lever is of soft metal that it is a very easy matter to deflect the portion of the key below the slot downward or upward to give exactly the right relation to the escapement-bar. This is obviously a very great advantage because it avoids the necessity of cutting away the key or of elaborately adjusting the key by such means as the screw *f* and the screw *e* to bring it to the proper relation to the escapement-bar when the finger-key at the front is at the right elevation. It can be done this way; but we prefer to use that means only on the spacer-key lever.

Beneath the rear ends of the finger-levers we place a transverse bar K, supported by a hanger K′ at such a distance therefrom as to prevent their accidental displacement. These lever-bars are liable to accidental displacement without this provision, as our experience demonstrates, though with careful usage the bar might be dispensed with.

Each key-lever B is connected by a coupling C to the connecting-wire C′ (see Figs. 3 and 4) to its proper type-bar. The coupling C is made up of sheet metal turned over upon itself, having at the lower extremity two ears adapted to straddle the finger-lever B. At its upper end is a cup-like formation the top of which is in a plane at right angles to the line drawn through its center and the ends of a pivot connecting the coupling to the lever B. In the center of this cup-like formation is an opening through which is passed the connecting-wire C′. Inside this cup is a nut *e*, conformed to fit within the cup and threaded to fit on the wire C′, and it is provided with a projection *e′*, fitting the hollow neck of the coupling where the same connects to the cup, thereby preventing the nut from turning within the cup when the wire C′ is turned therein. A lock-nut is threaded above the cup and locks the parts securely together. This coupling secures a perfect adjustment of the connection from the finger-levers to the type-bars as it is possible to secure, and thus regulates the position of the parts and secures the proper throw of the type-bars in relation to the finger-levers.

The transverse D common to all the key-levers is the escapement-bar and is adjustably supported under the key-levers by the rods D′ at each end, one of which only is illustrated. This rod is adjusted by the nut *d*, which is notched at *d′* and retained in position by the spring *d″* engaging the notch *d′*, as clearly appears in Figs. 5 and 6, so that the height of the bar can be quite accurately adjusted in position for all of the type-bars and a minute adjustment effected by deflecting the part of the key-lever opposite the bar or by adjusting the fulcrum of the key-lever, whichever seems to be the most expedient in the final adjustment of the machine.

As these keys are made of aluminium or of comparatively soft metal, it is a matter of considerable difficulty to secure the finger-keys to them in a rigid manner, particularly to the metal aluminium, because it cannot be satisfactorily soldered. It is preferable to have the keys made of brass or other soft metal that can be readily formed by a die. We therefore make an outer shell H of brass and an inner button part G of steel and shoulder the end of the key-lever B, so that a portion enters a slot in these two plates, like a tenon. We then rivet down the soft metal of the key against the rigid steel above, which gives it a firm hold, and owing to the added thickness the key is very satisfactorily retained in place when the printed disk I′ and the glass I are put in position and the outer ring H′ is forced down over the same. In Fig. 10 this is shown slightly modified, though the same principle is involved. The outer shell H is there deflected downward and engages an independent shoulder on the end of the lever B, and a second shoulder is formed within this shell to engage the steel plate G, thus making a very strong brace for the button and making it possible to use very soft metal. We find, however, that this separation of the two parts G and H to the extent indicated in Fig. 10 is of no great advantage unless the parts are made very light.

Having thus described our improved construction of key-levers and their connections, we desire to remark that the same can be considerably varied in its details without departing from our invention. We also desire to remark that many of the features employed are capable of use in other relations, although they all coact to increase the efficiency of the key-lever bar in a type-writing machine.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a type-writing machine, a lever system consisting of the combination of the finger-levers B having buttons at one end and a U-shaped notch *a* in the opposite end; a block E with a blade E′ for engaging the U-shaped notch; an adjustable screw *f* mounted in the block E; a U-shaped spring *b′* upon the under side of said finger-levers B for holding the same normally against said adjustable screw *f* said spring being formed of flat spring material, its upward extremity having two upwardly-projecting ears to engage the finger-levers B, and its lower portion formed down to fit a groove *g* in the block F; a screw C″

inserted in the block F to bear upon the downwardly-projecting portion of the spring *b'*, and adjustable connections between the finger-levers and the type-bars of the machine, substantially as described.

2. In a type-writing machine, a lever system consisting of the combination of finger-levers having buttons mounted upon one end thereof and a U-shaped notch cut at the rear end of the upper edge of said finger-levers; a block extending from one side of the frame of the machine to the other having a downwardly-projecting blade to engage the said U-shaped notch; adjustable screws in said block; U-shaped springs bearing upon the under side of said levers to hold said levers in normal position against said adjusting-screw; an adjusting-screw mounted in the cross-bar to bear upwardly on the said U-shaped springs; a cross-bar beneath the levers and connections between the finger-levers and the type-bars of the machine, substantially as described.

3. In a type-writing machine, the combination of an adjustable connection between the finger-levers and the type-bars consisting of a coupling C formed of a piece of sheet metal folded over upon itself in U shape having two ears alining with each other adapted to straddle the finger-levers; and a cup-shaped formation at the other end; the top of which cup-shaped formation is in a plane at right angles to a line through its center and the center of said ears, said cup-shaped formation having an opening in its center; a connecting-wire C' with its lower extremity threaded through said opening; a nut or bur upon said connecting-wire fitting the top of said cup-shaped formation; and a nut of a circular piece of metal to fit the under side of said cup-shaped formation, having a projection to fit the neck of said coupling *c'* where the same intersects the cup, substantially as described.

4. In a type-writing machine, the combination of an adjustable connection between the finger-levers and the type-bars consisting of a coupling formed of a piece of metal folded over upon itself in U shape having two ears adapted to straddle the finger-levers, and a cup-shaped formation at the other end, the top of which cup-shaped formation is in a plane at right angles to a line through its center and the center of said ears, said cup-shaped formation having an opening in its center; a connecting-wire with its lower extremity threaded, through said opening; and a nut or bur upon said connecting-wire fitting the top of said cup-shaped formation, and a lock-nut of a circular piece of metal adapted to fit the under side of said cup-shaped formation, having a projection to fit the neck of said coupling where the same intersects the said cup, substantially as described.

5. In a type-writing machine, the combination of an adjustable connection between the finger-levers and the type-bars consisting of a coupling formed of a piece of metal folded over upon itself in U shape having two ears adapted to straddle the finger-levers, and a cup-shaped formation at the other end, said cup-shaped formation having an opening in its center; a connecting-wire with its lower extremity threaded through said opening; and a nut or bur upon said connecting-wire fitting the top of said cup-shaped formation; and a nut of a circular piece of metal adapted to fit the under side of said cup-shaped formation, having a projection to fit the neck of said coupling where the same intersects said cup, substantially as described.

6. In a type-writing machine, the combination of an adjustable connection between the finger-levers and the type-bars consisting of a coupling formed of a piece of metal folded upon itself in U shape, having two ears adapted to straddle the finger-levers, and a cup-shaped formation at the other end, said cup-shaped formation having an opening in its center; a connecting-wire with its lower extremity threaded through said opening; and a nut or bur upon said connecting-wire fitting the top of said cup-shaped formation; and a nut of a circular piece of metal adapted to fit the under side of said cup-shaped formation, having a projection to fit the neck of said coupling where the same intersects said cup, substantially as described.

7. In a type-writing machine, the combination of an adjustable connection between the finger-levers and the type-bars consisting of a coupling formed of a piece of metal folded over upon itself in U shape having two ears adapted to straddle the finger-levers, and a cup-shaped formation at the other end, said cup-shaped formation having an opening in its center; a connecting-wire with its lower extremity threaded through said opening; and a jam-nut or bur upon said connecting-wire fitting the top of said cup-shaped formation, and a nut of a piece of metal adapted to fit the under side of said cup-shaped formation, having a projection to fit the neck of said coupling where the same intersects the said cup, substantially as described.

8. In a type-writing machine, the combination of an adjustable connection between the finger-levers and the type-bars consisting of a coupling formed of a piece of metal folded over upon itself in U shape having two ears adapted to straddle the finger-levers and a cup-shaped formation having an opening at its center; a connecting-wire with its lower extremity threaded through said opening; and a jam-nut or bur upon said connecting-wire fitting the top of said cup-shaped formation; and a nut of a piece of metal adapted to fit the under side of said cup-shaped formation, having a projection to fit the neck of said coupling where the same intersects said cup, substantially as described.

9. In a type-writing machine, the combina-

tion of the key-lever; a type-bar coupling-rod C′; and a coupling from said key-lever pivoted thereto and extending upwardly and curved at right angles to the said coupling-rod; screw-nuts one of which is adapted to seat in said coupling whereby its rotation is prevented, and the other of which serves as a lock-nut on the opposite side of said coupling, whereby a fine adjustment is attained between the parts, as specified.

10. In a type-writer, a metal key-lever with an elongated slot therein, whereby the contacting portion of the lever of an operative part may be deflected up or down to time its contact in combination with the escapement-bar, for the purpose specified.

11. In a type-writing machine, the combination of the finger-levers; a universal bar beneath the same; an upwardly-extending coupling-rod threaded at its lower end, extending through said universal bar; a notched nut on the lower end of said rod; and a spring secured to said universal bar, having a projection to engage said notched nut and retain it securely in position when it is adjusted, for the purpose specified.

In witness whereof we have hereunto set our hands and seals in the presence of two witnesses.

WILLIAM R. FOX. [L. S.]
GLENN J. BARRETT. [L. S.]

Witnesses:
EDWARD G. MATTER,
GEO. L. MCMULLEN.