July 30, 1940. A. R. BONORDEN 2,209,506

TELEGRAPH TRANSMITTING KEY

Filed June 8, 1939

FIG. 2

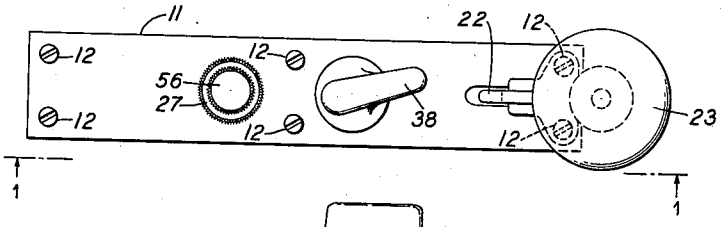


FIG. 1

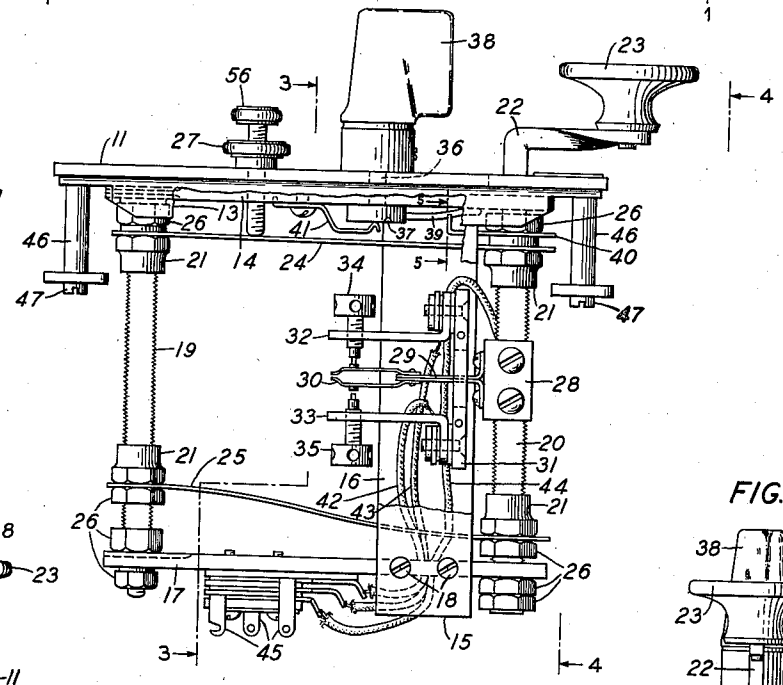


FIG. 3

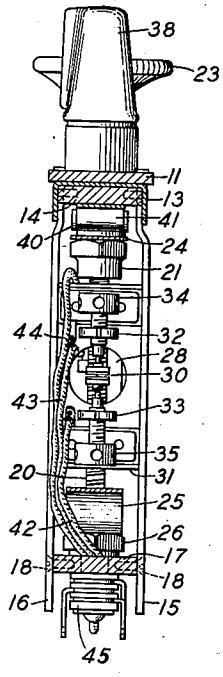


FIG. 4

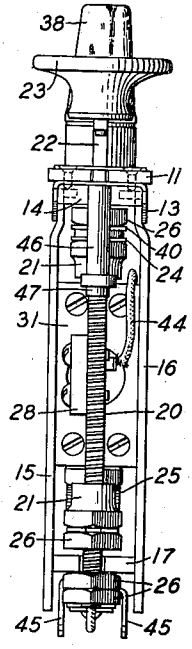


FIG. 5

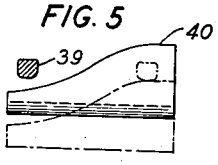


FIG. 6

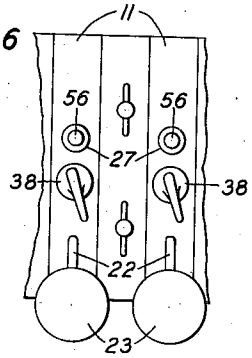
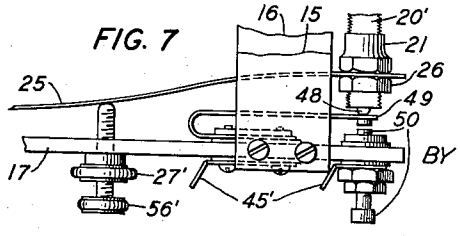


FIG. 7



INVENTOR
A. R. BONORDEN
BY
J. W. Schmied
ATTORNEY

Patented July 30, 1940 2,209,506

UNITED STATES PATENT OFFICE

2,209,506

TELEGRAPH TRANSMITTING KEY

Allen R. Bonorden, Plainfield, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

Application June 8, 1939, Serial No. 278,037

10 Claims. (Cl. 178—101)

This invention relates to that class of lever keys which are employed for the purpose of closing and opening an electric circuit with rapidity to transmit over said circuit telegraphic signals according to the Morse or other analogous systems of telegraphy.

The invention relates specifically to improvements in telegraph transmitting keys.

A principal object of the invention is to effect an economy of space in the operator's keyshelf of a telegraph switchboard.

Heretofore in the design of switchboards in teletypewriter exchange offices difficulty has been encountered in attempting to mount two or more Morse transmitting keys in the limited space afforded in the operators' keyshelves of telegraph switchboards. A previously known transmitting key, in general use, is mounted on trunnions and, in order to obtain the necessary rigidity against side movement the pivot or trunnion supports are spaced about 1½ inches apart which, together with the adjusting screws make the over-all width about 2¾ inches.

According to the present invention there is provided a narrow type of telegraph transmitting key which is of compact construction and whereof the contact-making points and other working parts are confined in a closed space so as to exclude all dust, fibres and other foreign substances from the working parts of the instrument. Its contact-making points and working parts are mounted below the level of the keyshelf of an operator's switchboard, when the key is mounted for use. Its operating lever lies in a vertical plane and in this respect differs from the type in general use, which has a long horizontal lever pivotally supported near its mid-point by means of trunnions in suitable bearings. Its over-all width, including the finger-button, is about $\frac{27}{32}$ of an inch, or the width of a single line-up of operators' lever type switching keys of a type such as disclosed in U. S. Patent 1,012,125, granted to E. B. Craft on December 19, 1911, and used in telephone switchboards. This width is about one-third of that of the usual type of telegraph transmitting key.

Among the principal features of the invention are:

(1) The economy of space afforded by the structural arrangement of the instrument;

(2) The avoidance of trunnions and their supporting members;

(3) The elimination of any lateral motion of the contact points;

(4) The assurance of making and breaking transmission circuits in a positive manner;

(5) The enclosure of the contact-making points and other working parts;

(6) The obscured means for locking the instrument in a make, or closed, position;

(7) The separate methods of regulating and adjusting the distances through which the key operates in moving from a make to a break position and vice versa;

(8) The provision of resilient members for effecting the make-and-break contacts;

(9) The rigidity of the instrument structure;

(10) The accessibility to all parts of the instrument for maintenance purposes.

In the accompanying drawing:

Fig. 1 is the side elevation view of the transmitting key constituting the present invention;

Fig. 2 is the top plan view of Fig. 1;

Fig. 3 is the vertical cross-sectional view taken along the dot and dash lines 3—3 of Fig. 1;

Fig. 4 is the vertical cross-sectional view taken along the dot and dash lines 4—4 of Fig. 1;

Fig. 5 is a detailed view of the camming arrangement whereby the key is locked in a closed position;

Fig. 6 is the top plan view of an assembly of two keys of the type embodying the present invention and a single line-up of push-pull keys mounted in an operator's keyshelf; and

Fig. 7 is an alternative arrangement of the operating contacts shown in Figs. 1 and 3.

All like parts in the figures of the drawing have like reference characters.

In the drawing, 11 represents a top horizontal plate of bakelite or similar substance fixedly mounted by means of machine screws 12 on a horizontal metallic base plate 13 having flanged sides as indicated in Figs. 3 and 4 and which may be identical to the key base designated 1 in Patent 1,012,125, supra. Supported to the underside and within the side flanges of plate 13 by machine screws is another metallic plate 14. Securely fastened in grooves in opposite sides of metallic plate 14 by means of countersunk rivets, screws or other suitable means are two vertical metallic members 15 and 16 and between the lower ends of members 15 and 16 is a horizontal metallic plate 17, machine screws 18 serving to fasten plate 17 securely to both members 15 and 16.

Disposed between corresponding ends of plates 14 and 17 are threaded metallic rods 19 and 20 on each of which two plane parallel surfaces have been milled the full length. Mounted on each

of the two rods 19 and 20 as shown, are internally-threaded bushings 21. A hexagonally-shaped shoulder is integrally formed on each bushing.

Referring to Fig. 1, metallic rod 19 at the top is fixedly disposed by staking or inserting it tightly into a punched oblong-shaped hole at the left end of plate 14 and at the bottom is finished in a threaded extension which engages a threaded hole in the left end of plate 17. Square-cut grooves are provided in the upper and the lower surfaces of the left end of plate 14 so that when rod 19 is inserted into the punched hole and filed on top to the level of the upper surface of plate 14 the milled surfaces of rod 19 will fit snugly against the sides of the grooves and the diffused top of the rod after filing will extend over the edges of the punched hole into the groove in the upper surface, thereby preventing the rod from rotating about its axis with respect to plates 14 and 17. Plate 17 is clamped in position on rod 19 by means of nuts 26. Metallic rod 20 has integrally formed therewith an extension arm 22 for supporting a finger-button 23 of insulative material. Rod 20 at the top slidably extends through an open slot in the right end of plate 14, a closed slot in the right end of base plate 13 and an open slot in the right end of bakelite plate 11. Rod 20 at the bottom slidably extends through an open slot in the right end of plate 17. Rod 19 is fixedly mounted whereas rod 20 is slidably mounted and forms the operating key member.

Adjustably mounted between the upper portions of rods 19 and 20 is a flat spring member 24 and between the lower portions of the same rods is a flat spring member 25. Each spring member is open-slotted, or bifurcated, at both ends to embrace closely the parallel surfaces of rods 19 and 20 and is also securely held in place, as shown, by means of bushings 21 and hexagonally-shaped nuts 26. Spring member 25 is normally maintained under a tension, that is, prestressed, by means of bushing 21 on the lower portion of rod 20. This prestressing may be reduced to the value desired by means of an adjusting screw 56 mounted through an adjusting nut 27, the screw 56 being in engageable relation with spring 24. The adjusting screw 56 may, as shown in Fig. 7, be mounted on plate 17 instead of plate 14 in which case the springs would be understressed initially and the adjusting screw advanced to increase the stress to the desired value. By prestressing one or both horizontal spring members 24 and 25 the operating rod 20, controlled by key, or finger-button 23, may be caused to rest in a definite normal position as will hereinafter be described.

Fixedly mounted on rod 20 is an L-shaped insulative block 28 upon which is mounted a support 29. Support 29 serves both as a wiring terminal and a support for the resilient members 30. Fixedly mounted on and between the two vertical metallic members 15 and 16 is a metallic block 31. Insulatedly mounted on opposite ends of block 31 are contact supports 32 and 33, through the ends of which are threaded capstan screws 34 and 35, respectively. A contact on the end of each of the capstan screws is in engageable relation with a contact on each of the resilient members 30. A round stud member 36 is rotatably mounted to extend through plates 11, 13, and 14. To the lower end of the stud member is fixed a circular disc 37 and to the upper end is fixedly mounted a knob 38 for rotating the stud and disc through a horizontal angle of about 30 degrees whereby a projecting lever 39 fixedly attached to disc 37 is placed in engagement with the cammed edge of the upturned end of plate 40 to force, when knob 38 is turned, plate 40 and operating rod 20 downward to hold the operating rod in a fully depressed position when the key is not in use. A flat spring member 41 is securely fastened at one end to the under-side of plate 14 and at the other end rests in a radially disposed groove on disc 37 to exert a pressure on the under-side of disc 37 to thereby hold the disc, and associated lever 39 out of engagement with plate 40 when the knob 38 is rotated preparatory to sending. In Fig. 5 projecting lever 39 is shown in cross-section in its normal position and in dot and dash line in its operated position, the lever not being in engagement with the cammed edge of the upturned end of bar 40 when it is desired to send.

The contact on the end of capstan screw 34 represents the spacing contact and that on the end of capstan screw 35, the marking contact. When the cam bar 40 is fully depressed as shown in dot and dash line in Fig. 5 the marking contact is closed, as when the key is not in use, that is, the key is normally held in a marking position. Conductors 42, 43 and 44 are shown in Fig. 1 connecting the marking, the spacing and a movable, or transfer, contact respectively to the main terminal block 45.

At opposite ends of the plate 13 are fixedly mounted internally-threaded studs 46 for engaging set screws 47 whereby the keys may be mounted in the keyshelf at an operator's telegraph switchboard.

Fig. 6 shows the relative positions of two transmitting keys of the present invention and a single line-up of lever type switching keys mounted in the keyshelf of an operator's switchboard.

An alternative arrangement of operating contacts, shown in Fig. 7, may provide a rigid make contact as used in the sending keys heretofore used. In such an arrangement an insulated contact may be affixed to the bottom of operating rod 20' and the rod when operated serves to cause a contact on a resilient member 49 to engage with another contact affixed to an adjustable screw 50. Resilient member 49 and adjustable screw 50 are insulatively mounted on plate 17 and connected to terminals 45'. A prestress adjusting screw 56' is shown in Fig. 7 as mounted in the lower plate 17 instead of in the upper plate 14 as shown in Fig. 1.

What is claimed is:

1. A circuit make-and-break instrument comprising a contact, a second contact in engageable relation with the first-mentioned contact, an operable member on which said second contact is fixedly mounted, a fixed member, flexible members substantially parallel for supporting said operable member in a prestressed position from said fixed member and means for momentarily operating said operable member to a further stressed position whereby said second contact moves into engagement with the first-mentioned contact.

2. A circuit make-and-break instrument comprising an adjustable stationary contact, a resilient contact element in engageable relation with said stationary contact, an operable member, a fixed member, flexible members substantially parallel for supporting said operable member in a prestressed position from said fixed member, said flexible members adapted to restrict said operable member to a movement that is along its longitudinal axis, means for momentar-

ily operating said operable member to a further stressed position whereby said resilient member moves into engagement with said contact, and adjustable means in engageable relation with one of said flexible members for regulating the amount of prestress normally applied to said operating member.

3. A circuit make-and-break instrument comprising a pair of adjustable stationary contacts, a resilient contact element in engageable relation with each contact of said pair, an operable member on which said resilient element is fixedly mounted, a fixed member, flexible members substantially parallel for supporting said operable member in a prestressed position from said fixed member, means for momentarily operating said operable member to a further stressed position whereby said resilient element moves from one to the other contact of said pair and camming means for locking said operable member in a fully operated position.

4. A telegraph transmitting key comprising a square-shaped rigid structure whereof the contact-making points and other working parts are enclosed and the top is arranged to be mounted flush with the keyshelf of an operator's switchboard, said structure having a width of a ratio of about 1 to 4 to each of its two other dimensions, an operable member controlled by said key and normally arranged in a prestressed position, a resilient element fixedly and insulatedly mounted on said operable member, and a pair of stationary contacts arranged to be alternately engaged by said resilient element depending on the operation of said operable member to its normal and its operated position.

5. A telegraph transmitting key comprising a square-shaped rigid structure whereof the top is arranged to be mounted flush with the keyshelf of an operator's switchboard, and the contact-making points and other working parts are enclosed, said structure having a width of a ratio of about 1 to 4 to each of its two other dimensions, an operable member controlled by said key and normally arranged to be in a prestressed position, a resilient element fixedly and insulatedly mounted on said operable member, a pair of stationary contacts arranged to be alternately engaged by said resilient element in accordance with the operations of said operable member to its normal and its operated position, and means for further stressing said operable member any desired amount.

6. A telegraph transmitting key comprising a square-shaped rigid structure whereof the top is arranged to be mounted flush with the keyshelf of an operator's switchboard and the contact-making points and other working parts are enclosed, said structure having a width of a ratio of about 1 to 4 to each of its two other dimensions, an operable element controlled by said key and normally arranged to be in a prestressed position, a resilient element fixedly and insulatively mounted on said operable member, a pair of stationary contacts arranged to be alternately engaged by said resilient element in accordance with the operations of said operable member to its normal and its operated position, and means for locking said movable member in an operated position.

7. A circuit make-and-break instrument comprising an upper plate to be arranged flush with the top of a keyshelf of an operator's telegraph switchboard, a lower plate, a rigid separator between said plates, vertically disposed legs at opposite ends of said plate, one of which is fixedly connected to the corresponding ends of said plates and the other movably arranged at the opposite ends of said plates, a manually operated button fixedly mounted on top of said movable leg above said upper plate for operating said movable leg, a resilient element fixedly connected to the upper portions of said legs, a second resilient element fixedly connected to the lower portions of said legs, a movable contact-making resilient element fixedly connected insulatively to said movable leg, other contact-making elements adjustably mounted in engageable relation with said movable contact-making resilient element, supports for said other contact-making elements fixedly mounted on said rigid separator, and a clamp for locking said movable leg against movement.

8. A circuit make-and-break structure of a narrow parallelopiped form having a ratio of its over-all width to either of its other two dimensions of about 1 to 4 and comprising an upper plate for fixedly mounting said structure in the keyshelf of an operator's switchboard, a lower plate and a rigid separator interconnecting said plates, two vertically arranged rods at opposite ends of said plates, one of which is fixedly connected to the corresponding ends of said plates and the other movably arranged at the opposite ends of said plates, a manually operated button fixedly mounted on the top of said movable rod above said upper plate for operating said movable rod, a resilient element fixedly connected to the upper portions of said rods, a second resilient element fixedly connected to the lower portions of said rods, means employed for establishing said fixed connections adapted to exert a normal stress on said movable rod, a movable contact-making resilient element fixedly connected insulatedly to said movable rod and normally held in a definite position, other contact-making elements adjustably mounted in engageable relation with said movable contact-making resilient element, supports for said other contact-making elements fixedly mounted on said rigid separator and a clamp for locking said movable rod against movement.

9. A circuit make-and-break structure, according to claim 8, wherein said resilient elements comprise adjustable means for determining the amount of movement of said movable rod.

10. A circuit make-and-break structure, according to claim 8, wherein said other contact-making elements include adjustable means for determining the amount of movement and the amount of pressure exerted on said movable contact-making resilient element independently of the movement of said movable rod.

ALLEN R. BONORDEN.