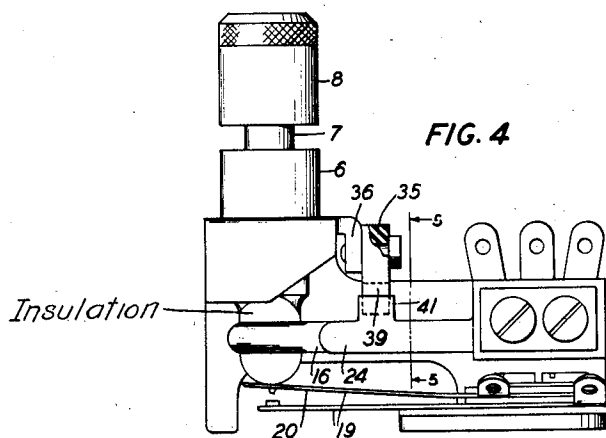
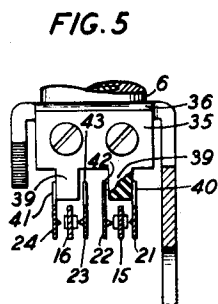
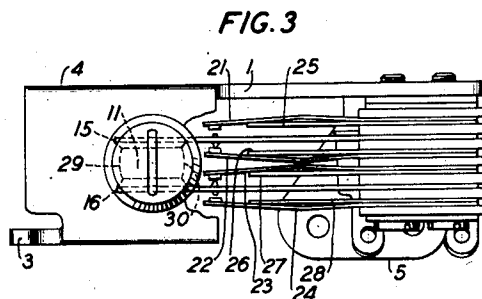
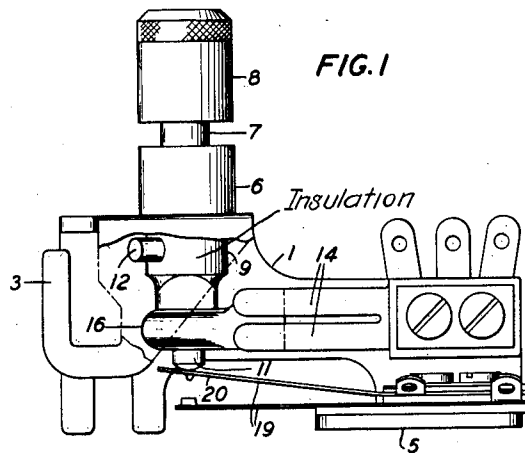
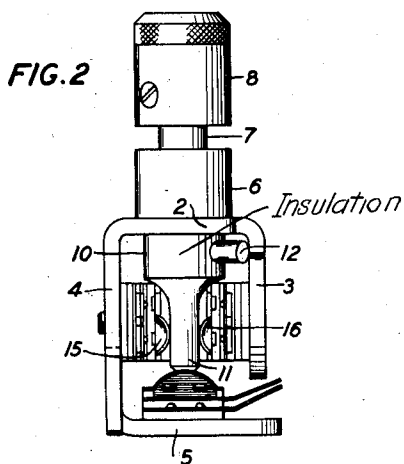


April 21, 1942.

E. C. MATTHEWS
CIRCUIT CONTROLLING DEVICE

2,280,438

Filed Feb. 24, 1939



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2,280,438

CIRCUIT CONTROLLING DEVICE

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Application February 24, 1939, Serial No. 258,132

10 Claims. (Cl. 200—1)

This invention relates to circuit controlling devices and particularly to manually operative contacting devices for use in communication systems.

An object of the invention is to simplify manually operative contacting devices and to combine in a unitary structure contacting devices requiring different manual operations.

Heretofore manually operative contacting devices for telephone systems have been provided in which a key may be operated in two different ways to actuate different sets of contacts.

According to the present invention advantages are secured over these prior devices by a combined contact controlling structure in which the turning of a button operates one set of contacts and the pushing or depressing of the button operates another set of contacts. More specifically, a feature of the invention is a structure comprising a bracket, a plunger rotatably and longitudinally slidably mounted in said bracket with one set of contact springs mounted on the bracket in position to be actuated by the rotative movement of the plunger, said contacts cooperating with the plunger to hold the plunger in its rotated position, and with another set of contact springs mounted on the bracket in position to be actuated by the sliding motion of said plunger, said plunger being so formed that the second set of contact springs may be operated regardless of whether or not the plunger is held in the rotated position.

The invention has been illustrated in the accompanying drawing in which:

Fig. 1 shows a side view of a turn and push button type key constructed in accordance with the applicant's invention.

Fig. 2 shows a front view of the key structure shown in Fig. 1;

Fig. 3 shows a top view of this structure;

Figs. 4 and 5 show a turn and push button type key disclosing the applicant's invention in a modified form. Fig. 4 is a side view and Fig. 5 is a cross-section taken on line 5—5 of Fig. 4.

Referring now to the drawing and particularly to Figs. 1, 2 and 3, the key structure is supported and assembled on the bracket 1 having an upper flat member 2, a side member 3, another side member 4 and a lower member 5. In the upper member 2 is inserted and secured a bushing 6 in which a plunger 7 is rotatably and slidably mounted. This plunger is provided at the top with a button 8 and at the bottom with an insulation member 9, the upper end 10 of which is circular in cross-section and the lower end 11 of which is rectangular in cross-section. This plunger with its associated parts is shown in the normal position. To the portion 10 is secured a pin 12 which limits the rotary movements of the plunger by engaging member 3

when the plunger is in its normal position and by engaging member 4 when the plunger is in its fully rotated position. On the inner side of the member 4 is secured a group of six springs 14 two of which, marked 15 and 16, respectively, engage the wide flat surfaces of the portion 11 and are tensioned so as to hold the plunger in the normal position. On the inside of the lower member 5 is secured a group of two springs 19, the upper spring 20 of which engages the under edge of the portion 11 to hold the plunger in its upper normal position. The springs 21, 22, 23 and 24 of the group 14 are tensioned to rest against supporting springs 25, 26, 27, 28, respectively, so as to hold them in proper normal relation in regard to the springs 15 and 16. That is, so that springs 21 and 24 are normally out of contact with the springs 15 and 16, respectively, and springs 22 and 23 are normally in contact with these springs 15 and 16, respectively. The two springs in the group 19 are normally out of contact with each other.

This mechanism may be operated as follows: For example the plunger 7 may be operated in one manner by depressing the button 8 with a finger until the button comes in contact with sleeve 6. When the plunger is in this position electrical connections may be made between the two springs in the group 19. When the plunger is being depressed it will not disturb the contact relations between the springs in the group 14, as the springs 15 and 16 will merely slide on the wide flat surfaces of the portion 11. If the plunger is now rotated so that the pin 12 engages the inner surface of the side member 4, it is readily seen that the springs 15 and 16 will be separated by the portion 11 so that spring 15 will be disengaged from spring 22 and engage spring 21, while spring 16 will be disengaged from spring 23 and make contact with spring 24. With the plunger rotated in this manner it will cause the opposite side surfaces 29 and 30 of the portion 11 to engage the springs 15 and 16 in such a manner that the tension of these springs will hold the plunger in this rotated position. The side surfaces 29 and 30 may be slightly rounded and the plunger will be permitted to rotate from the normal position to a fully rotated position which is slightly over a quarter of a turn so that the plunger will be securely held. It is evident that the plunger will be held in this position even though it may be returned to its normal position with regard to its longitudinal movement and that regardless of which position it is in in this latter respect, the plunger may be rotated to operate the contacts in the group 14. Hence this key structure may be operated to open or close connections between the springs in a group 19 regardless of whether the springs in the group 14 have been operated or not and in either

case, the springs 19 may be operated without disturbing the normal or operated position of the contacts in the group 14.

In another form of the applicant's invention as disclosed in Figs. 4 and 5, the general structure is identical with the structure as disclosed in Figs. 1 to 3. The difference is that instead of having the supporting springs 25, 26, 27 and 28 for holding the springs 21 to 24 in their normal relation to the springs 15 and 16, the springs 21 to 24 may be held by an insulating comb 35 secured to an additional extension 36 on the bracket 1. Normally the springs 21 to 24 rest against the outer sides of the prongs 38 and 39 by means of the extensions 40 and 41 of these springs, whereas the springs 22 and 23 are placed under tension against the springs 15 and 16 but have extensions 42 and 43 in close proximity to the inner sides of the prongs 41 and 42 so that when the springs 15 and 16 are operated upon by the portion 11 these extensions will engage the prongs 38 and 39 almost immediately after the springs 15 and 16 are moved and thus open the connections between these springs at the proper time. With the improved bracket structure disclosed herein it is possible to mount the spring controlling comb 35 on the same bracket, thus forming a complete and unitary structure of all the component parts.

What is claimed is:

1. In a contacting device, a bracket, a plunger rotatably and longitudinally slidably mounted on said bracket, a group of contact springs on said bracket responsive to the rotary movement of said plunger, said contact springs cooperating with said plunger to hold the plunger in its rotated position, another group of contact springs mounted on said bracket in position to be actuated by the sliding motion of said plunger, said plunger being so formed that said second group of contact springs may be operated regardless of whether or not the plunger is held in the rotated position.

2. In a contacting device, a bracket, a plunger mounted on said bracket to permit said plunger to be moved from a normal position in a rotary direction a definite distance and to be moved from a normal position in a longitudinal direction a definite distance, a set of contact springs on said bracket in position to be actuated during the rotary movement of said plunger, said contact springs cooperating with said plunger when it has completed its rotary movement to releasably hold said plunger in its fully rotated position, a second set of contact springs on said bracket in position to be actuated during the longitudinally slidable movement of said plunger, said plunger being so formed that said second set of contacts may be actuated regardless of whether or not the plunger is releasably held in the fully rotated position.

3. In a contacting device, a bracket, a plunger rotatably and longitudinally slidably mounted on said bracket, contact springs on said bracket in position to be actuated by the rotary movement of said plunger, said contact springs cooperating with said plunger to hold the plunger in its rotated position, another set of contact springs mounted on said bracket in position to be actuated by the sliding motion of said plunger, said plunger being so formed that the second group of contact springs may be operated regardless of whether or not the plunger is held in the actuated rotary position, a member on said bracket for guiding said first-mentioned contacts

so that the opening and closing of connections between them will take place at fixed intervals during the rotative movement of the plunger.

4. In a contacting device, a bracket, a plunger rotatably and longitudinally slidably mounted on said bracket, means associated with said plunger and cooperating with said bracket to limit the rotative and longitudinally slidable movement of the plunger to within certain limits, a set of contact springs on said bracket operative when said plunger has been fully rotated, said contact springs cooperating with said plunger when fully rotated for holding it in said fully rotated position, another set of contact springs on said bracket operative when said plunger has been fully operated in its longitudinally slidable movement, and means for preventing the movement of the first-mentioned contact springs during the longitudinally slidable movement regardless of whether or not the rotary movement has taken place.

5. In a contacting device, a plunger, three sets of contact springs, a mounting bracket comprising a horizontally located upper member provided with a collar having an aperture therein in which the plunger is mounted for movement in a rotary direction and in a longitudinally slidable downward direction, two side members projecting at right angles downwardly from said upper member, a button attached to the upper end of said plunger to limit the movement of said plunger in the downward direction, an operating member having two opposite and parallel flat surfaces and attached to the lower end of said plunger to limit the movement of the plunger in an upward direction, a pin attached to said operating member to limit the rotary movement of said plunger by normally resting against one of said side members and by resting against the other of said side members when rotated, means for mounting two of said sets of contacts on one of said side members so that one set will normally engage one of the flat surfaces of said operating member and the other set normally engage the other flat surface of said operating member for actuation when the plunger is rotated, another lower member integral with one of said side members and extending therefrom at an angle and parallel with said upper member, means for mounting said remaining set of contacts on said lower member in position to be actuated by the actuating member when the plunger is moved longitudinally in a downward direction, said last-mentioned set of contacts cooperating with said actuating member to be actuated thereby regardless of whether said plunger has been rotated.

6. In a contacting device, a bracket, a plunger secured to said bracket and so mounted therein as to be capable of a limited rotary movement and a limited longitudinally slidable movement, an extension member attached to said plunger of insulation material of rectangular cross-section and having two opposite large flat surfaces and two opposite smaller flat surfaces, two sets of contact springs secured to said bracket so that one of the springs in one set and one of the springs in the other set normally rest respectively against the two large opposite surfaces of said extension member to normally hold the plunger in its normal position and so that when the plunger is manually rotated approximately 90 degrees, said springs will be bent outwardly and come to rest respectively on the opposite smaller surfaces of said extension member

and be held in these positions and due to their tension in turn hold the plunger in its rotated position, said bending movement of the two springs causing connections or disconnections to be established between these two springs and their respectively associated sets of springs, while the interaction between these two springs and the plunger in either the normal or the rotated position will not interfere with the longitudinally slidable movement of the plungers, another set of contact springs mounted on said bracket in position to be operated by said extension member in response to the longitudinally slidable movement of the plunger.

7. In a contacting device, a bracket, a plunger mechanism secured in said bracket and mounted therein so as to be manually movable in a limited rotary movement from a normal position to a fully rotated position, and in a limited longitudinally slidable movement, two sets of contact springs mounted on said bracket controlled by the rotary movement of the plunger, said two sets of contact springs and said plunger being so shaped and related to each other that with the plunger in the normal position in regard to its rotatable movement, or in its fully rotated position, and regardless of whether or not the plunger has been longitudinally moved in a slidable movement, said plunger will be held in said normal or rotated positions by the two sets of contact springs, another set of contact springs mounted on said bracket in position to be controlled in response to a manually controlled slidable movement of the plunger from the normal position to its actuated position and to act on said plunger when manually released to slidably restore it to said normal position.

8. In a contacting device, a plunger, two sets of contact springs, a mounting bracket comprising a horizontally located upper member, two side members projecting at right angles downwardly from said upper member and a third member extending at right angles from one of said side members, said plunger being rotatably and longitudinally movable in said bracket, said bracket and said plunger being so constructed that the plunger is confined to move within certain limits in its rotary and longitudinal movements, means for mounting one of said sets of contacts on one of said side members and the other set of contacts on said third member of the bracket, an operating member attached to said plunger being so constructed that when the plunger is moved from a normal position to the limit of its longitudinal movement, said member will actuate one set of contacts and when the plunger is moved from a normal position to the limit of its rotary movement, the said member will actuate the other set of contacts, said operating member and said other set of contacts being so constructed that the plunger will be held in a normal position in regard to the rotary movement or in its fully rotated position regardless of whether or not the plunger is moved from its normal position in regard to its longitudinal movement to the limits of said movement.

9. In a contacting device, a plunger, two sets of contact springs, a mounting bracket comprising a horizontally located upper member, two side members projecting at right angles down-

wardly from said upper member and a third member extending at right angles from one of said side members, said plunger being mounted in said bracket to move in a rotary and a longitudinal direction, means associated with said plunger and said bracket, for limiting the movements of said plunger from normal positions to the actuate positions, means for mounting one of said sets of contacts on one of said side members, and the other set of contacts on said third member, an operating member attached to said plunger, said operating member and the contact set attached to the side member being so constructed that the plunger will be held by said set of contacts in its normal position in regard to its rotary movement and in its fully rotated position and to operate said set of contacts when the plunger has been fully operated in its rotary movement, said operating member and said second set of contacts being so constructed and related that when the plunger is moved to its fully operated position with regard to its longitudinal movement, said second set of contacts is operated, the relationship between said two sets of contacts and the operating member being such that the second set of contact springs may be operated regardless of whether the operating member and plunger are held in their normal position in regard to its rotating movement or have been fully rotated.

10. In a contacting device, a plunger, two sets of contact springs, a mounting bracket comprising a horizontally located upper member, two side members projecting at right angles downwardly from said upper member and a third member extending at right angles from one of said side members and having an aperture in said upper member in which the plunger is movable in a rotary and a longitudinal movement, a button attached to the upper end of said plunger and an operating member attached to the lower end of said plunger to limit the movement of the plunger in its longitudinal direction between fixed limits, a pin on said operating member arranged in said bracket in relation to said side members to limit the movement of the plunger in its rotary movement within fixed limits, means for mounting one of said sets of contact springs on one of said side members and for mounting the other set of contacts on said third member, said operating member and said first-mentioned set of contact springs being so related and constructed that the operating member will be held in either its normal position in regard to its rotary movement and in its fully rotated position by being clamped between certain of said first set of contact springs and to operate said first set of contacts when the operating member is fully rotated, said operating member and said second set of contact springs being so related and constructed that the operating member will actuate the second set of contact springs when the plunger is moved to its fully operated position in regard to its longitudinal movement without disturbing the plunger and the operating member if in the normal position with regard to the rotary movement and without disturbing the plunger and the operating member if in the fully rotated position.

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