

Jan. 5, 1943.

R. F. MALLINA
CALL TRANSMITTER

2,307,525

Filed April 1, 1941

3 Sheets-Sheet 1

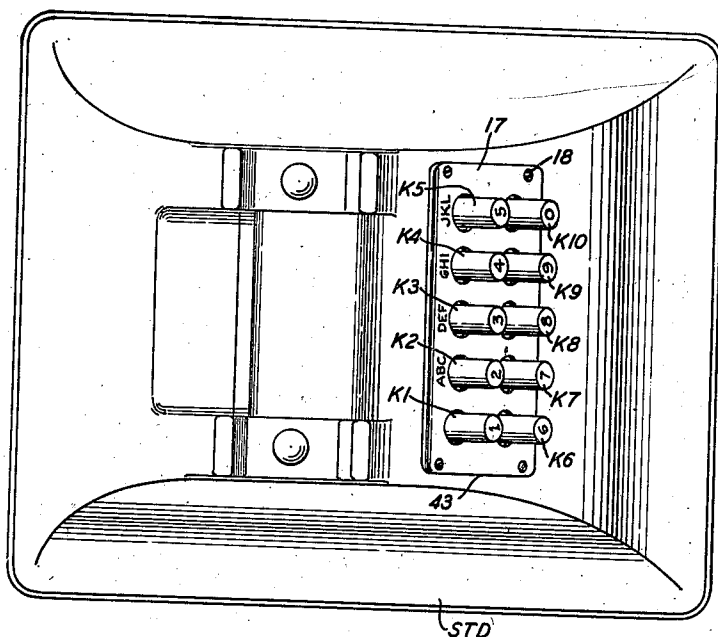


FIG. 1

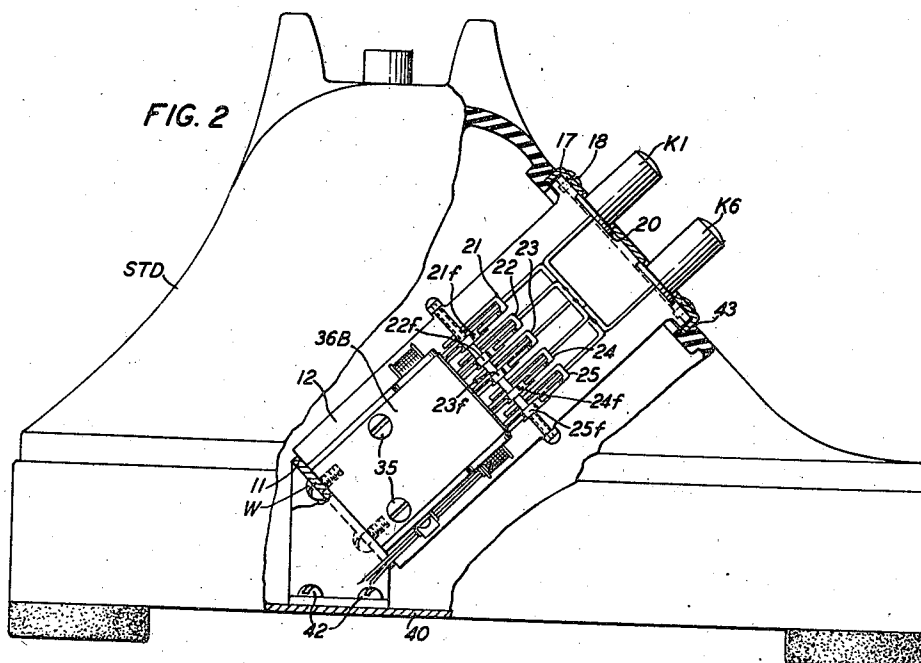


FIG. 2

INVENTOR
R. F. MALLINA
BY *J. Mac Donald*
ATTORNEY

Jan. 5, 1943.

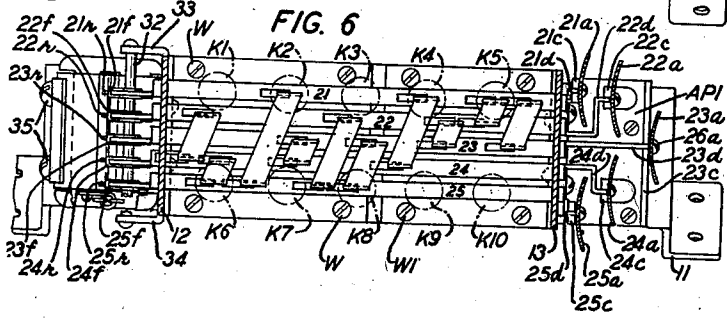
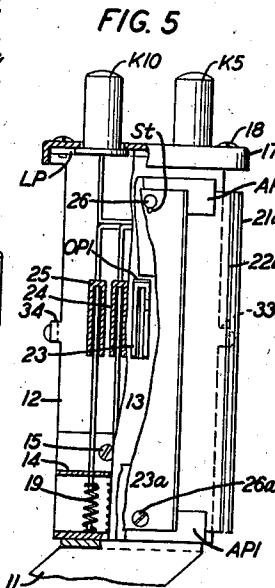
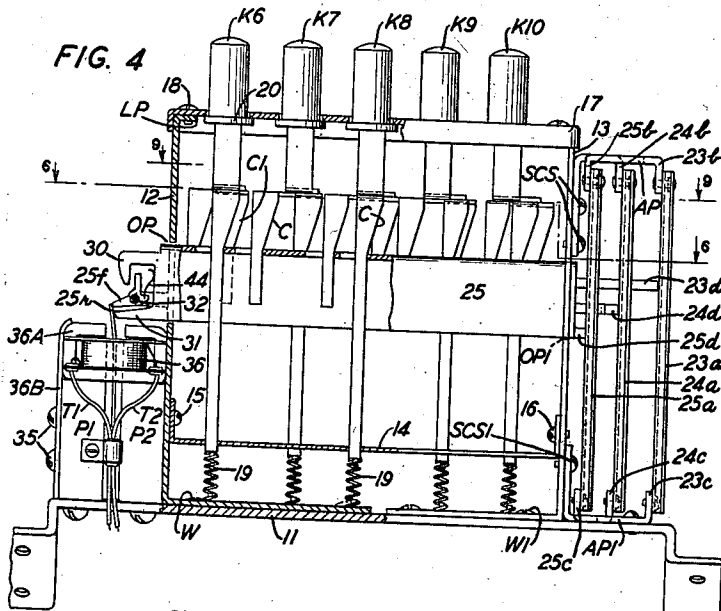
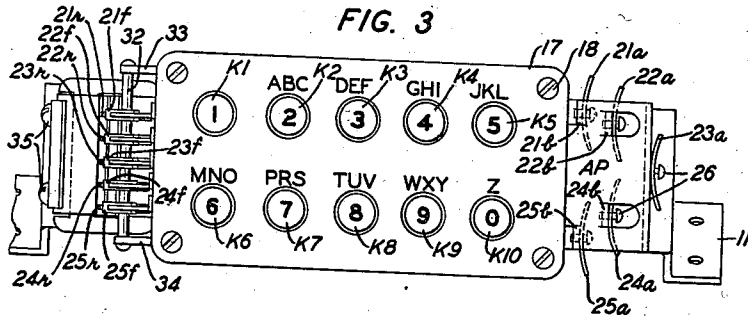
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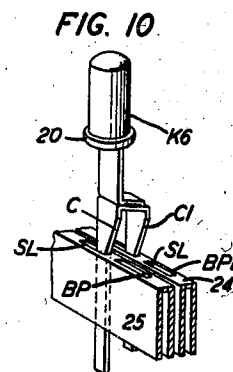
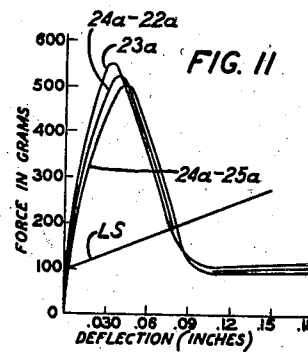
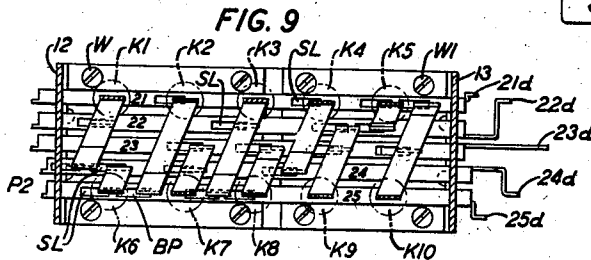
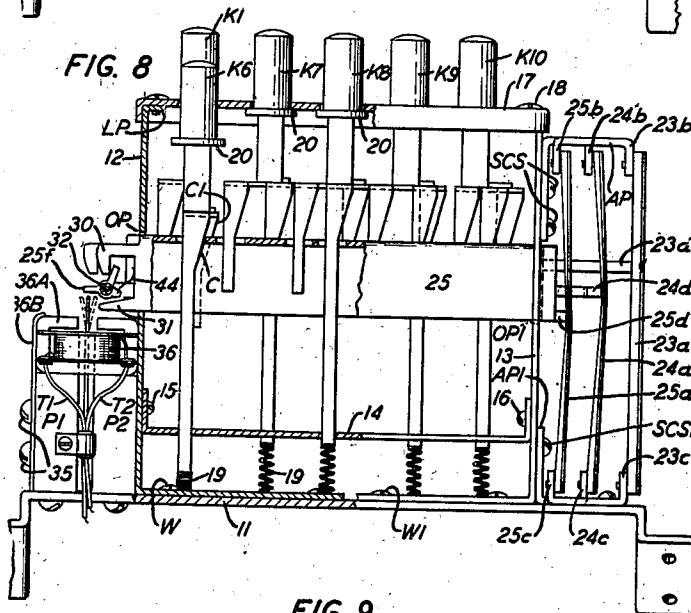
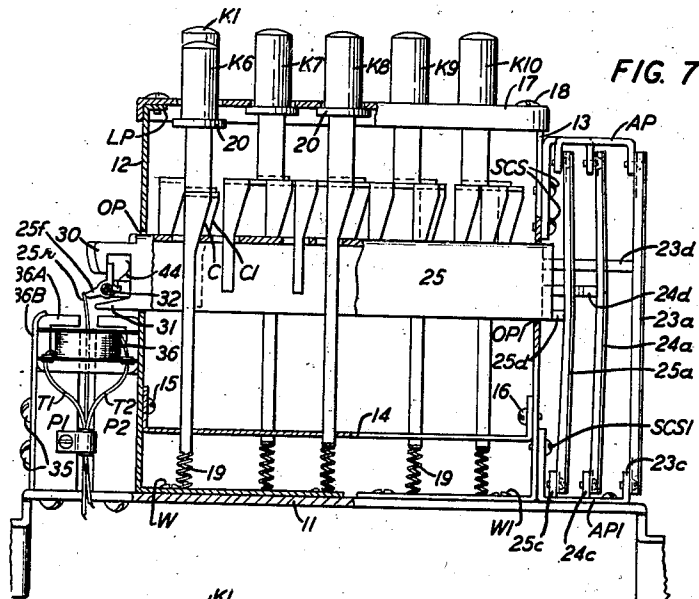
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INVENTOR
R. F. MALLINA
BY *J. Mac Donald*
ATTORNEY

2,307,525

3 Sheets-Sheet 3



INVENTOR
R. F. MALLINA
BY *J. MacDonald*
ATTORNEY

UNITED STATES PATENT OFFICE

2,307,525

CALL TRANSMITTER

Rudolph F. Mallina, Hastings on Hudson, N. Y.,
 assignor to Bell Telephone Laboratories, Incorporated,
 New York, N. Y., a corporation of New York

Application April 1, 1941, Serial No. 386,284

8 Claims. (Cl. 179-90)

This invention relates to call transmitters of the type in which the operation of digit-numbered key members operate vibrative elements in the field of a magnet for generating alternating-current impulses in a telephone line circuit corresponding to the digits of the operated key members.

The object of the invention is the provision of a call transmitter of the type above mentioned which will be simple in construction, cheap to manufacture, and positive in operation.

In accordance with the invention, a number of bars which are movable longitudinally in upright members forming parts of a frame supporting the transmitter-operating mechanisms are actuated in a plurality of predetermined combinations by pairs of camming elements carried by manually-operable keys, which are movable longitudinally in the supporting frame at right angles to the bars. Means carried by the bars is provided for moving operatively-associated vibrative elements into pretensioned positions upon the movement of the bars in one of two directions, with other means carried by the bars for actuating operable members in the above-mentioned combinations for releasing the vibrative elements upon the movement of the bars in the other direction as effected by the operation of the keys, each of the keys being provided with a retractile spring in the form of a metallic tape of arcuated cross-section, such spring offering maximum resistance to a force tending to change its curved surface, while offering a minimum resistance to such force when its arcuated shape has been flattened, the change in shape of the retractile spring occurring at the point where the depressed key and the bars actuated thereby reach a predetermined point toward their operated positions.

Other novel features and advantages of the invention will be apparent from the following description and by the claims appended thereto, reference being had to the accompanying drawings in which:

Fig. 1 is a top view of the casing which houses the call transmitter mechanism of the invention, the keys being shown in normal non-operated position;

Fig. 2 is a side elevation of Fig. 1, partly in section, showing the left-hand side of the transmitter mechanism;

Fig. 3 is a top view of the transmitter mechanism showing the operating parts in normal position;

Fig. 4 is a front elevation shown with a number of operating parts partly in section;

Fig. 5 is a right side elevation showing a number of operating parts with portions broken away;

Fig. 6 is a horizontal sectional view taken on line 6-6 of Fig. 4;

Fig. 7 is a front elevation showing a number of operating parts in section with one of the keys and a number of parts actuated thereby partly operated;

Fig. 8 is a view similar to that of Fig. 7, but showing the key and parts controlled thereby in their fully operated position;

Fig. 9 is a horizontal view taken on line 9-9 of Fig. 4;

Fig. 10 is a view in perspective of one of the key members shown in operative relation with two elements of the reed-controlling mechanism; and

Fig. 11 is a set of curves showing the tension characteristics of the retractile springs used in the call transmitter of the invention in relation to a well-known coiled tension spring.

Referring to the drawings, a set of key members K1, K2, K3, K4, K5, K6, K7, K8, K9, and K10 are mounted for longitudinal movement on a frame consisting of a base 11, two upright supports 12 and 13 secured to the base by a plurality of screws W and W1, a spacer plate 14 secured at its end to the upright supports 12 and 13 by screws 15 and 16, and a plate or cover 17 secured by a number of screws 18 to lug portions carried by the supports 12 and 13 at the top end thereof, the key members K1, K2, K3, etc., being guided in their longitudinal movement at their lower ends in rectangular openings in spacer member 14 and at their upper ends in circular holes in the cover plate 17.

The keys K1, K2, K3, etc., are each provided at their lower ends with a retractile spring 19 normally holding these keys in the non-operated position as shown in Figs. 1, 2, 4 and 5 where the collar portions 20 of these keys abut against the underside of cover plate 17.

The upright supports 12 and 13 are each provided with five rectangularly-shaped openings OP and OP1 provided for slidably receiving U-shaped bars 21, 22, 23, 24 and 25 best seen in Figs. 2, 5, 6 and 9, these bars being held in their normal non-operated positions by retractile springs 21a, 22a, 23a, 24a and 25a, respectively, each in the form of a piece of metallic tape curved latitudinally and provided with slots ST, shown in Fig. 5, at their upper ends engaged by screws 26 threading in lugs 21b, 22b, 23b, 24b

and 25b formed with an angle piece AP secured to the top outer disposed portion of upright 13, by screws SCS, while their lower disposed ends are secured by screws 26a to lugs 21c, 22c, 23c, 24c and 25c formed with an angle piece API secured by screws SCS1 to the upright support 13, the bars 21, 22, 23, 24 and 25 being provided with projections 21d, 22d, 23d, 24d and 25d for engaging their retractile springs 21a, 22a, etc., as for practical reasons at different points along their lengths as shown in Figs. 4, 7 and 8.

The bars 21, 22, 23, 24 and 25 are moved from the position shown in Figs. 3, 4 and 6 to the positions indicated by bars 24 and 25 shown in Figs. 8 and 9 by the operation of key members K1, K2, K3, etc., each carrying a pair of cam elements such as C1 and C, engaging bearing portions BP and BP1 formed by slots SL cut into the bar for operation in the following combinations:

- Key K1 operates bars 22 and 24.
- Key K2 operates bars 21 and 25.
- Key K3 operates bars 22 and 25.
- Key K4 operates bars 21 and 24.
- Key K5 operates bars 21 and 22.
- Key K6 operates bars 25 and 24.
- Key K7 operates bars 23 and 24.
- Key K8 operates bars 23 and 25.
- Key K9 operates bars 22 and 23.
- Key K10 operates bars 21 and 23.

The bars 21, 22, 23, 24 and 25 are each formed with a projection 31 and hook-shaped portion 33 formed for actuating respectively associated right-angle shaped pawl members 21f, 22f, 23f, 24f and 25f best seen in Figs. 3, 4, 6, 7 and 8 in a manner which will be hereinafter described in detail. These pawls are pivoted on a common shaft 32 journaled at both ends on lugs 33 and 34 formed with the upright support 12.

To the outer side of upright support 12 is securely mounted on a voltage generator in the form of metallic blocks P1 and P2 clamping a plurality of vibrative reeds 21r, 22r, 23r, 24r and 25r therebetween by the tightening effect of screw 35, the free ends of reeds 21, 22r, etc., extending through a coil 36 for operation between the poles of a permanent magnet 36a held in adjusted position on the end of blocks P1, P2 by a plate 36b interposed between the screws 35 and the block P1.

The free ends of reeds 21r, 22r, etc., are disposed in engageable relation with the horizontally disposed arm of pawls 21f, 22f, 23f, 24f and 25f and with the projections 31 of bars 21, 22, 23, 24 and 25, the latter serving for moving the vibrative reeds from their normal positions shown in full line in Figs. 8 and 9 to their flexed positions shown in Figs. 3, 4 and 6 by their retractile springs 21a, 22a, 23a, 24a and 25a, bearing against the lugs 21d, 22d, 23d, 24d and 25d of the bars.

The operation of the key members K1, K2, K3, etc., is effective to impart a longitudinal movement to the bars 21, 22, 23, etc., through their camming portions C and C1 to cause the pivotal movement of pawls 21f, 22f, in the combination above mentioned for releasing their corresponding reeds and thereby causing their vibration between the poles of permanent magnets 36a, the windings of coil 36 being connected to the subscriber's telephone line by the terminals T1 and T2 shown in Figs. 4, 7 and 8.

The call transmitter thus constructed may be mounted into the stand STD of a telephone desk set having a base 40 to which a support 11 is secured by a number of screws 42 shown in

Fig. 2 with the plate 17 fitted into a recess 43, formed in the stand STD.

According to the operation of the call transmitter of the invention, supposing that it is desired to establish a talking connection with a subscriber having, for example, the telephone call designation MHW-7281 and considering the keys K1, K2, K3, etc., and therefore the bars 21, 22, 23, etc., in normal position as shown in Fig. 4. The operation of key K6 representing the first digit of the call designation MHW-7281 above mentioned causes each camming portion C and C1 of that key to move the bars 24 and 25 simultaneously to the points where the projections 31 of these bars as shown in Fig. 7 are moved clear of the reeds 24r and 25r with these reeds remaining in their flexed positions due to their abutment against the horizontal arms of pawls 24f and 25f. The continued movement of key K6 and that of bars 24 and 25 is effective through their respective hook portions 30 to impart a small angular movement to the pawls 24f and 25f from the position shown in Fig. 7 to the position shown in Fig. 8 so as to release reeds 24r and 25r to cause their vibration between the poles of permanent magnet 36a for generating alternating current in the telephone line corresponding to the frequencies of reeds 24r and 25r. The return movement of key K6 under the tension of its retractile spring 19 permits the return of bars 24 and 25 to normal position under the tension of their respective retractile springs 24a and 25a, thus moving the reeds 24r and 25r in their normal pretensioned position while rotating the pawls from the position shown in Fig. 8 to the position shown in Fig. 4 through the engagement of the springs 44 carried by these pawls in abutment against their respective bars 24 and 25 and the transmitter is now ready for the operation of key K4—H, the second digit of the call designation MHW-7281 above mentioned and the consequent vibration of the reeds 21r and 24r caused by the operation of the bars 21 and 24 actuated by that key in the manner above described in connection with the operation of key K6 and the operation is continued for each of the digit keys forming the telephone call designation MHW-7281.

The curve shown in Fig. 11 indicates the deflection in inches of the retractile springs 21a—25a, 22a—24a and 23a V. S., the force in grams applied at the middle length portions on springs 21a and 25a by the projections 21d and 25d of bars 21 and 25, at points substantially one quarter of an inch above the middle length portion applied on springs 22a and 24a by the projection 22b and 24d of bars 22 and 24 and half-inch from the middle length portion applied on spring 23a by the projection 23d of bar 23 in relation to an ordinary tension spring LS.

The use of retractile springs having the characteristics shown in Fig. 11 due to the so-called collapse of these springs at the point corresponding to the engagement of the hook portion 30 of bars 21, 22, 23, 24 and 25 with the pawls 21f, 22f, 23f, 24f and 25f has been found to cause the operator to depress the keys to their full operated positions and thereby assuring proper transmitting of the signals.

What is claimed is:

1. In a call transmitter, a set of key members, a plurality of slidably movable elements actuated by said key members in predetermined combinations, a set of vibrative reeds, and a plurality of means actuated in said combination

by means formed with said elements to cause the operation of said reeds upon the operation of said key members for transmitting a call.

2. In a call transmitter, a set of longitudinally movable key members, each of said key members having cam portions, a plurality of longitudinally movable bars actuated by movement of said cam portions in predetermined combinations, a plurality of pretensioned vibrative elements, and means actuated by the direct operation of said bars for releasing said elements in said combinations.

3. In a call transmitter, a set of key members, a plurality of longitudinally movable elements, means carried by said key members for operating said elements in predetermined combinations, spring means for yieldably holding said elements in operative relation with the first-mentioned means, a set of vibrative reeds one for each of said elements held in pretensioned position under the tension of said spring means, means for holding said reeds in pretensioned position upon a partial operation of said longitudinally movable elements as effected by said key members, and means formed with said elements for operating the second-mentioned means for releasing said reeds in said combinations upon the continued operation of said elements by said key members.

4. In a call transmitter, a set of longitudinally movable key members, retractile springs for said key members, a plurality of longitudinally movable bars actuated by said keys, a retractile spring for each of said bars in the form of a piece of arcuate tape operable by the movement of said bars for decreasing their tension following a predetermined movement of said bars for controlling the operation of said keys, a frame for mounting said keys and said bars at right angles to each other, means carried by said frame for securing one end of each of said tape springs, other means carried by said frame for loosely supporting the opposite ends of said tape springs for permitting free bending thereof, a pair of cams carried by each of said key members for operating said bars in predetermined combinations, a set of normally tensioned vibrative reeds, and a mechanism actuated by said bars to cause the release operation of said reeds in said combinations for transmitting a call.

5. In a call transmitter, a frame comprising two upright supports, a pair of plates for holding said supports in parallel spaced relation to each other, a set of key members mounted for longitudinal movement in said plates, each of said

key members having a pair of cams, a set of bars mounted for longitudinal movement in said supports and engaged by said cams for operation by the movement of said key members in predetermined combinations, spring means tensioned by the operation of said bars for returning the latter to normal following the return of said key members to normal, a set of vibrative reeds disposed in engageable relation with means formed with said bars and normally pretensioned by the tension of said springs, and a mechanism actuated by said bars for releasing said reeds in said combinations for transmitting a signal according to the operation of said key members.

6. In a call transmitter, a set of manually operable key members, a set of movable means actuated by said key members, a plurality of vibrative elements, a mechanism actuated by the operation of said movable means for causing the operation of said elements, and a plurality of springs tensioned by the movement of said movable means by said key members, said springs flexing variably upon the movement of said movable means for controlling the manual operation of said key members.

7. In a call transmitter, a set of key members, a set of operable elements actuated by said key members, a mounting for said key members and said operable elements, retractile springs for said elements secured to means carried by said frame, said springs being in the form of metallic laterally curved tapes, said springs affording maximum resistance to a force applied to said key members tending to change their curved surfaces and offering minimum resistance to such a force following a change of said curved surfaces for controlling the operation of said key members.

8. In a call transmitter, a set of key members, a set of movable elements actuated by said key members, a retractile spring for each of said elements tensioned by the movement of the latter, each of said springs being in the form of a tape curved laterally, secured at one of its ends to a fixed support, each of said springs offering maximum resistance to a force tending to change its curved surface as at the beginning of the movement of one of said key members and offering a minimum resistance at the point where said key reaches a given point along toward its operated position, said spring returning said operated key to normal unoperated position with a force which increases as the key nears its normal non-operated position.

RUDOLPH F. MALLINA.