July 23, 1940. B. A. WALLACE 2,209,214

GANG RELAY

Filed Aug. 19, 1938

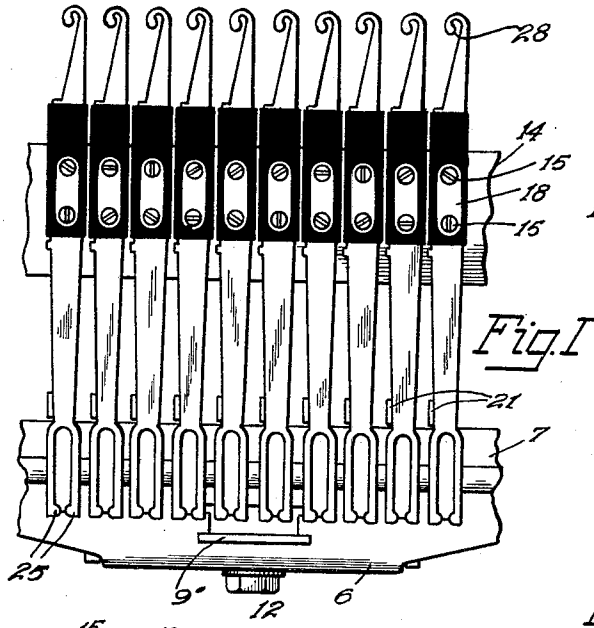

Fig. 1

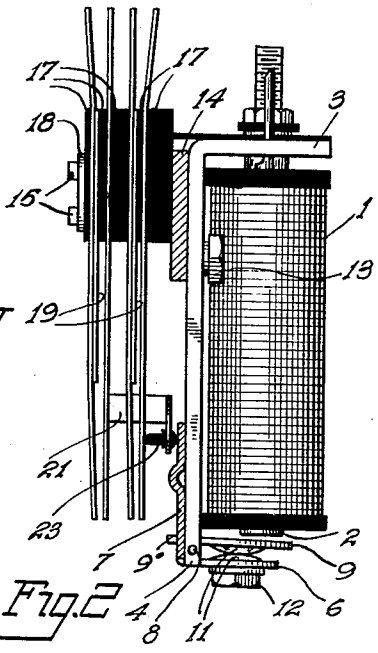

Fig. 2

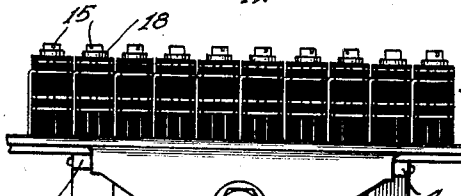

Fig. 3

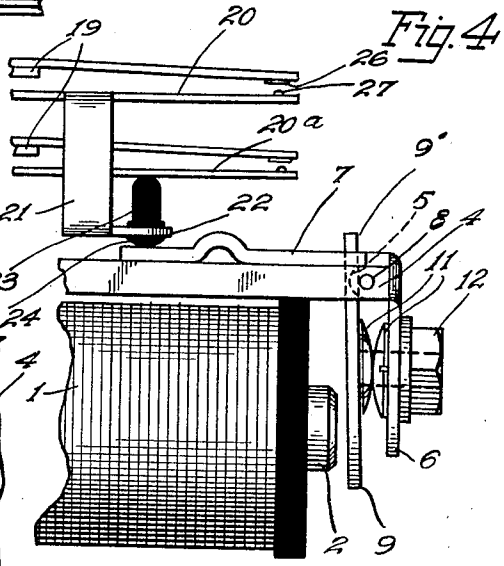

Fig. 4

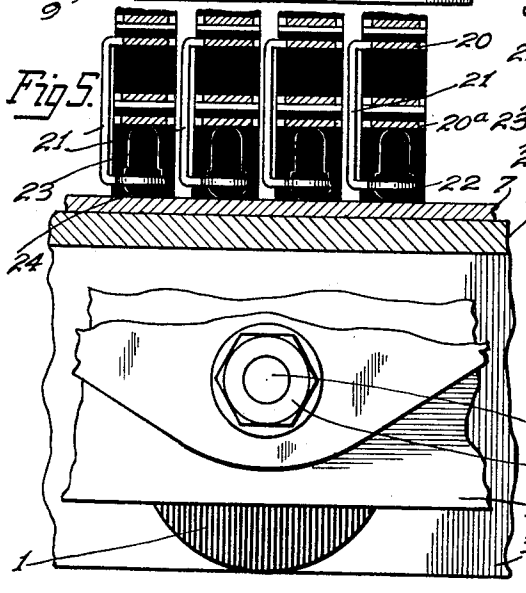

Fig. 5

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GANG RELAY

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Application August 19, 1938, Serial No. 225,684

4 Claims. (Cl. 200—104)

This invention relates to a new and useful improvement in gang relays, and particularly to the type which are used in telephone systems in establishing talking connections between the calling and called subscribers.

The object of the invention is the provision of a relay of this type which is compact, reliable in operation, which permits ready adjustment and which is cheap to manufacture.

One of the features of the invention resides in the spring design which is of such a character that several of the individual spring stackups may be mounted close together in adjacent spaces and still permit adjustment of the individual springs to be made easily by working from the front or contact end of the relay. This ready adjustment is facilitated by the structure, wherein the lever springs of each two-set combination are carried from the bottom on a single bumper of insulating material inserted in a formed arm which is part of the lever spring of the upper pair.

Another feature resides in the adjustable armature, which is so arranged that the air gap between it and the coil core may be readily regulated to govern the degree of spring travel. This is accomplished by mounting the armature proper on a depending arm of the spring lever, the two parts being separated by spring washers and held together with a threaded stud and nut by means of which the distance between the armature and the depending portion of the spring lever may be varied by tightening or loosening the nut.

Other features and advantages will appear from time to time as the description of the invention progresses. It is believed that the details of the invention will be most easily understood from a description, thereof, taken in connection with the accompanying drawing in which:

Fig. 1 is a top plan view of the relay with parts broken away;

Fig. 2 is a sectional view through Fig. 1, as seen from the right;

Fig. 3 is a view looking at the relay of Fig. 1. from the bottom of the page;

Fig. 4 is an enlarged view through a portion of the spring and armature arrangement showing the manner in which the lever springs are carried by the single bumper, which engages the spring lever and also showing the means for adjusting the relay armature; and

Fig. 5 is a view of the structure shown in Fig. 4 as seen from the right hand edge of the sheet.

Referring now to the drawing in which like reference characters indicate the same parts in the several views, 1 indicates the operating magnet having a core with the projecting end 2. Associated with the core of magnet 1 is the mounting plate 3 which forms part of the magnetic circuit. The free end of the plate is cut away to provide a pair of lugs 4. Between the lugs 4 are positioned the inwardly directed ears 5, formed on the depending portion 6 of the spring operating lever 7. A pivot pin 8 passes through the openings in lugs 4 and ears 6, whereby the spring operating lever is pivotly carried by the frame member 3. By reference to Fig. 1, it will be noted that the portion 7 of the spring-operating lever is of considerable length and extends under all the springs of the relay. Referring to Fig. 4, it will be noted that the horizontal portion 7 of the spring operating lever is provided with an opening through which projects the reduced end 9' of the armature 9. Fixed with armature 9 is a threaded lug 10 which passes through the spring washers 11 and the depending portion 6 of the spring operating lever. A nut 12 is threaded on the end of the lug 10, whereby the spring washers 11 may be compressed, and the distance between the armature 9 and part 6 decreased. Obviously, if the nut 12 is turned in reverse direction, the spring washers 11 operate to increase the distance between the armature 9 and the part 6. The adjustment brought about through the nut 12 also acts to slightly change the angle between parts 9 and 6. By this adjustment, the distance of armature 9 from the pole piece 2 may be readily and accurately adjusted so as to definitely determine the amount of throw of the movable springs of the relay.

As shown in the drawing, the relay consists of a number of stackups of springs, each stack consisting of two pairs, such as disclosed in Fig. 2. The springs of the relay are mounted in the following manner: Secured to the plate 3, by means of bolts 13, and extending transversely, thereof, is a spring mounting plate 14. The plate 14 is provided with a plurality of pairs of threaded openings which receive the threaded ends of the screws 15. The springs of the stack are separated from the plate 14 and from each other by strips 17 of insulating material. The springs of the stack are maintained in position by means of the screws 15 which pass through a bearing plate 18 insulated from the top spring of the stack and loosely through the insulating strips 17 and the various springs of the stack. It is understood, of course, that the screws 15 are out of engagement with the several springs. Underlying each of the dormant contact springs, is a metal strip 19 of somewhat ductile material which acts as a stop

that may be raised or lowered by bending it to adjust the contact spring adjacent thereto. The lever spring 20 of the upper pair is provided with a laterally and downwardly extending finger 21 which terminates in the laterally extending plate 22 provided with an opening through which extends the lug 23, having at its lower end, a bumper 24 arranged to be engaged by the laterally extending arm 7 of the spring-operating lever. From an inspection of Fig. 4 of the drawing, it will be readily seen that upon energization of the coil 1, armature 9 will be drawn to core 1 and the left end of the plate 7 raised causing the upper lever spring 20 and the lower lever spring 20a to move upwardly into engagement with their cooperating free or dormant contact springs, respectively.

The springs are so constructed as to provide two multiple contact points between each pair of springs. This is accomplished by bifurcating the end of one spring of each pair and providing each of the bifurcations with a contact adapted to engage a similarly arranged contact on the other spring of the pair. In the present structure, the upper or free spring is bifurcated to provide the two parts 25, each of which is provided with a contact 26 arranged to engage a similar contact 27 on the lever spring of the pair. This structure provides a maximum finger action which distributes the tension so that both pairs of contacts are under pressure even though there may be considerable unevenness in the normal form of the two split ends of one spring and also in the other mate spring. Each of the contact springs is provided, at the rear end, thereof, with a hook type soldering terminal 28 which facilitates the attachment of the continuous loop wiring. The shape of the hook is designed to limit the size of the opening which admits the wire, thus, helping to keep several wires in place prior to soldering. The open end of the hook is knob shaped and the body of the terminal is tapering so that when a wire is put in place and given a single turn, it will be held in place prior to soldering and not be liable to work up the spring or slip off the open end.

From the above description, it will be evident that the applicant has provided a structure in which the armature may be readily and definitely adjusted so as to determine the throw or movement of the lever springs of the relay and in which the various springs may be readily adjusted from the free or contact end of the relay by means of the usual well-known adjusting tool. Due to the manner of actuating the lever spring of the upper pair through the medium of the dependent finger 21, the spaces between the various springs of the stackup are clear and readily permit the insertion of an adjusting tool therein.

While in the drawing a preferred embodiment of the invention has been disclosed, many changes may be made in the details of the structure without departing from the spirit of the invention. The scope of the invention should, therefore, be limited only by the appended claims.

Having thus described my invention what I claim is new and desire to secure by Letters Patent of the United States is:

1. In a relay, a coil, a core for said coil having a projecting end, a free contact spring, a lever contact spring, a spring actuating lever arranged to move said lever spring into engagement with said free spring, means for pivotly supporting said spring actuating lever, a portion fixed with said actuating lever and extending adjacent to said core end, an armature between said core end and the portion of said actuating lever, said armature being carried by said lever, resilient means between said armature and said laterally extending portion of said actuating lever and means for compressing said resilient means to adjust the distance of said armature from the end of said core, whereby the amount of movement of said actuating lever may be determined.

2. In a relay, a coil, a core for said coil having a projecting end, a free contact spring, a lever contact spring, a spring actuating lever arranged to move said lever spring into engagement with said free spring, means for pivotly supporting said spring actuating lever, a portion fixed with said actuating lever and extending adjacent to said core end, an armature between said core end and the said portion of said actuating lever, said armature being carried by said lever, resilient means between said armature and said laterally extending portion of said actuating lever and threaded means engaging said armature and said portion for compressing said resilient means to adjust the distance of said armature from the end of said core, whereby the amount of movement of said lever spring may be determined.

3. In a relay, a coil, a core for said coil, having a projecting end, a free contact spring, a lever contact spring, an actuating lever arranged to move said lever spring into engagement with said free spring, means for pivotly supporting said actuating lever, a portion fixed with said actuating lever and extending adjacent to said core end, an armature between said core end and said portion, a spring washer between said armature and said laterally extending portion, and threaded means extending through said washer and engaging said armature and laterally extending portion, whereby said washer may be compressed and the distance of said armature from said core end adjusted.

4. In a relay, a stackup of contact springs comprising at least two pairs of springs, each pair of springs comprising a free spring and a lever spring, a spring actuating lever extending adjacent to one of said lever springs, a finger integral with the other of said lever springs extending laterally and then toward said spring actuating lever, a plate at the free end of said finger between the said one lever spring and said actuating lever, and insulating means between said plate and said one spring lever and between said plate and said spring actuating lever, whereby both lever springs may be actuated by said spring actuating lever.

BERT A. WALLACE.