W. W. DEAN.

TELEPHONE SWITCH.

APPLICATION FILED APR. 13, 1916.

1,247,796.

Patented Nov. 27, 1917.

Fig. 1

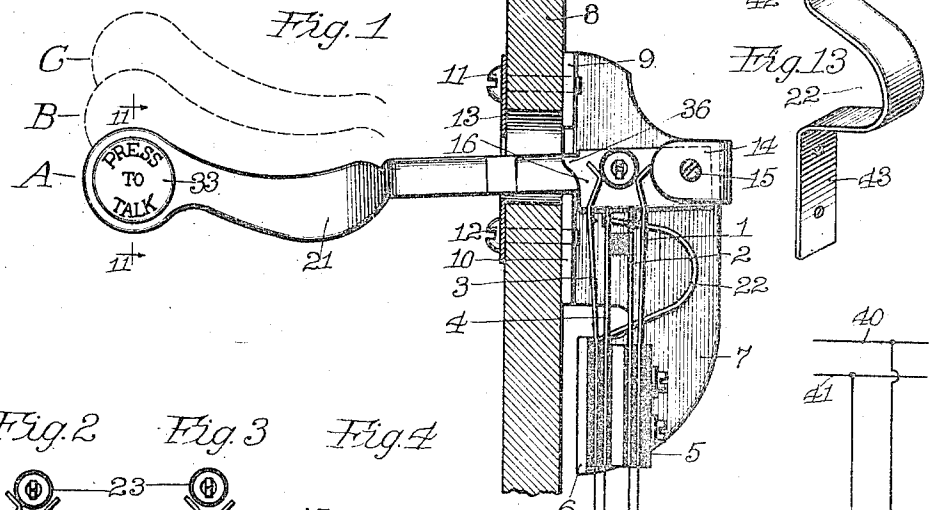


Fig. 2

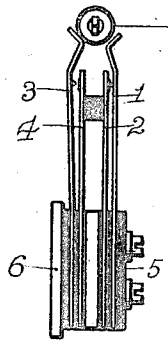


Fig. 3

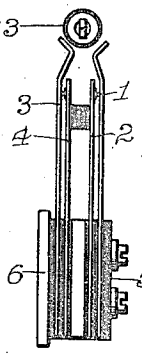


Fig. 4

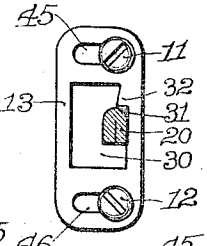


Fig. 5

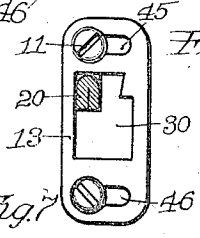


Fig. 12

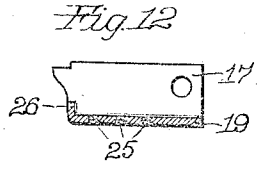


Fig. 6

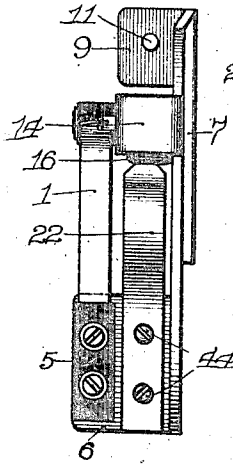


Fig. 7

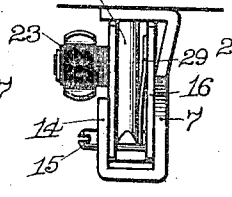


Fig. 8

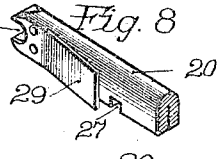


Fig. 10

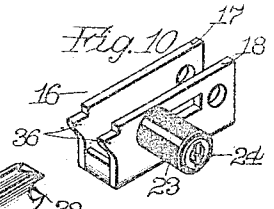


Fig. 9

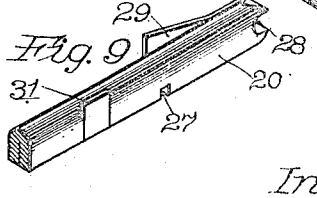
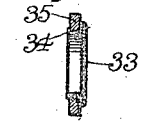


Fig. 11



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UNITED STATES PATENT OFFICE.

WILLIAM W. DEAN, OF ROCHESTER, NEW YORK, ASSIGNOR TO STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

TELEPHONE-SWITCH.

1,247,796. Specification of Letters Patent. Patented Nov. 27, 1917.

Application filed April 13, 1916. Serial No. 90,812.

To all whom it may concern:

Be it known that I, WILLIAM W. DEAN, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented a certain new and useful Improvement in Telephone Switches, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to switching mechanism and is especially useful in connection with telephone substation apparatus for controlling the speech transmission circuits and the signaling circuits, though it is to be understood that the invention is not limited solely to use in telephone circuits in which I have chosen to illustrate and explain it, but may be applied to other circuits as well.

It has been found that the ordinary automatic switch-hook suffices for the use of a majority of telephone users, but that special circumstances arise where it is desirable to separate the functions of "transmitting" and "receiving" or "talking and listening" as they are often called. This separate control of the talking and listening circuits the automatic switch-hook of the prior art has not been able to accomplish, and numerous devices have been proposed to supplement the switch-hook in effecting suitable control of the speech transmission circuit.

My invention aims to provide an improved automatic switch-hook which is capable of effecting the proper separate control of the talking and listening circuits respectively.

As an illustration of the advisability of separate control, the party line telephone is referred to. It is usual for subscribers to listen on the line to a conversation in which they take no part. It is also usual for the subscribers to listen to reports, such as weather reports and the like. In such cases the transmitter or talking circuit is preferably left open or otherwise inoperative inasmuch as it would otherwise merely add noise to the line. An important advantage to be gained is the saving in current consumption. Where local batteries are employed it is important that every effort be made to prevent needless current consumption in the interest of economy and efficiency.

In order to give the subscriber proper control of the necessary circuits, as outlined, I provide a two-motion automatic switch-hook. This switch-hook has a plurality of switching positions and transition from one position or state to another is permitted only after the receiver has been removed and a lateral motion of the controller or hook lever effected.

Inasmuch as the dealer may be called upon to furnish the same general style of telephone for situations where the battery saving mechanism is not required my invention aims to provide means which will permit the battery saving function to be dispensed with or employed as desired by a change in adjustment.

My invention also aims to provide an improved switch hook spring for raising the hook when the receiver is removed therefrom.

In the accompanying drawings I have illustrated one modification of my invention.

Figure 1 is a side elevation of one form of the switch-hook showing the escutcheon or controller-plate in cross section;

Fig. 2 illustrates the position of the springs when the switch is in the second stage or position.

Fig. 3 illustrates the switch in the third stage or position;

Fig. 4 is an elevational view of the escutcheon or controlling plate, showing the same adjusted to perform the battery saving function.

Fig. 5 is a view similar to Fig. 4 showing the escutcheon adjusted to dispense with the battery saving function.

Fig. 6 is a rear elevation of the structure shown in Fig. 1 with the switch-handle omitted;

Fig. 7 is a top plan view of the same;

Fig. 8 is an isometric view of the end of the switch-handle or controller which rests in the socket shown in Fig 7;

Fig. 9 is a similar view from the other side;

Fig. 10 is an isometric view of the socket arm for receiving the end of the handle or controller, as shown in Fig. 9;

Fig. 11 is a cross-section taken on the lines 11, 11 of Fig. 1;

Fig. 12 is a longitudinal cross-section of the socket arm for the switch-handle or controller; and

Fig. 13 is an isometric view of the spring.

The switch which I have shown employs the receiver circuit contacts 1 and 2 and transmitter circuit contacts 3 and 4. These contacts are made in the form of leaf springs. These contact springs are mounted in a block or blocks of insulation 5 and secured to the flange 6 of the frame plate 7, which frame plate is preferably mounted upon the inside of the wall 8 of the usual telephone box or cabinet. The frame plate 7 has a pair of feet 9 and 10 which are bolted against the wall 8 by means of the screws 11, 12 which also hold the escutcheon or controller plate 13 upon the outside of the wall.

The frame plate 7 is provided with a lug 14 which is bent back into parallelism with the main portion of the frame plate 7, as may be seen in Fig. 6. The lug 14 in connection with the main portion 7 forms a suitable support for the pin 15 which is detachably secured as by screw threads to these parts.

The socket arm member 16 is formed of a U-shaped cross-section having the side members 17 and 18 joined by the bottom portion 19, these parts fitting loosely around the end of the stem 20 of the switch-hook 21. The switch-hook 21 is formed with the usual bifurcated end for receiving and supporting the receiver. The socket arm member 16 is pivoted upon the pin 15 and is engaged upon its bottom side 19 by the end of a spring 22 which is mounted upon the flange 6 of the frame plate 7, as is shown in Fig. 5.

A stud of insulation 23 projects from the side 18 of the socket arm member, this stud being held by a finger 24 struck up from the side of the socket. The stud 23 lies immediately above the longer springs 1 and 3 and is adapted to engage the bent ends thereof in order to separate the springs 1 and 3 from the stationary springs 2 and 4. The bottom portion 19 of the socket arm member is provided with a plurality of notches or slots 25 for the upper end or point 42 of the spring 22, shown in Fig. 12.

The spring 22 comprises a U-shaped portion having the point 42 and the attaching portion 43 which latter is secured to the flange 6 by means of a pair of screws 44 (see Fig. 5). The effective pressure of the spring 22 may be adjusted by moving the engaging point 42 of the spring toward or away from the pivot 15 of the socket arm 16. When the end of the spring rests in the notch nearest the pivot 15 the leverage through which the spring acts is less than when it is placed in the other notches. This feature of adjustability is valuable in securing uniformity of action which might be lacking through variations in manufacture. It is also valuable in securing the proper adjustment for receivers of different weights.

The front end of the bottom portion 19 of the socket arm member 16 is turned up, as shown at 26 in Fig. 7, for the purpose of engaging the notch 27 formed in the bottom of the stem 20. The stem 20 of the switch-hook 21 has its end notched or recessed, as shown at 28 in Figs. 8 and 9, this recess being so arranged with respect to the notch 27 that when the end of the stem 20 is inserted in the socket member 16 the notch 28 will embrace the pin 15, while the ridge or projection 26 engages the notch 27. The spring 22 always tends to maintain the ridge 26 in the notch 27 regardless of the movement of the switch-hook, hence after the stem 20 is once inserted in the socket 16 these parts will remain firmly connected.

The socket 16 loosely embraces the stem 20 so that a sidewise movement of the stem 20 in the socket 16 is possible. A thin leaf-spring 29 is secured to the side of the stem 20 thereby tending to hold the stem 20 in such a position in the socket that it will be nearer the wall 18 than the wall 17. The purpose of the spring 29 is to cause the stem 20 to be yieldingly pressed against one side of the slot 30 which is formed in the plate 13 so that the catch or shoulder 31 which is formed on the side of the switch hook will engage the projection 32 which is formed on the side of the plate 13 when the plate 13 is in the position shown in Fig. 4.

The plate 13 is provided with slots 45—46, through which the bolts 11—12 are passed. These slots permit of such an adjustment of the plate 13 as will bring the shoulder 32 out of the line of travel of the switch hook stem 20. When it is desired to dispense with the battery saving function the screws 11—12 are loosened and the plate moved to the position shown in Fig. 5. When the plate is in this position the stem 20 being held by the spring 29 against the side 18 of the socket does not stop at the intermediate position as the shoulder 32 is out of its path.

The end of each side of the fork of the receiver hook 21 is perforated or apertured, as is common in the art. The aperture in the front fork supports a button 33 which is provided with a collar or eyelet 34 having its inner end spun or riveted over the circular portion 35 of the fork. A suitable legend may be inscribed upon the front face of the button as is shown in Fig. 1.

The operation of the mechanism will now be apparent. The switch-hook is detachable from the socket arm 16 for shipping purposes and for economy in space. When the switch-hook 21 is removed the socket arm rises to its uppermost position where

the projecting lips 36 engage the bottom of the lug 9 preventing excess of movement of the socket 16. When the stem 20 of the switch-hook 21 is inserted the notch 28 engages the pin 15 and the ridge or projection 26 of the socket member 16 engages the notch 27 so that the stem of the switch-hook and the socket arm are held together at all times.

When the receiver is on the hook and the switch-hook is in the position shown in full line or position A of Fig. 1, both spring pairs 1, 2 and 3, 4 are open so that the circuit for the receiver 37 and for the transmitter 38, respectively, are open.

If now the receiver is removed from the switch-hook, this hook rises to the position B, shown in dotted line in Fig. 1. This position is caused by engagement of the shoulder 31 on the stem of the switch-hook, with the projection 32 on the escutcheon or plate 13. The corresponding position of the switch springs is shown in Fig. 2, the contacts 1 and 2 being closed, in this position, and the contacts 3 and 4 remaining open. That is to say, in this position, the circuit for the receiver 37 is closed. It is possible, inasmuch as the transmitter circuit 38 is open at this time to employ the receiver without energizing the transmitter. No current from the battery 39 is used and no deterioration of the battery results from continued listening in. It is to be noted that the switch automatically moves to the position where the "listening" circuit is closed and the "talking" circuit is open, so that the particular subscriber in going in upon the main lines 40, 41, may ascertain whether the line is busy or not without causing a disturbance upon the line or in any way interrupting a conversation, if such is going on. If the line is not busy, or if the subscriber wishes to render his transmitter operative for speaking purposes, the handle of the switch is moved inward by pressing on the button 33, thereby disengaging the portions 31, 32, so that the switch hook rises to the dotted line position C, shown in Fig. 1. In this position the switch contacts 1, 2 and the contacts 3, 4 are closed so that both the transmitter and the receiver are operative.

It will be apparent that other mechanisms may be employed for securing the two motions of the switch handle. The particular arrangement that I have shown is typical. It is obvious that instead of depending upon the lost motion or the loose fit between the stem 20 and the socket 16, a pin joint may be introduced for the purpose of getting freedom for movement in that direction. It is also apparent that the switch pair 3, 4 might be closed directly by the sidewise movement. This would result if the springs 3, 4 were placed at the side of the stem. The two constructions are obviously equivalent for the purposes of my invention.

The button 33 which is secured to the eye in the end of the switch-hook arm is adapted for other uses than that in connection with which I have illustrated it. This button may be employed as a means for attaching the number of the telephone instrument or the exchange number or for conveying any other information whether used with the particular type of switching mechanism that I have illustrated or otherwise.

What I claim is:

1. In combination a transmitter circuit switch, a receiver circuit switch, a pivoted arm having a pin for operating both of said switches, a spring for raising said arm, a switch-hook connected to said arm and adapted to have lateral motion relative thereto, a stop for engaging said switch-hook at a point where said receiver circuit only is closed, a spring for holding said switch-hook in position to engage said stop, said switch-hook being manually movable to disengage said stop to permit said first spring to move the arm to close the transmitter circuit.

2. In combination a switching mechanism having a plurality of stages or positions for securing a plurality of circuit changes, a controlling handle therefor, stop mechanism for stopping said handle at each position, a spring for moving said handle automatically from one stop to another, said handle being moved laterally with respect to its general line of movement to disengage the same from one of said stops, to permit the same to be automatically advanced to the next stop.

3. In a telephone a switch-handle adapted to have movement longitudinally and transversely, a spring for moving said handle longitudinally, a catch for stopping said longitudinal movement at an intermediate point, electrical contacts operated by movement of said handle to said stop, said handle being laterally movable to disengage said stop and being adapted thereafter to continue its longitudinal movement and other electrical contacts adapted to be controlled by disengagement of said stop.

4. In combination a two-motion switch-handle, stop means having an intermediate and a final stop for checking the motion of said handle in one direction, electrical contacts closed by said handle when in said position, a spring for moving said handle to engage said final stop, said handle being manually movable to disengage said stop means, and electrical contacts adapted to be operated upon release of said handle from said intermediate stop.

5. In combination a switching element pivoted to swing in a single plane, said switching element having a plurality of switching

positions, a plurality of contacts controlled by said switching element to produce circuit changes at each position, a handle for the switching element movable laterally with respect to said switching element, stop means for engaging the handle in its switching positions and means for automatically moving said switching element from one position to another, said means being controlled by lateral movement of said handle to disengage the same from the stop means.

6. In combination a pivoted switch operating element, said element being adapted to be moved relatively up and down, a handle for controlling said element, an intermediate and a final stop for limiting the up and down movement of said element, and spring means for causing engagement between said handle and said stop, said handle being movable sidewise to disengage said stop, and switching contacts operated at each of said stops.

7. In a telephone switch the combination of a frame plate, a switch arm pivoted to said frame plate, switch springs controlled by said switch arm, a transmitter circuit and a receiver circuit, separately controlled by said switch springs, a switch-hook connected to said switch arm, said switch-hook being movable laterally relative thereto, a perforated plate embracing said switch-hook, said plate having a notch, said hook having a shoulder adapted to engage said notch and a spring for causing said shoulder to engage said notch.

8. In combination a frame plate, a switch arm pivoted thereto, contact springs mounted on said frame plate and adapted to be operated by said switch arm, a switch hook adapted to be embraced by a portion of said switch arm, said arm and said switch-hook having off-set portions, a spring for holding said off-set portions together, and a guard plate, said guard plate having a notch adapted to engage said switch-hook handle.

9. In combination a frame member, a switch arm pivoted to said frame member, said arm comprising a socket, a detachable switch hook having a stem for engaging said socket, means to hold said stem and socket together, a transmitter and a receiver circuit having switch contacts controlled by said switch arm and a guard plate having a notch for engaging said switch stem, said stem being movable laterally to disengage said notch.

10. In combination a frame member, a switch arm, a pin for pivoting said switch arm to said frame member, said switch arm having a socket, a switch hook having a stem adapted to lie loosely in said socket, said stem having its end notched to embrace said pin, means to prevent withdrawal of said stem from said socket, a spring lying between said stem and one side of said socket and a guard plate embracing said stem, said guard plate having a projection adapted to engage said switch hook stem, said switch hook being movable laterally against said spring to disengage said stem from said projection.

11. In combination a frame plate, a switch arm pivoted on said frame plate, said frame plate having a depending portion below said switch arm, a spring having its lower end secured to said depending portion, an intermediate U-shaped portion and a portion engaging said switch arm, said switch arm having a plurality of notches for engagement with the end of said spring.

12. In combination a frame plate, a switch arm pivoted to said frame plate, said frame plate having a depending portion below said switch arm, a spring having its lower end secured to said depending portion and adapted to engage said switch arm, said switch arm and said spring having coöperating parts adapted for adjusting the effective leverage of said spring with respect to said switch arm.

13. In combination a pivoted hook switch lever and an escutcheon plate surrounding said lever, said plate having a slot and an intermediate shoulder along the sides of said slot for holding the switch lever in an intermediate position.

14. In combination a pivoted hook switch lever and an escutcheon plate for said lever, said plate having a slot in which the lever is adapted to play, said plate having means adapted to engage the switch lever and hold the same in an intermediate position, said plate being adjustable laterally to permit the lever to play in said slot without being stopped in intermediate position.

15. In combination a pivoted hook switch lever, an escutcheon plate for said lever, said plate having a slot in which the lever is adapted to play, said plate having means adapted to engage the switch lever and hold the same in intermediate position, said plate having transverse slots and screws passing through said slots for holding the plate in adjusted position.

In witness whereof, I hereunto subscribe my name this 10 day of April, A. D. 1916.

WILLLIAM W. DEAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."