May 30, 1933. S. M. KENERSON 1,911,513

JACK ASSEMBLY

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Fig. 3.

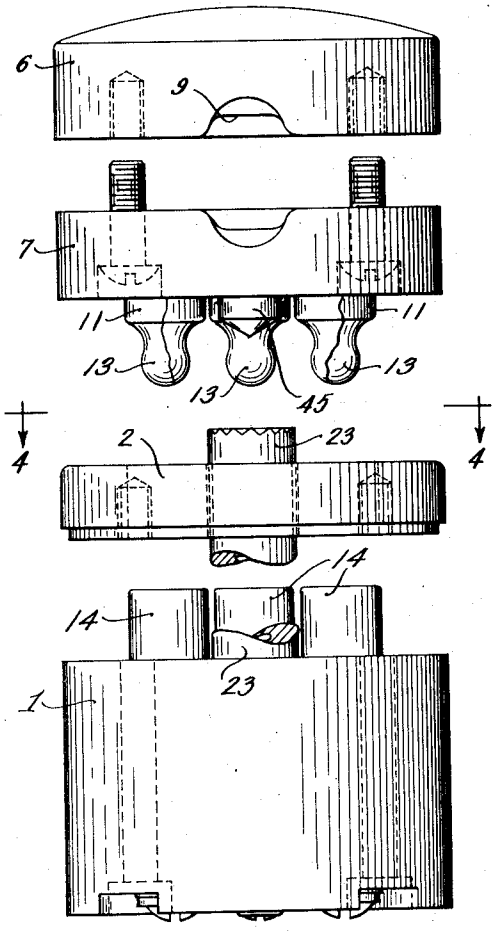


Fig. 1.

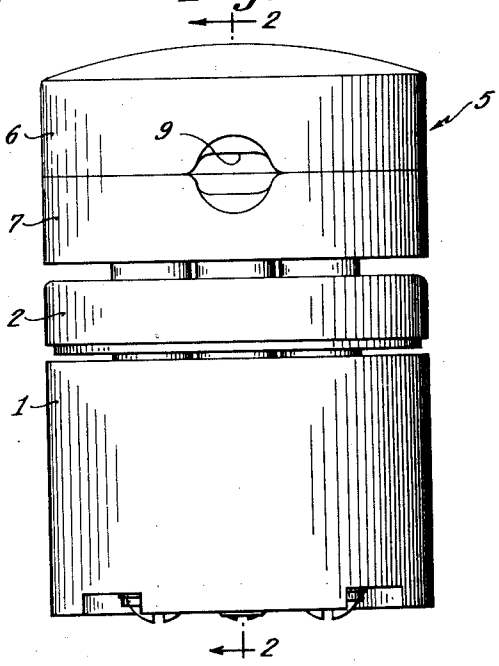


Fig. 2.

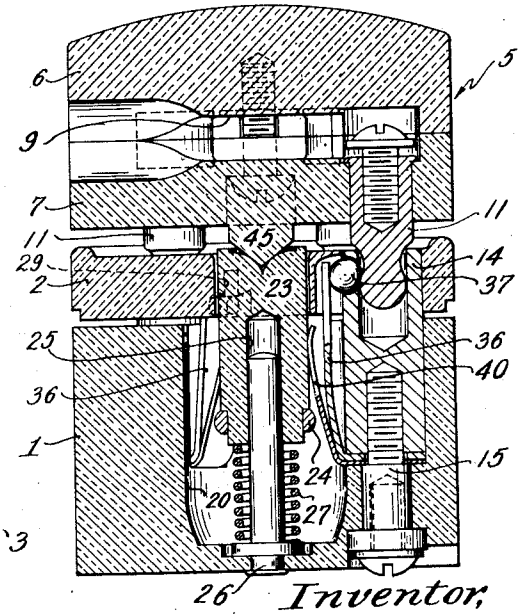
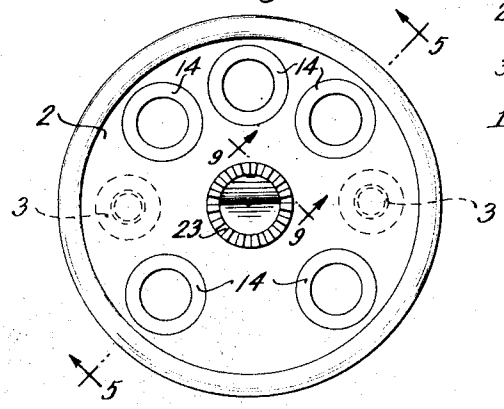


Fig. 4.



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May 30, 1933. S. M. KENERSON 1,911,513

JACK ASSEMBLY

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Fig. 5.

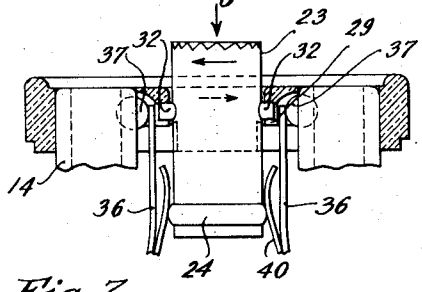


Fig. 6.

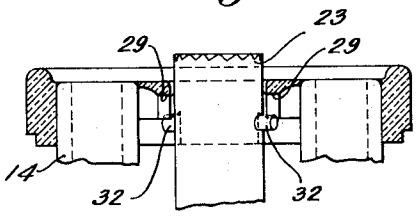


Fig. 8.

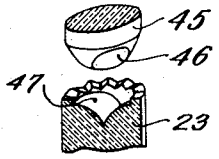


Fig. 7

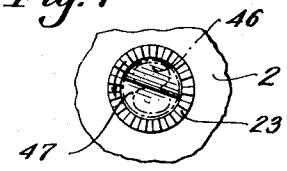


Fig. 9.

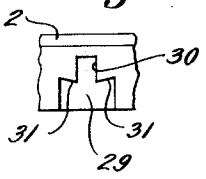
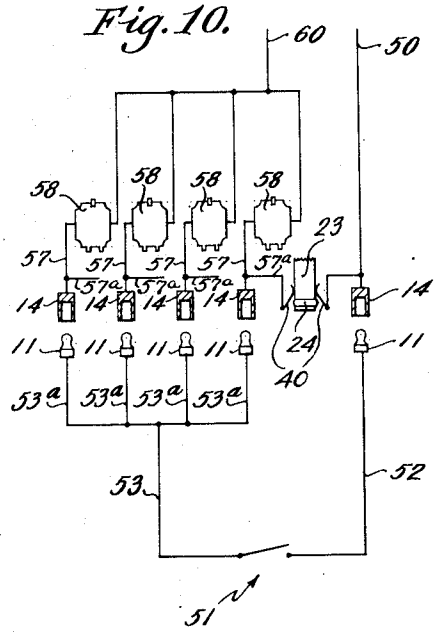


Fig. 10.



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Patented May 30, 1933 1,911,513

UNITED STATES PATENT OFFICE

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JACK ASSEMBLY

Application filed June 27, 1932. Serial No. 619,456.

This invention relates to an improved jack particularly intended for use in a wall receptacle in a hospital room for attachment to a switch connection, whereby a patient may operate a number of signals to summon a nurse, although it will be understood that the jack is adapted to many other uses.

In some respects, the present invention is an improvement upon the jack disclosed in the patent to Kenerson No. 1,777,755, which includes an arrangement permitting the automatic closing of a circuit or circuits to energize one or more annunciators should the plug portion of the jack accidentally become disconnected from the socket or receptacle assembly. Not only is an improved structural arrangement afforded by the present invention to perform this function, but this invention also permits the removal of the plug assembly from the socket assembly and then the manual setting of the switch, so that the circuits which have been automatically closed may be manually opened. Thus an arrangement of this character permits the employment of a plurality of receptacles or socket assemblies in different rooms, which may be arranged so that the circuits connected thereto are opened except when a plug is accidentally removed from its socket or an actuating switch is voluntarily closed.

The present invention also affords means automatically opening the emergency circuit, which is automatically closed when the plug is removed, if the plug is again inserted. Thus under normal conditions a jack assembly of the type disclosed therein will operate in the usual manner, so that when the patient closes the conventional control switch by pressing a button or the like, a plurality of annunciators, bells or lights are actuated or energized. If, however, the patient should accidentally pull the cord connected to the plug assembly so that the latter is disengaged from the socket receptacle, a circuit is automatically closed to actuate one or more of the signaling devices, such as annunciators, thus calling the nurse's or attendant's attention to the matter. When the nurse arrives in the room, the switch, which has thus automatically been closed, can be manually locked in its open position and remain in this position until the plug is reinserted in the receptacle. Thereupon the switch is held by the plug in its open position but is released from the locked position so that it is again ready automatically to close, if the plug should be accidentally removed from the receptacle.

In the accompanying drawings:

Fig. 1 is an elevational view of the improved jack assembly;

Fig. 2 is a central vertical section through the same;

Fig. 3 is a broken elevational view showing the parts of the assembly in separated positions;

Fig. 4 is an end elevation of the socket assembly;

Fig. 5 is a sectional detail of a portion of this assembly showing the short-circuiting element in its circuit-closing position;

Fig. 6 is a similar view showing a different position of the parts;

Fig. 7 is an end elevation of the circuit-closing element;

Fig. 8 is a perspective view, partly in section, showing the shape of the end of the circuit-closing element and the cooperating part of the plug member;

Fig. 9 is an elevational detail of a portion of the socket assembly; and

Fig. 10 is a wiring diagram.

Referring to the accompanying drawings, it may be seen that my improved jack comprises a socket assembly having a body portion 1 and a cap 2, which may be secured to the body portion by screw elements 3 (Fig. 4), while the plug member or assembly has a body portion 5 formed of two parts 6 and 7 of insulating material. These two parts cooperate to provide a cylindrical opening 9 through which the switch cord may extend to the actuating button or the like, which is to be operated by the patient. The member 7 is provided with a plurality of prongs or metal conductors 11 (Fig. 3) which have bulbous end portions 13. For example, in the assembly shown there may be five of these elements which are non-symmetrically

located in relation to the central axis of the assembly, so that the socket and receptacle member may interfit in only one relative position. The body portion 1 of the socket member is provided with a plurality of bores in which metal sockets 14 are held by screw elements 15 (Fig. 2) in a position to receive the prongs 11. The cap 2 is provided with openings through which the ends of the metal sockets 14 project.

A central recess 20 is provided in the body member 1 which registers with a central opening in the cap 2. Slidably received in this opening is a circuit-closing member 23 having a body portion of insulating material and carrying a metal ring 24 upon its inner end. A central bore 25 within the member 23 slidably engages a stud 26 fixed to the end of member 1, while a coil spring 27 tends to urge the element 23 outwardly toward the plug member.

The cap 2 is provided with bayonet-slot recesses 29 (Figs. 5 and 6) comprising central indentations 30 extending outwardly toward the outer face of the cap and shoulders 31 at each side of each indentation 30 and spaced inwardly from its outer end, these shoulders being inclined from their juncture with the sides of the indentation 30 toward the outer end of the cap, as shown in Fig. 9. The member 23 is provided with pins 32 engageable with the bayonet-slot recesses 30, so that in one position of the parts, as shown in Fig. 5, the end of circuit closer 23 may project beyond the face of cap 2, while in another position the element 23 may have its pins 32 engaging shoulders 31 holding the spring 27 under compression and the end of the member 23 substantially flush with the outer face of cap 2 (Fig. 6).

Secured adjoining each of the socket members 14 is an outwardly extending leaf spring 36 engaging a ball 37. Each ball 37 is mounted in an opening in the wall of the corresponding socket 14 and is pressed inwardly so that it may engage the bulbous head of the corresponding prong with a snap action. Each leaf spring 36 may have its end contacting the end of leaf spring 40, which has its free end portion juxtaposed to the cylindrical wall of member 23 and engageable with the metal ring 24 thereof when the latter moves to its outermost position, as shown in Fig. 5.

Upon the inner face of plug member 7 I provide a projection 45 having mutually inclined planar faces 46 and thus affording a ridge (Fig. 8). The latter is engageable with a recess 47 in the end of member 23, the recess having a straight bottom portion or valley with inclined sides, each having a generally convex curvature. The parts are so shaped and arranged that when the prongs 11 and sockets 14 are properly interengaged the surfaces 46 of projection 45 will engage within the recess 47 of the element 23 with a cam-like action, if the member 23 is in its locked and retracted position, i. e., that shown in Fig. 6, slightly rotating the element 23 about stud 27 so that the pins 32 no longer engage the shoulders 31, but are aligned with the indentations 30. Accordingly if the plug member is thereafter removed from the socket member, the spring 27 automatically moves member 23 to its projecting or circuit-closing position, wherein the ring 24 engages the contact springs 40, thus closing the circuit between all of sockets 14. If, however, it is desired manually to open this circuit, the end of member 23 may be pressed inwardly and it may be slightly rotated so that the pins 23 catch upon the shoulders 31 to lock it in a position wherein the circuit may remain open.

The electrical arrangement of this jack and the associated apparatus may be more clearly understood by reference to the diagram afforded by Fig. 10.

Lead 50, connected to one side of the line, may extend to one of the sockets 14, which normally engages a prong 11. A wire 52 extending from the latter through the opening 9 is connected to one side of the switch 51, which may be in the form of a button at the patient's bedside. The opposite side of this switch is connected by a lead 53 and its branches 53^a to the remaining prongs 11 of the plug assembly, which normally engage the corresponding sockets 14. The latter are connected through suitable wiring or leads 57 to a plurality of signaling devices 58, such as annunciators, the latter being connected to the lead 60 at the other side of the line. The element 23 is arranged so that in its retracted position the circuit between the line 50 and the annunciators can only be closed by the switch 51, but if the circuit closer 23 moves to its projecting position, the ring 24 engages the springs 40, thus to close the circuits between line 50, the annunciators 58, and line 60. In the diagrammatic view afforded by Fig. 10 one socket 14 is shown as connected to a spring 40 by a branch lead 57^a while the remaining sockets are provided with branch leads which may be connected to similar springs but which are not so connected in the figure for convenience of illustration. Thus, if the plug member 5 should accidentally be removed from the socket assembly, the spring 27 will move the member 23 outwardly with the pins 32, sliding in recesses 30 so that annular contact 24 will engage springs 40, thus closing the circuit to the annunciators and calling attention to the removal of the plug from the receptacle. Thereupon, if desired, the member 23 may be manually moved to its locked position, illustrated in Fig. 6, wherein the pins 32 engage shoulders 31 holding the spring 27 compressed and the

ring 24 out of engagement with springs 40. Thus, if desired, the plug member may be removed from the receptacle when there is no patient occupying the room, and a simple adjustment of the member 23 conditions the jack assembly so that the annunciators will not be energized.

When the parts are in this position the member 23 is automatically moved from its locked position by the reinsertion of the plug member. Thus, as previously explained, the planar surfaces of projection 45 engage the recess in the end of element 23 with a cam-like action to cause a slight rotation of this member, so that its pins 32 are moved out of engagement with shoulders 31 and in alignment with recesses 30. Thus the member 23 is positioned so that it may again move to circuit-closing position if the plug should be accidentally removed.

I claim:

1. Jack receptacle assembly comprising an insulating body, a plurality of separate recessed conductors to receive complementary prongs on a plug thus to complete an external electrical circuit, a movable circuit-closing element, a spring tending to move said element into an electrically conductive position between said conductors thus to complete an internal circuit, said element having a part engageable with the plug so that the spring may be stressed and the element moved out of said position to an inoperative position when the plug is inserted, and supporting and guiding means for said element to permit its manual movement to inoperative position and the locking of the element in said inoperative position when the plug is removed.

2. Jack assembly comprising an insulating receptacle body, a plurality of separate conductors carried by said body, an insulating plug member, a plurality of prongs carried by the latter and engageable with said conductors, a circuit-closing element movably mounted on the receptacle body, a portion of said element being movable into an electrically conductive position between said conductors, a spring tending to move the element to said position, the end of the element when in said position being contractible with the plug member so that the element is moved out of said position when the prongs are engaged with the conductors, and supporting and guiding means for said element arranged so that the element may be manually pushed in against the action of the spring and locked in a non-conductive position.

3. Jack assembly comprising an insulating receptacle body, a plurality of separate conductors carried by said body, an insulating plug member, a plurality of prongs carried by the latter and engageable with said conductors, a circuit-closing element movably mounted on the receptacle body, a portion of said element being movable into an electrically conductive position between said conductors, a spring tending to move the element to said position, the end of the element when in said position being contractible with the plug member so that the element is moved out of said position when the prongs are engaged with the conductors, supporting and guiding means for said element arranged so that the element may be manually pushed in against the action of the spring and locked in a non-conductive position, the end of the element and the registering portion of the plug member being shaped automatically to release the element from locked position when the plug has its prongs engaged with the conductors, so that the spring may automatically move the element to circuit-closing position upon accidental separation of the plug member and receptacle body.

4. Jack comprising plug and socket assemblies each having insulating bodies and a plurality of conductors in normally interfitting engagement with corresponding conductors of the other assembly, a circuit closer associated with one of said assemblies and automatically movable to close a circuit between conductors of that assembly when the assemblies are separated, and means supporting and guiding said circuit closer to permit its manual movement to a position where it can be locked out of circuit-closing position when the assemblies are separated.

5. Jack comprising plug and socket assemblies each having insulating bodies and a plurality of conductors in normally interfitting engagement with corresponding conductors of the other assembly, a circuit closer associated with one of said assemblies and automatically movable to close a circuit between conductors of that assembly when the assemblies are separated, and means supporting and guiding said circuit closer to permit its manual movement to a position where it can be locked out of circuit-closing position when the assemblies are separated, said circuit-closer being automatically movable out of its locked position in response to subsequent relative movement of the assemblies so that it may again move to circuit-closing position if the assemblies are separated.

6. Jack comprising an insulating receptacle assembly, a plurality of conductors carried by said assembly, an insulating plug assembly, a plurality of prongs projecting from the latter and engageable with said conductors, said receptacle assembly having a circuit-closing element movably mounted thereon, said element having a body formed of insulating material and including a metal contact secured to the body, a spring tending to move the element so that its contact

is in circuit-closing position between certain conductors, a part of the insulating body projecting from the assembly when the element is in circuit-closing position and then being engageable with the plug assembly so that the element is moved out of circuit-closing position when the prongs of the plug assembly are engaged with the conductors, said receptacle assembly having a bayonet slot recess engageable with a part projecting from the circuit-closing element arranged so that the element may be moved inwardly and locked by the bayonet slot recess in a position spaced from its circuit-closing position.

7. Jack comprising an insulating receptacle assembly, a plurality of recessed conductors carried by said assembly, an insulating plug assembly, a plurality of prongs projecting from the latter and engageable with said conductors, said receptacle assembly having a circuit-closing element movably mounted thereon, said element having a body formed of insulating material and including a metal contact secured to the body, a spring tending to move the element so that its contact is in circuit-closing position between the conductors, a part of the insulating body projecting from the assembly when the element is in circuit-closing position and then being engageable with the plug assembly so that the element is moved out of circuit-closing position when the prongs of the plug assembly are engaged within the recessed conductors, said receptacle assembly having a bayonet slot recess engageable with a part projecting from the circuit-closing element arranged so that the element may be moved inwardly and locked by the bayonet slot recess in a position spaced from its circuit-closing position, a part projecting from the plug assembly engageable with the circuit-closing element when the latter is in its locked position automatically to move the element out of its locked position so that it may again move to its circuit-closing position if the plug and receptacle assemblies should again be separated.

8. Jack comprising a receptacle asssembly including a plurality of conductors, a plug assembly including a plurality of prongs engageable in interfitting relation with said conductors, said receptacle assembly also having a circuit-closing element and a spring tending to move the element to a circuit-closing position between the conductors, contacts associated in electrically conductive relation to the conductors, a metal part upon the element engageable with said contacts when the element is in circuit-closing position, said element having an end portion projecting from the receptacle assembly when in said position and having means cooperating with a part of the assembly to permit the manual movement of the element into a locked position wherein said part no longer engages the contacts, said plug assembly having a cam-like part, said part and the end of the element having a cam-like engagement to effect the movement of the element out of its locked position when the plug and receptacle assemblies are reengaged so that the element is positioned to permit its subsequent automatic movement to circuit-closing position when the assemblies are again separated.

9. Jack comprising a receptacle assembly including a plurality of conductors, a plug assembly including a plurality of prongs engageable in interfitting relation with said conductors, said receptacle assembly also having a circuit-closing element and a spring tending to move the element to a circuit-closing position between the conductors, resilient contacts associated in electrically conductive relation to the conductors, a metal ring upon the element engageable with said contacts when the element is in circuit-closing position, said element having an end portion projecting from the receptacle assembly when in said position to engage a part of the plug to move the element out of circuit-closing position.

10. Jack assembly comprising a plug having an insulating body portion and spaced metal prongs projecting therefrom, a receptacle having an insulating body portion with recessed conductors engageable in interfitting relation with said prongs, said body portion of the receptacle having a central recess, a pin projecting into said recess, a circuit-closing element having a body of insulating material with a bore slidably engaging said pin, a coil spring concentrically arranged in relation to the pin and tending to press the element outwardly, said element having a metal ring upon its body portion, resilient contacts fixed to the recessed conductors and projecting into the path of the ring so that the element normally tends to be pressed by the spring into a position wherein the ring engages the resilient contacts to close a circuit between the conductors, the end of said element being engageable with a part of the plug when the prongs and conductors are in interfitting relation so that the ring is held out of engagement with the contacts.

11. Jack assembly comprising a plug having an insulating body portion and spaced metal prongs projecting therefrom, a receptacle having an insulating body portion with recessed conductors engageable in interfitting relation with said prongs, said body portion of the receptacle having a central recess, a pin projecting into said recess, a circuit-closing element having a body of insulating material with a bore slidably engaging said pin, a coil spring concen-

trically arranged in relation to the pin and tending to press the element outwardly, said element having a metal ring upon its body portion, resilient contacts fixed to the recessed conductors and projecting into the path of the ring so that the element normally tends to be pressed by the spring into a position wherein the ring engages the resilient contacts to close a circuit between the conductors, the end of said element being engageable with a part of the plug when the prongs and conductors are in interfitting relation so that the ring is held out of engagement with the contacts, said element and receptacle being shaped so that the end of the element may be pressed inwardly and turned to lock the element out of its circuit-closing position even if the plug and receptacle are separated, said part of the plug and the end of the element being shaped to have a cam-like engagement so that the element may be automatically moved out of its locked position when the prongs of the plug are again engaged within the recessed conductors of the receptacle, whereby subsequent separation of the plug and receptacle permits automatic movement of said element to its circuit-closing position.

Signed by me at Springfield, Mass., this twenty-fourth day of June, 1932.

STANLEY M. KENERSON.