Sept. 4, 1928.

1,682,738

S. N. BUCHANAN

CABLE CONNECTER

Filed Jan. 6, 1927

Fig. 1

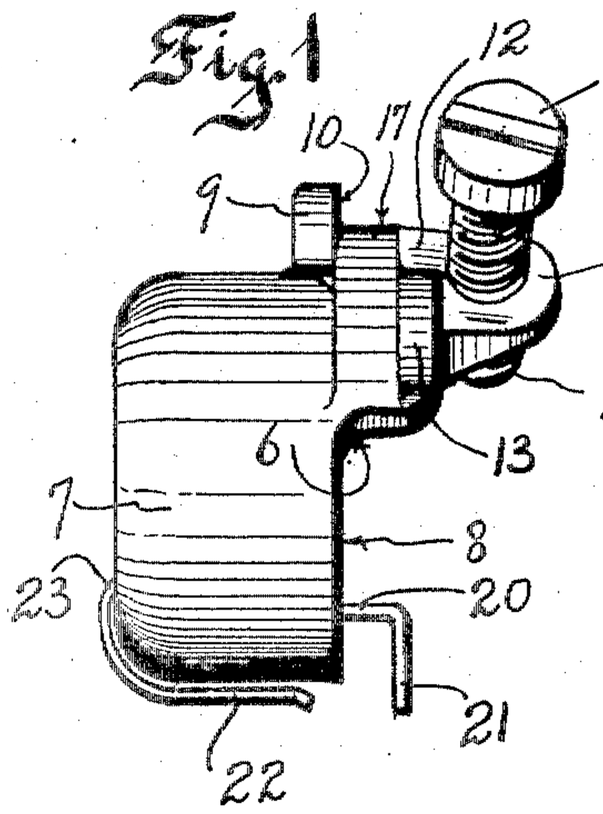



Fig. 2

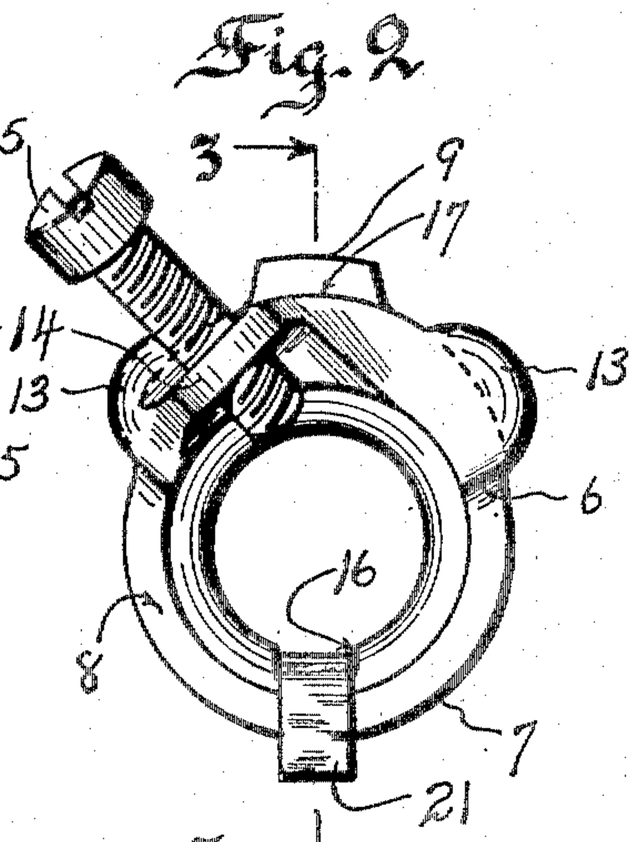
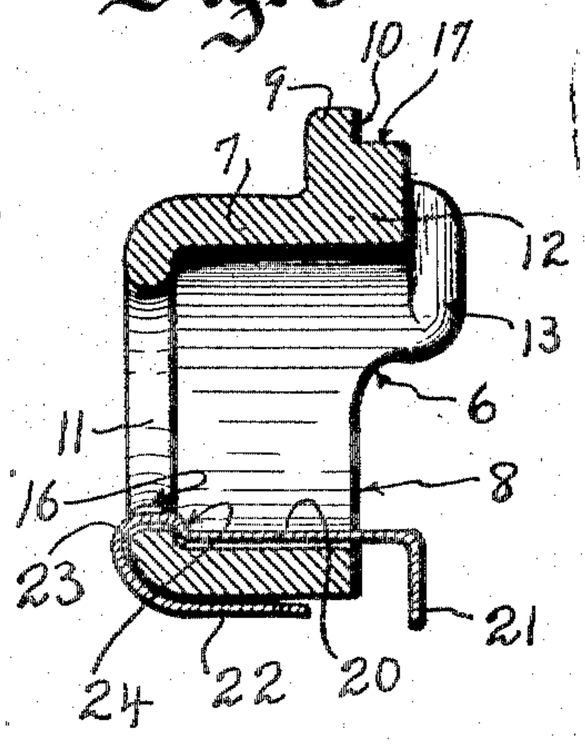



Fig. 3



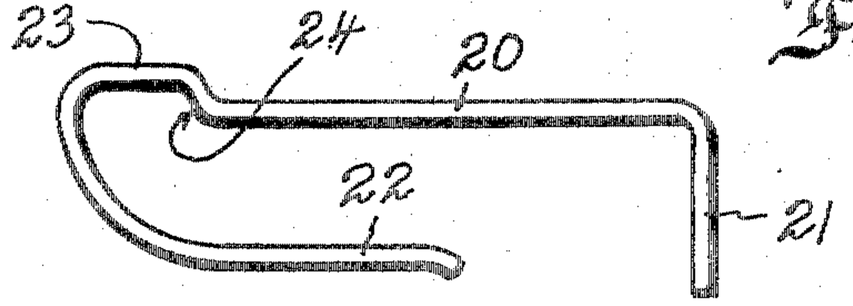
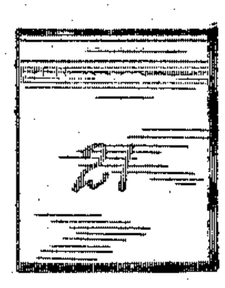




Fig. 4



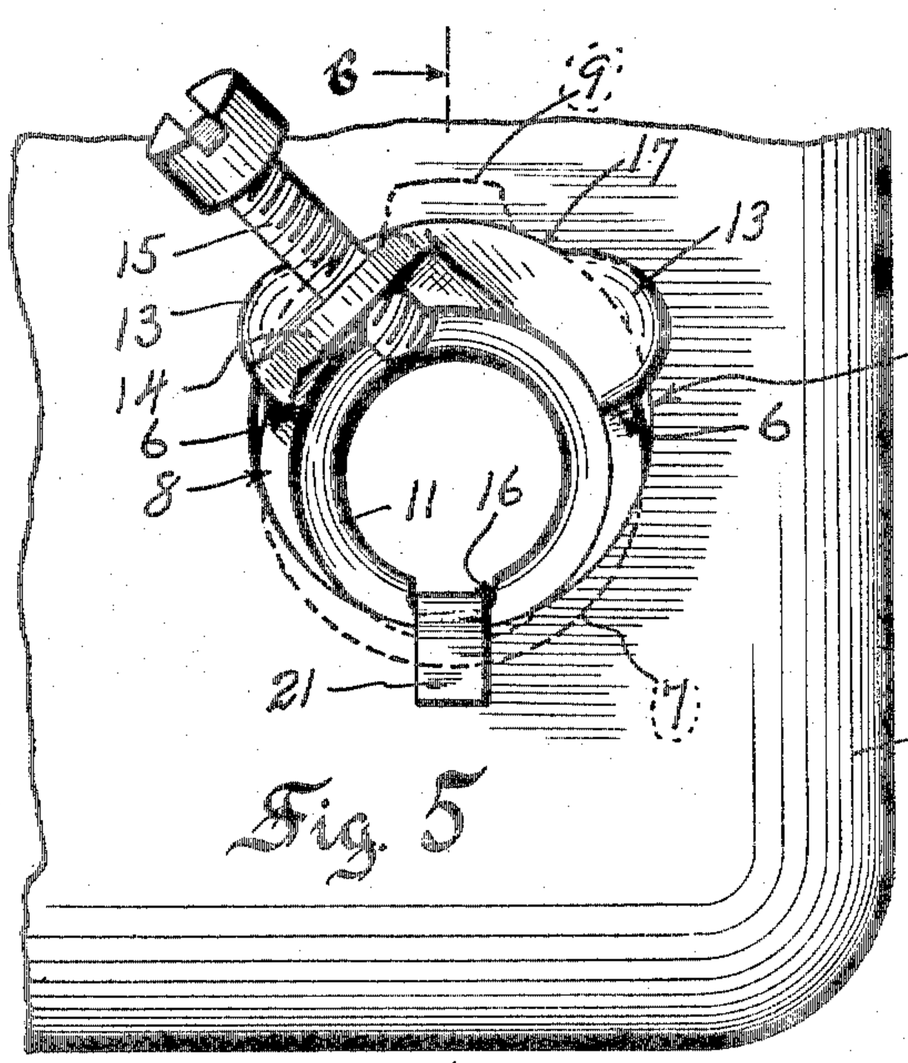




Fig. 5

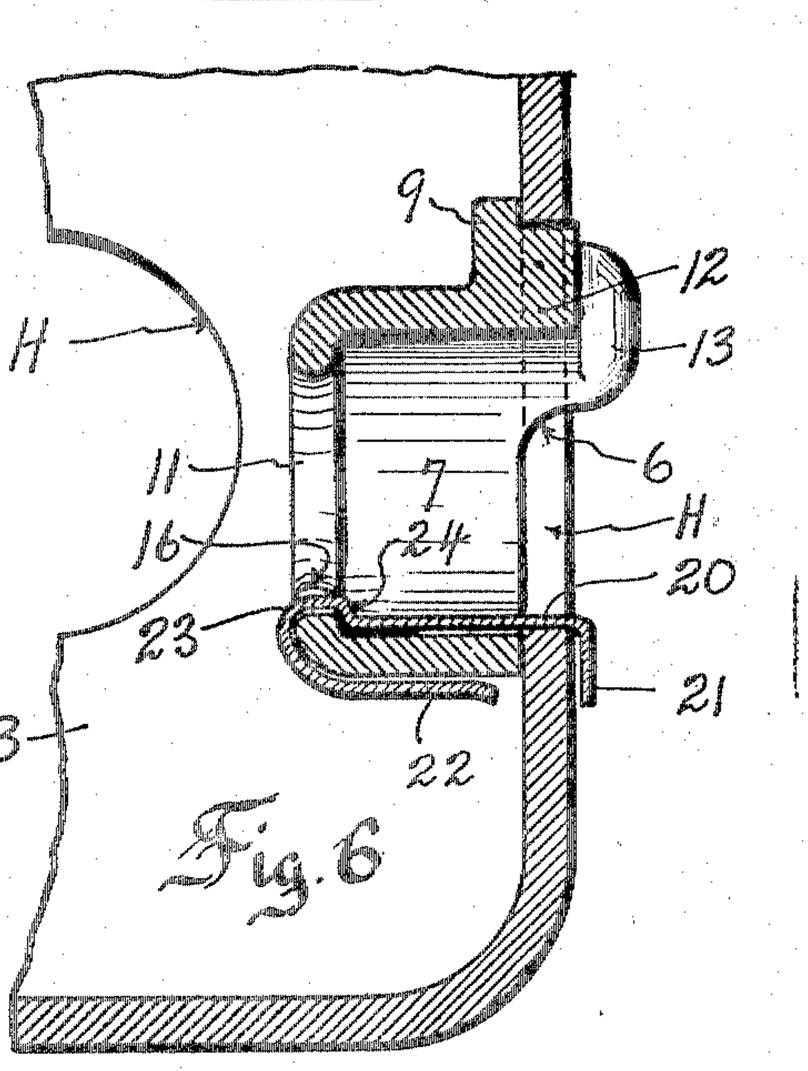



Fig. 6

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Patented Sept. 4, 1928. 1,682,738

# UNITED STATES PATENT OFFICE.

STEPHEN N. BUCHANAN, OF NEW YORK, N. Y., ASSIGNOR TO THE THOMAS & BETTS CO., OF ELIZABETH, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## CABLE CONNECTER.

Application filed January 6, 1927. Serial No. 159,438.

This invention relates to cable connecters to fasten cable in outlet boxes and the like and more particularly to a connecter novel in respect to its box hole anchorage means to hold the connecter in place preliminary to insertion of the cable and tightening up of the screw or other operating means so as to free the hand of the mechanic.

An object of the invention is to produce a cable connecter which positively remains in position in the box hole preliminary to the insertion of a cable and preliminary to the tightening up of the operating means by the workman to complete the assembly of a box, cable and connecter, and improvements are made in the anchorage means for connecters by which this object is carried out.

Another object is to improve that kind of connecter which I refer to as an exposed box hole edge type of connecter because it leaves open and exposes a part of or the rim of the box hole edge and secures the cable in direct contact therewith, and this type of connecter is improved in its anchorage means to hold it in the box hole.

A further object is to produce a connecter embodying a single operating means which, when actuated or tightened up, simultaneously anchors both the connecter and a cable in a box hole, the cable being gripped between the connecter and exposed box hole edge, and the connecter itself being anchored to the concealed remaining portion of the box hole edge, all of this being attained without any connection whatsoever of the operating means, such as a screw, being made into, thru, or with the box; and this object is perfected by including, as a main underlying factor, means for the preliminary retention of the connecter in the box hole until the assembly is complete, thereby freeing both hands of the mechanic as far as the connecter is itself concerned.

One popular or typical type of cable connecter with which my box and connecter retainer may be used, is of the exposed box hole edge type and includes a single operating means such as a screw which bears directly against some stationary object, say the cable, to produce a reaction and thereby grip the cable between the exposed box hole edge and connecter. In such connecters just mentioned, the screw operating means does not fasten into the box wall and no other permanent connection exists between the connecter and box, so there is no means of self retention for the connecter in the box hole until the cable is in place and the screw is tightened and one hand of the workman was required to hold the connecter while the cable was inserted and the screw tightened by his other hand. The mechanic's work was thus handicapped since he must use one hand to hold the connecter and he frequently works in close quarters. This invention overcomes the difficulty and speeds up the work because the connecter remains steady and rigid in the box hole entirely independent of any other factor and becomes a part of the box for all working purposes and does not topple or slide around in the box hole while the work is being done.

Aside from the broad principle of the invention, it is an object to produce a separate one piece box and connecter retainer which can be easily snapped into place on a connecter member and which preferably yields to positively engage, hook onto, or rest against the box hole edge during the insertion of the connecter into the box hole and which spring snaps to lift or move the connecter into final position when the mechanic releases the connecter. It follows that the connecter is more quickly mounted in position because my novel retainer quickly snaps the connecter into its final resting place and rigidly holds it there and thus prevents it dropping out of the box hole or moving about therein while the cable is being manipulated into position.

The accompanying drawing illustrates an example of the invention serving to disclose its principle and a construction of one embodiment thereof.

Figure 1 shows a side elevation of the connecter, Figure 2 an outer end elevation, and Figure 3 a longitudinal section on the line 3—3.

Figure 4 shows an example of the box and connecter spring retainer in side and end elevations detached from the connecter and enlarged or exaggerated in size to better show it.

Figure 5 is an outside box and connecter assembly view showing the connecter mounted in the box but without a cable.

Figure 6 is also a box and connecter assembly section taken on the line 6—6.

Electric outlet and fixture boxes B are made with knockout openings or holes H to receive cable or electric wires, not shown, and various forms of cable connecters are

used to fasten cable in the box. Since the invention in the main pertains to retaining the connecter in the box before the cable is inserted, the cable itself is not shown. The new connecter forming the subject of my invention includes means such as a spring to render the connecter self-supporting to thereby sustain its own weight in the box hole preliminary to mounting the cable therein so that the mechanic on the job may use both hands to manipulate the cable thru the connecter and box hole and tighten up the screw or other operating means. Both his hands are free to speed the work.

According to the principle of the invention and referring to the drawings for demonstration thereof, a connecter member 7 is made with two kinds of box hole edge engaging or anchorage means, one of which is shown as ears 13 spaced from an ear 9 both being rigid on the connecter and effecting permanent anchorage of the connecter and cable (not shown) to a box B after all parts are assembled, the box hole edge H resting in the space between ears 9 and 13; and the other means is shown as a spring hook 21 which is flexible and effecting temporary retention of the connecter only in box before the assembly is complete. The latter means, i. e., the flexible anchorage element 20—21 exerts reaction and presses the permanent anchorage means 9—13 into engagement with the box hole edge H until such time as an operation means such as a screw 15 is actuated to seat the rigid means 9—13 permanently in place against the box hole edge H. In this way an exposed box hole edge connecter 7 is made to remain steady in a box while a cable is being manipulated into position but without using a screw or the like to fix the connecter in the box.

According to one example of my invention, a separate retaining device is made and then attached to the connecter. One preferred retainer assumes the form of a spring member which engages the box hole edge and retains its hold thereon as the connecter is passed thru or into the box hole. The spring retainer flexes or yields to permit the necessary movement of the connecter until it is passed thru or inserted into the box hole, and the accumulated resistance of the spring retainer by reason of having been flexed, reacts to instantly snap the connecter into final position when the mechanic then turns loose of it. Thus he does not have to hold it in the box hole. The retainer itself performs that purpose but does not interfere with quick insertion of the connecter.

Broadly one form of the retainer comprises a spring body 20 including ends 21 and 22. The end 22 hooks over or thru a connecter member 7 and is flexible so as to spring open to permit the hook 22 to be slipped onto the connecter. The other end may also be a hook 21 to engage the box hole edge H at its exposed portion and supports the connecter member 7 in the box hole against tipping or wobbling movement until such time as the mechanic may install a cable. But to more fully disclose the invention, I will first describe one type of connecter which to advantage may employ my spring retainer 20 because the connecter member 7 in question is inherently loose in box until its screw is tightened up but my improvements overcome that difficulty.

One form of cable connecter which is sometimes found in need of preliminary retaining means is made in the form of a sleeve 7 which is suitable in size and form to be projected through the box hole H and supported on one side or the other of the box wall and anchored therein. While any suitable box hole anchorage means to permanently fix the connecter member 7 in the box, after a cable is installed, may be used with my invention, I will explain one suitable box hole anchorage means, such for exampde as abutment ears, but I claim in general other means. Also there is required operating means, i. e. some suitable instrumentality to be actuated or turned by which to clamp a cable in place and cause an anchorage means to become effective to permanently fix the connecter in the box. For this purpose I show a screw operating means but I claim any other suitable operating means which functions satisfactorily with the connecter.

The connecter sleeve member 7 is cut away at 8 thereby forming a sleeve end edge 8 and a projecting portion 12 extending therefrom, including a corner 6 leading from the sleeve end edge 8 overreaching the box hole edge to define the projection 12. Thus the connecter is longer on one side than on the other. The short side may well be a sleeve 7 which exposes at its end a part of the box hole edge, while the long side 12 covers up the other portion.

For box hole edge anchorage means, the abutment ear 9 is included on the sleeve preferably above or opposite to the sleeve end edge 8. The sleeve end edge 8 and outer face 10 of the ear are preferably in alignment on a plane at right angles to the sleeve axis, and the two surfaces 8 and 10 abut or rest against the wall of the box and contribute to the holding of the connecter in place against longitudinal displacement in one direction. The sleeve 7 and ear 9 are small enough to pass thru the box hole. The cut away sleeve formation includes the corner 6 as a continuation of the sleeve end edge 8 in order to carry additional abutment anchorage means in the form of an ear or ears 13 on the outer end thereof on that side of the box wall opposite to the first ear 9. The two ears 13 are preferably circumferentially spaced apart, so as to span a circumference somewhat greater than that described by the circle of the box hole H to prevent the pas-

sage or entry of the projection 12 and ears 13 all the way thru the box hole. Thus the abutment ears 13 stop against the box wall but ear 9 passes thru. Furthermore the ears 13 are spaced longitudinally from the ear 9 a distance about equal to the thickness of the box to permit its wall or hole edge to rest thereinbetween.

In certain forms of connecters of this or similar types, operating means may be mounted on the connecter inside or outside the box and in the form shown, a screw 15 is threaded thru a lug or boss 14 which overhangs the cut away sleeve portion thereby pointing the screw in the general direction of the exposed box hole edge. The screw is intended to set up a gripping action against a cable between the exposed box hole edge and the connecter and simultaneously fix the ears in final position overlapping or abutting the box hole edge so as to anchor the connecter against longitudinal movement in the box.

The connecter sleeve 7, more particularly the projection 12, includes a raised bearing face 17 which is arched above the cut away sleeve end edge 8, is opposite thereto, and is disposed between the anchorage ears 9 and 13. The bearing face 17 is a counterpart of the box hole so as to rest in close engagement therewith. Furthermore the raised bearing face 17 extends above the surface of the sleeve 7 and is made eccentric thereto, and this eccentricity causes the opposite sleeve end edge portion 8 to rest correspondingly eccentric to the box hole edge H, thereby causing a portion of the box edge to be exposed slightly within the inner circular wall of the sleeve so that a cable rests against the box hole edge rather than the connecter. In other words the inner wall of the sleeve 7 is preferably not quite flush with the box hole edge H to the extent that the box edge may project into the inner circle defining the sleeve end.

The connecter is inserted into the box by disposing the sleeve 7 through the box hole and by then slightly tipping it to permit the ear 9 to pass thru the hole whereupon the abutment ears 13 come to rest against the opposite box wall and cause the raised bearing face 17 to rest against the box hole edge. The position of the ear 9 opposite the sleeve end 8 permits it and the sleeve to be passed thru the box hole because the sleeve can be tipped and first inserted after which the sleeve will move laterally until the ear 9 goes thru the hole. However the spread of the ears 13 prevents their passage thru the box hole. Nevertheless the connecter may be constructed to fit into the box hole from either direction, or may be constructed to pass entirely thru the box hole as construction requirements demand.

The spring retainer 20 may to advantage, if it is a separate part to be attached to the connecter, include a shouldering means 24 to cooperate with the bushing 11 to fix the retainer against longitudinal motion relative to the connecter. Means may also be provided, as a notch 16 in the connecter member, to receive the spring retainer and prevent its rotary displacement in or on the connecter. In this way the retainer 20 is carried with the connecter 7 and is positively held in place since the shoulder 24 and notch 16 prevent displacement of the retainer in any direction.

The spring body 20 is preferably longer than the sleeve 7 so that the hook end 21 projects from the connecter end edge 8 a distance about equal to the thickness of the box wall to receive it thereinbetween. The spring 20 and/or its hook 21 is made in a suitable manner, say comparatively narrow, so as not to cover up any considerable part of the exposed box hole edge and the exposed portion of the box hole edge is left free for direct gripping engagement with a cable inserted through the box hole into the connecter. While a cable may rest against the spring 20, the cable also lies in contact with the box hole edge since the cable is usually forced to one side by the powerful clamping action exerted thereagainst by the operating means 15.

The spring retainer bulge or off-set 23 is arched to reach over the bushing 11 thru the notch 16 and secure it in position. The hook end 22 embraces or reaches around the inner end of the connecter and bears yieldingly on the outside to positively hold the spring body portion 20 in place inside the connecter and to hold the shoulder 24 and curved off-set portion 23 in the bushing notch 16. The spring retainer is mounted on the connecter by slipping it on from the bushing end 11, the hook 22 springing open for this purpose until the off-set 23 is slid into final position.

When the connecter with the retainer thereon is snapped into the box, the end or hook 21 engages the box hole edge, and the spring body 20 yields or bends from its inner end 23 sufficiently to permit the sleeve 7 to be moved laterally downwardly in respect to the box hole axis so as to gain sufficient room to permit one of the ears, say 10, to pass by and thru the box hole edge. Thereupon the distorted spring 20 reacts to throw the bearing face 17 upwardly against the box hole edge and thus the connecter is snapped into the box and sustains itself through the action of the spring, and the box wall rests between the ear 9 and ears 13. In other words the spring, i. e. its hook 21 embraces the box wall at the knockout H and holds thereto while the connecter is inserted.

The weight of the connecter and screw thus rests directly on the spring 20 which has sufficient tension to carry the weight of the

connecter, which is comparatively light, in the box without the aid of any other part thus freeing the mechanic's hands so that he may work with a cable and the screw 15. The connecter remains attached to the box until a cable is installed.

The outer end of the spring may to advantage have its hook 21 placed in substantial alignment with the ears 13 since the latter ears and the hook cooperate to rest against the same box wall surface and thus act in opposition to the aligned sleeve end edge 8 and ear face 10. The spring hook 21 is simply one of the anchorage means for the connecter although a flexible anchorage means, and becomes effective instantly the connecter is set into the box hole, while the other anchorage means as the ears and sleeve end 8 are rigid do not in reality become permanently effective until a cable is inserted and the screw is tightened up. Thus one anchorage means as 9—13 is rigid on the connecter member and the other anchorage means 21 is flexible in relation thereto, the latter holding the former in overlapping engagement with the box hole edge H.

When the screw 15 is run down against a part to produce reaction, as for example against a cable, it follows that the cable is gripped between the connecter and the exposed box hole edge and simultaneously therewith the screw reaction causes the bearing face 17 to tightly press against the box hole edge thus anchoring the connecter in the box. Having held the connecter rigidly in place until a cable can be inserted, the spring retainer 20 has served its purpose and the improved connecter expedites the installation of the electrical equipment.

While the connecter member 7 is shown in sleeve form, it is susceptible to a design and construction of other forms and shapes so long as the member is so formed as to fit into the box hole and is so formed as to directly expose a portion of the box hole edge to a cable therein received and so formed as to include anchorage means to fix the member in the box hole once the operating means is tightened up.

It is pointed out that in a preferred example of the invention, the spring retainer 20 or the like is carried with the connecter member at or in its cut away portion and is therefore opposite to the projecting overhanging end 12 and operating means 15. The retainer hook 21 is none less than anchorage means itself to hold the connecter in the box hole since it is companion to the outer spaced ears 13, but whereas ears 9 and/or 13 are rigid anchorage means, the anchorage ear or hook 21 is flexible that it may yield or bend to allow one or more rigid ears to pass by the box hole edge, and is flexible that it may react to hold the rigid ears in place preliminary to insertion of the cable.

My improvements in respect to a member 7, which may be of sleeve form or otherwise, and from which a cable connecter is made, includes means to receive and hold the box retainer device 20 in position in or on the connecter member. The notch, groove, or recess 16 in the bushing 11 is by way of example of such means to perform this useful purpose. A cable connecter may therefore be manufactured with the retainer recess and the retainer may at any time be snapped into position if it is desired. The improved cable connecter 7 of the exposed box hole edge type fills a long felt want both with and without the spring snap-in retainer 20 or its equivalent.

The box anchorage retainer 20 may be manufactured as a separate part and used or not used with connecters as box assembly and working requirements demand. In the form of the invention shown, the spring retainer 20 advisedly carries a hook on each end. The hook end 22 fastens the retainer on and carries it with a cable connecter while the other hook end 21 is flexibly free to engage a box portion, particularly the box hole H, to hold the connecter in the box until such time as the cable entry is made secure.

While the spring retainer shown is susceptible to variations in shape and design, the larger hook may advisedly include the long hook portion 22 lying parallel to the body portion 20 so that the connecter member rests between the spring body 20 and spring hook 22. In this way the off-set spring portion 23 is securely anchored to the member 7 at the bushing 11 in the recess 16 thereby leaving the long spring body 20 free to yield all the way from the arched or off-set end 23 out to the box hole hook 21.

In inserting the connecter in the box hole, the spring hook 21 is the first part to be set into position. The mechanic then flexes the spring 20 out of normal shape by pressing the connecter 7 down until one set of shouldered anchorage ears as 9 are forced past and thru the box hole. H then releases the connecter and the spring 20 reacts and snaps the bearing face 17 up against the box hole edge which places ear 9 on one side and ear 13 on the other side of the box wall.

The spring 20 therefore adequately fills the office of temporary operating means by exerting reaction thruout the connecter to force the ears 9—13 in anchoring position until such time as the permanent operating means in the screw is brought into play.

The invention fills a need felt and is economical in production and speeds up the work. The retainer is readily combined with a connecter and may alone be included as the separate part shown or unitarily made a part of the connecter.

What I claim is:

1. Cable and box connecter means compris-

ing, a box provided with a cable and connecter receiving hole, a member of such size as will fit into said hole and so formed as to expose a portion of the box hole edge directly to a cable placed therein, and including box hole anchorage means rigid in respect to the member; said cable and box connecter means also including operating means to grip a cable between the member and exposed box hole edge; and additional box hole edge anchorage means carried with the member engaging the exposed box hole edge portion to preliminarily support the member therein before inserting a cable and including a part thereof which is flexible in respect to the member to permit the rigid anchorage means to pass thru a box hole.

2. A connecter comprising, a member suitable in size to fit into a box hole, and formed to expose the edge of said box hole, and rigid box hole anchorage means carried with the member; operating means carried with the connecter adjacent the rigid anchorage means to grip a cable between the exposed box hole edge and member; and yielding retainer means opposite the operating means to fasten the connecter in a box hole prior to inserting a cable and actuating the operating means.

3. A connecter comprising, a member including a sleeve suitable in size to fit into a box hole, and formed to expose a portion of the edge of said hole, and box hole anchorage means carried with the member; operating means carried with the connecter to grip a cable between the exposed box hole edge and member; and retainer means including, a yielding spring, secured at one end to the sleeve, and a hook on the other end adapted to engage a box portion and react to seat the anchorage means against a box hole edge.

4. A connecter including a sleeve provided with an end edge adapted to rest against a box wall adjacent the box hole, rigid anchorage means and an eccentric bearing face to hold the end edge eccentric to the hole edge, operating means to grip a cable between the hole edge and connecter; and flexible anchorage means carried with the sleeve projecting beyond the end edge and yielding to permit the rigid anchorage means to pass thru the box hole.

5. A connecter including, a member formed to expose a portion of a box hole edge, a bushing thereon formed, a notch in the bushing, box hole anchorage means, and operating means therefor which cooperate with the cable to secure the connecter and cable in a box hole; and a spring retainer including, means to secure the retainer on the connecter in the notch at the bushed end thereof, and shouldering means to abut the bushing in the notch and restrain the retainer from longitudinal displacement.

6. A connector including, a member formed to expose a portion of a box hole edge, box hole anchorage means and operating means which cooperate with the cable to secure the connector and cable in a box hole; and a yieldable box hole anchorage means carried with the member including, a spring embodying a shouldered hook at one end thereof to mount the yieldable anchorage means on the member, and a freely flexing box hole engaging portion on the other end thereof and to retain the connecter within the box hole prior to insertion of the cable in the connecter.

7. A connecter comprising a member suitable in size to fit into a box hole and formed to expose a portion of said box hole edge, anchorage means formed on the member to engage the box hole, operating means carried by the connecter to render effective the anchorage means and thereby permanently fix the connecter and fix a cable in the box hole, and a spring catch attached to the member in a position substantially opposite the anchorage means and adapted to engage the exposed box hole edge portion to support the connecter and prevent it from falling out of the box hole preliminary to insertion of a cable.

8. A connecter comprising a member formed to fit into a box hole and leave exposed a portion of the edge of the hole, anchorage means formed on the member to engage a box hole, operating means carried by the connecter to tighten upon and grip a cable against the exposed hole edge, and a plate spring one end of which includes means to attach it to the member and the other end includes a portion substantially opposite the anchorage means to yieldingly hook over the exposed box hole edge.

9. A connecter comprising a member formed to fit into a box hole and leave exposed a portion of the edge of the hole, anchorage means formed on the member to engage a box hole, operating means carried by the connecter to tighten upon and grip a cable against the exposed hole edge, a flexible plate spring provided with a hook on one end to engage the member and thus attach the spring thereto, and a hook on the other end of the spring to engage the exposed portion of the box hole edge.

10. A connecter comprising a member which is suitable in size to fit into a box hole and which is shaped and formed to leave a portion of the box hole edge exposed to a cable inserted into the box hole and hence the connecter is unsupported by the cable until the latter is inserted, anchorage means formed on the member to engage that box hole edge portion which is opposite the exposed portion, operating means mounted on the member proximate the anchorage means to tighten upon and grip the cable against the exposed box hole edge portion and seat the anchorage means against the box hole edge; a connecter-support spring including parallel

arms embracing the member substantially opposite the anchorage and operating means, one arm being longer than the other end and reaching beyond the member and being bent toward the plane of the other arm to form a hook which overlies and engages the exposed-box-hole edge portion thereby supporting the connecter in the box hole preliminary to insertion of the cable, and the longer spring being narrow so as to not cover any appreciable part of the exposed-box-hole-edge portion; and said member being provided with a depression to receive the spring to hold the latter in place.

11. A temporary support for a connecter comprisng a flat-plate-type spring including a pair of spaced parallel arms joined by a curved portion which is formed with a shoulder, one arm being longer than the other and having its end bent substantially at right angles toward the plane of the shorter arm to leave a space between the short arm and bent end.

In testimony whereof I affix my signature.

STEPHEN N. BUCHANAN.