

Feb. 8, 1955

A. RAUCH
QUICK-ACTING BINDING POST

2,701,871

Filed Oct. 1, 1952

2 Sheets-Sheet 1

FIG. 1

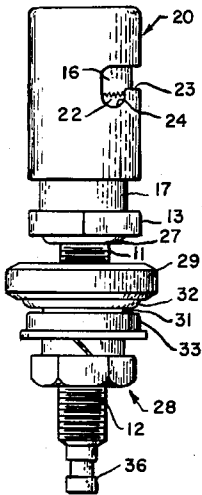


FIG. 4

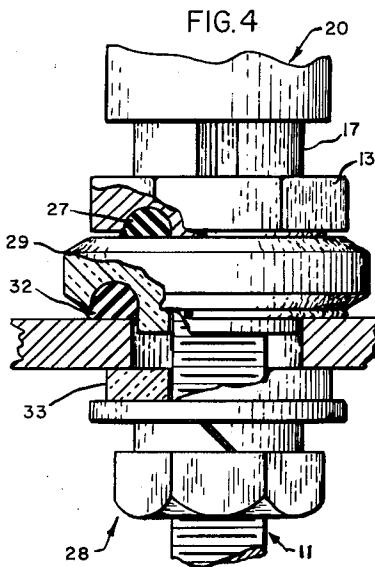


FIG. 3

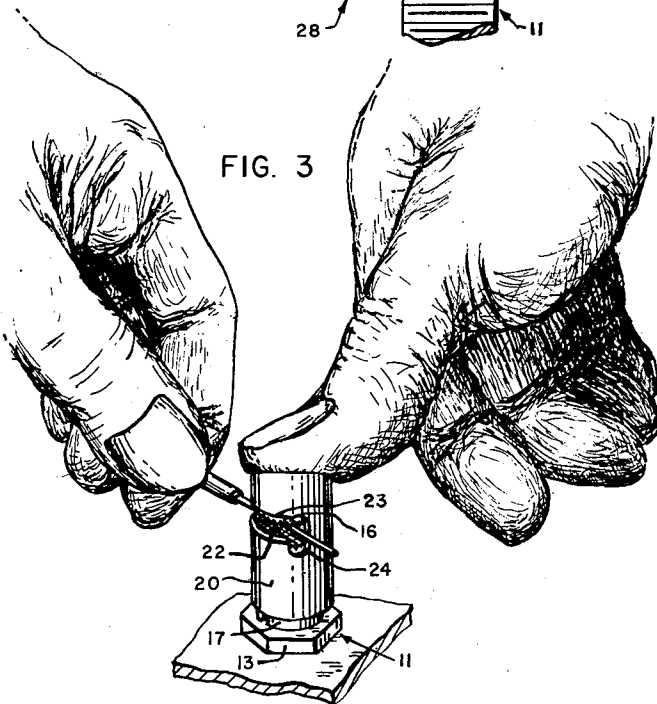


FIG. 5

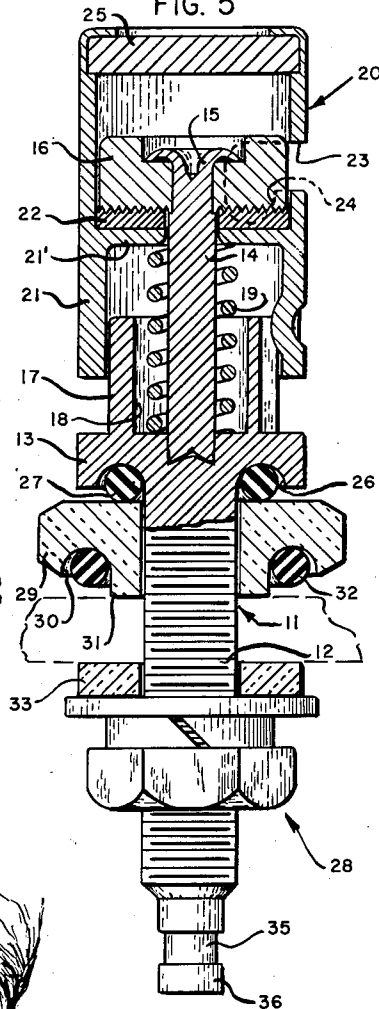
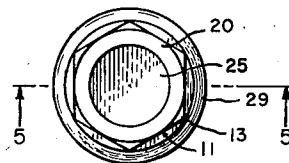


FIG. 2



INVENTOR.
ALEXANDER RAUCH

BY
Harry M. Saragovitz
Attorney

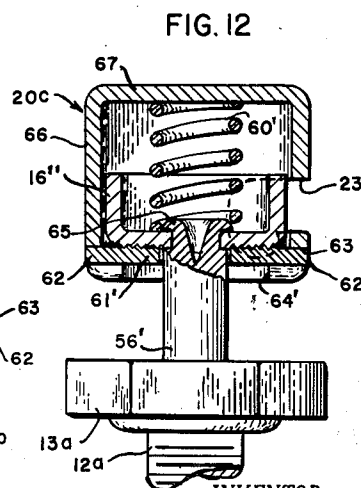
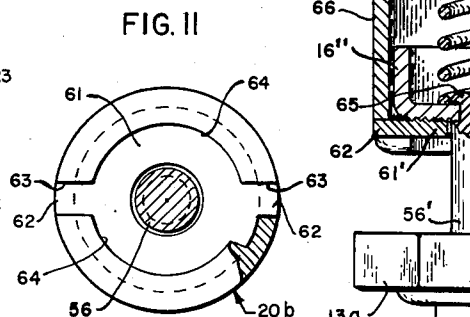
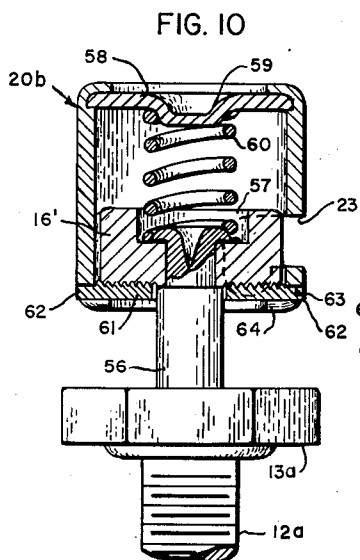
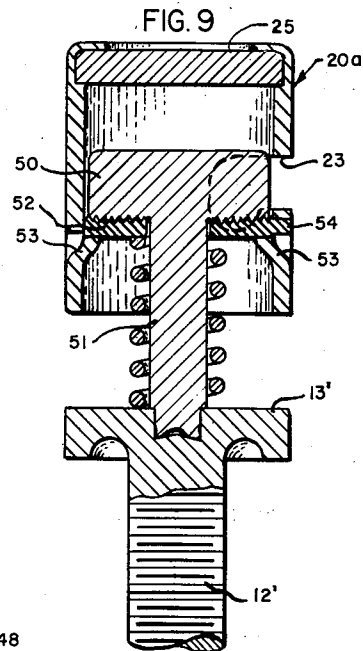
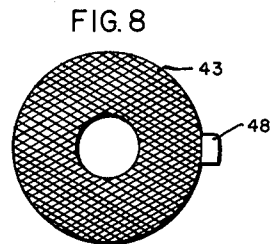
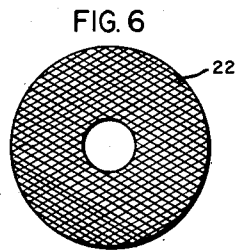
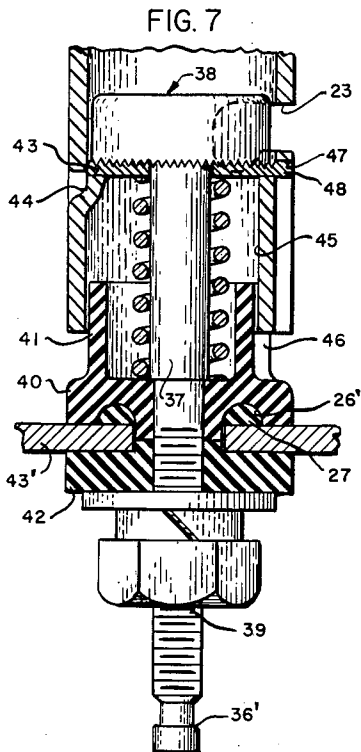
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INVENTOR.
ALEXANDER RAUCH

BY

Harry M. Saragovitz
Attorney

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QUICK-ACTING BINDING POST

Alexander Rauch, Red Bank, N. J.

Application October 1, 1952, Serial No. 312,676

9 Claims. (Cl. 339—254)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to quick acting binding posts especially adapted for use upon electrical apparatus and instruments, for securing wire leads and the like to circuit terminals. It is an important aim of the invention to present a binding post which will be effective and efficient under extreme conditions encountered in field operations where instruments or apparatus are set up in situations exposed to shock, dust, mud and dirt of various kinds, and temperature extremes. It is therefore a further aim of this invention to offer a construction in an automatic-grip or clamping post, the function of which will not be easily impaired in the presence of mud, sand and the like. A further aim is to construct the post in a form which will be easily operable manually for the rapid connection and release of electrical conductors serving as leads for electrical energy supplied to or from electrical apparatus.

The present device has been developed with the object of overcoming many objections which have been raised to prior binding posts of various kinds. These prior binding posts have been in three principal classes, viz: (a) the screw-down cap or clamp screw form; (b) the finger-pressed cap spring-grip type, and (c) the finger-pulled spring pressed cap type.

In many of these, transverse apertures are provided to receive the wire, requiring a needle-threading operation in placing the wire. The clamp-screw type, involves the deformation of the wire at the point of impingement of the screw, with increased liability of breakage of the wire under moderate movement or vibration. Many of the screw cap type involve damaging shear engagement of the wire, in addition to "needle-threading" and liability of loosening of the screw cap by wire movements; the danger of deformation of the wire is increased, and careless manipulation of the cap or screw causes many circuit failures. Both the clamp screw and screw cap types are subject to impairment by jamming of threads by wire or dirt, and crossed threads. They are difficult to manipulate in confined spaces, and involve excessive liability of shock to workers and shorts of circuits by tools applied in servicing apparatus.

The automatic spring-actuated finger-released devices have involved the needle-threading wire placement in many instances, and have also involved objectionable shear engagement of the wire to hold it. To eliminate "needle-threading," some finger-pressed cap devices have been provided with lateral slots permitting a wire end to be inserted by lateral movement of the wire thereinto when finger-pressed to open the slot, but these devices have retained some highly objectionable features, such as the shear grip, space between the grip surfaces too small, or surfaces of the grip faces too small, or other shortcomings.

In addition to overcoming the foregoing disadvantages it is an important aim of the present invention to construct a finger-pressed release type of binding post which when mounted will withstand severe lateral stresses, such as might be incident to collisions with heavy objects, or blows of tools, or force communicated by a wire held by the device. In this connection it is desired to adapt the post to permit wind-around of the gripped wire to relieve stress and strain of the gripped part.

A specific aim of the invention is to present a novel construction in the wire-engaging clamp elements, to the

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end that a wire will be securely held with a minimum liability of casual disengagement, as well as avoiding liability of damage to the conductor so engaged. It is a related object in this connection to give an effective assembly of such parts, which may be easily manufactured and assembled with a minimum of difficulty to present a strong binding post liable in a minimum degree to derangement or damage by rough usage, such as encountered in military or other field operations.

Another aim of the invention is to originate a post which may be easily mounted upon instrument panels or chassis cases and at the same time will seal the panels or cases against ingress of water through the mounting apertures through which the post is inserted.

It is also an object to present a post having the above advantages which will permit ready attachment of a test clip to either the external or inner end of the post. It is further advantage of the invention that it may be mounted and used in conformity with customary practices in the setting up of electrical apparatus.

An important purpose of the invention is to present a construction wherein a complete closure is presented in one of its forms, adapted to prevent access of detritus to the interior of the device, or in the space in which parts of the device must move.

Additional objects, advantages and features of invention reside in the construction, arrangement and combination of parts involved in the embodiment of the invention, as described in the following specification and accompanying drawings (Figures 4 to 12 being four times actual size), wherein:

Figure 1 is an elevational view of a post embodying my invention, but unmounted;

Figure 2 is a top view of the assembled post;

Figure 3 is a perspective view of the device mounted on a typical chassis;

Figure 4 is a fragmentary section of the base portion of the post mounted on the wall of a chassis;

Figure 5 is a section on the line 5—5 of Figure 2;

Figure 6 is a plan of the grip washer forming the lower jaw element of the device;

Figure 7 is an axial section of the upper part of a post of modified construction;

Figure 8 is a plan of the jaw washer for the last-named modification;

Figure 9 is an axial section of a second modified construction of the invention;

Figure 10 is a similar view of a third modification;

Figure 11 is a bottom view of the third modification;

Figure 12 is a view similar to Figure 10 of a fourth modification.

Referring to the drawings, there is illustrated a binding post comprising body part 11, the lower or base portion of which is a simple threaded shank 12 adapted to receive therearound washers and assembly or mounting at 28, as will be more particularly referred to. The shank has a hexagonal bolt head 13 thereon, from the center of which there spring a coaxial stud 14 of reduced diameter, the upper end of which is formed with a tenon 15 of further reduced diameter, around which is fitted an upper jaw or grip in the form of a thick washer 16, the extremities of the tenon being flared and turned over the washer to retain the same rigidly and permanently in place. The grip 16 is of hardened stainless steel knurled on its under face.

Surrounding the stud 14 and spaced therefrom there is an annular wall 17 of less than one-half the height of the stud 14, forming a recess 18 and seat for a helical spring 19 fitted loosely around the stud 14, the spring affording a yielding support to a finger-released substantially tubular cylindrical presser or clamping head 20, or cap, fitted slidably around the stud 14 and wall 17. The presser head 20 comprises a substantially cylindrical tube or sleeve, and midway of its height is formed with a horizontal wall or shelf 21' therewith centrally apertured to fit slidably around the stud 14. A lower clamping member or grip 22 is snugly fitted in the presser head sleeve over the wall 21', this grip being in the form of a thin hardened non-corrosive metal washer, knurled on its upper face and receiving the stud 14 slidable there-through. By reason of the protractile action of the

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spring 19 against the wall or shelf 21', the presser head 20 is pressed outwardly so as to tend to hold the lower grip 22 forcibly against the upper grip 16. A small distance (say, one-sixteenth inch) above the grip 22 a horizontal perimetral wire-receiving slot 23 is formed in the head 20, extending circumferentially over an angle of approximately 180° with respect to the axis of the post, and at each end of this slot the lower edge thereof is recessed as at 24, so that it extends downwardly slightly below the top face of the grip 22. The upper end of the presser head 20 is rabbetted on the inner side, so that an outer thin wall portion remains. Set within the rabbet there is a closing disc 25, and the upper extreme end portion of the thin wall part of the head is spun over this disc to retain the same permanently. The disc 25 serves also as a push plate, against which the finger of the user may engage to depress the presser cap 20.

The device so described may be mounted in panels or upon chassis casings in a conventional manner, utilizing the shank 12 as a mounting bolt and conductor secured by conventional washers and nuts, as is familiar in the art.

It should be appreciated that in addition to the strength of the stud 14, the device described is adapted to resist comparatively severe lateral shocks and stresses applied to the upper part of the device when mounted, the upstanding wall 17 and apron portion 21 (the latter comprising the external cylindrical wall of the presser head below the wall or shelf 21') will coact to withstand pressures against the sides of the upper parts of the post assembly.

To insure the preservation of circuit elements or other devices enclosed within a chassis from damage by water gaining access through the apertures receiving the shank 12, there is shown an improved form of the post body and cooperating washers by which such apertures are effectively sealed by conventional mounting or fastening devices. This means consists in the forming of a concentric groove 26 semicircular in cross section in the underface of the bolt head 13, closely around the shank 12, and a soft rubber washer or gasket ring 27 is provided, circular in cross section, fitted around the shank and of a size small enough in cross section to permit accommodation of the whole deformed washer within the groove 26 when the head 13 is pressed against the surface through which the shank 12 is inserted. In one manner of use of the device the shank 12 may be inserted through a panel or chassis plate and the latter clamped against the head 13 by means of a lock-washer and nut shown at 28. For use on metallic plates and chassis casings where it is desired to insulate the post, a special washer 29 is provided of a suitable insulating material and this is formed with an annular groove 30 in its underside semicircular in cross section and approximating the transverse size of the groove 26 before described, a central portion of the washer being extended axially as a boss at 31, and a soft rubber washer 32 circular in cross section is fitted around the extension 31 in the groove 30, and having a cross-sectional dimension such as will permit the accommodation of the whole washer within the groove 30 when the extension 31 of the washer is inserted through a corresponding hole in a plate, and the washer 29 pressed toward the plate until the outer edge of the groove 30 engages the plate. A simple annular insulator washer 33 is provided, for location at the opposite side of such plate, so that the washers and nut at 28 may clamp the plate between the washers 33 and 29 as shown in Figure 4.

It will be noted that the extremity of the shank 12 is formed with a reduced neck part 35 and a terminal small head 36 well adapted to permit soldering of conductor wire thereto or to receive the spring-pressed jaws of a test clip. The presser head 20 is likewise adapted to receive a test clip with one jaw inserted in the slot 23 and the other engaged against the top of the disc 25 and the top edge of the presser wall.

It is also important to note that this invention has been so constructed that the device may be manufactured in an extremely small size, the drawings representing it in this application being several times the actual size throughout the views illustrating the several forms of the device, excepting Figures 1, 2, and 3.

In Figure 7 there is shown a modification of the device especially suited to mounting the post as an insulated terminal. In this instance the integral bolt head 13 and enlarged shank 12 are omitted, the body of the post com-

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prising a cylindrical stud 37 with an integral top grip head 38 thereon corresponding to the shank 14 and grip washer 16. These comprise the principal body parts of the post. A shank 39 of slightly reduced size is extended coaxially from the lower end of the stud 37 and provided with washers and nuts for securement against the face of a panel or chassis wall through which the shank is inserted, and having a tip head 36' similar to the one 36 before mentioned. In place of the bolt head 13 and case wall 17, a separate cuplike case base 40 is provided formed of a rigid insulation material which may comprise hard rubber or one of the synthetic resins of suitable properties. This base 40 is enlarged at the bottom so as to fit against the face of the panel or chassis, receiving the shank 39 snugly therethrough. It is formed with an integral case wall portion 41 similar in form to the case wall portion 17 on the post body 11; this may be also formed with the concentric annular groove 26' in its underface to accommodate a soft rubber ring 27 as in the case of the first described form of the device. An insulation washer 42 having a boss thereon to fit in an aperture of a chassis wall 43' or the like is provided to be opposed to the base 40 when the device is mounted on a chassis wall or plate. The upper portion of the device may be the same as that first described in all respects, but in the present instance there is shown a modification of the mounting of the lower grip, shown at 43. In this instance the presser head is generally in the same form as the cylindrical part of the presser 20 first described, but the horizontal wall 21 is omitted, and in its place a tongue 44 is struck inward in the side of the presser to engage under the grip washer 43 opposite the slot 23, which is of the same shape as that first described. A rib 45 is pressed in the opposite side of the presser head, extending vertically parallel to the stud 37, shaped to fit slidably a vertical groove 46 in the base piece 40 so as to hold the presser reciprocally against rotation. The rib 45 stops at the lower side of the grip washer 43, serving as a support for the latter, and in addition an aperture 47 is formed immediately thereover in the wall of the presser, so as to receive a radial tongue 48 formed integrally on the grip washer 43. The upper end of the presser may be closed in any suitable way, as, for instance, in the same manner described in connection with the presser 20 of Figure 1. The tongue 48 and aperture 47 may be omitted with further economy, the drive fit of the washer in the presser being then depended on to sustain the thrust of the spring.

In Figure 9 there is shown a further modification of the device, in which the possibility of leaving the assembly open below the presser head is indicated, and an improved mounting for the lower grip is indicated, permitting the presser head to be formed from simple tubular stock, which is true of the presser head of Figure 7 also. Also, the upper grip head 50 is formed integrally with the stud 51, these parts corresponding to those 14 and 16 first described. The stud is formed separately from the bolt head and shank 13' and 12' and secured on the head by any conventional means, the lower end of the stud being in this instance tenoned, cupped and set in a suitable recess in the top of the head 13' where it may be secured by driving into the head 13', spreading the tenon, or otherwise. The presser head is greatly shortened in this instance, the skirt portion 21 of the first described form being omitted for the most part, and the lower grip 52 is formed as a simple washer, having a pressed fit into the presser head 20a from above and supported at its lower side by a suitable number of instructed tongues 53. The lower grip may be a simple separate washer, or as shown may have a tongue 54 extended therefrom through the apertured wall of the presser head immediately under the slot 23. The upper end of the presser head may be closed in the same manner as in the presser head 20 first described.

In Figures 10 and 11 there is shown a further modification of the invention involving a considerable further simplification and further reduction in size. In this instance the shank 12a and bolt head 13a may be identical with the shank and head 12 and 13 of Figures 1 and 2, and from the head 13a there is extended upwardly an integral or attached stud 56 of greatly reduced length, upon the upper end of which there is secured an upper grip 16', identical with the one 16 first described and secured in a like manner, the upper end of the stud being tenoned and upset within a circular recess 57 in the top

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face of the grip 16'. The presser head 20b in this form of the invention is a simple short cylinder or sleeve adapted to be produced from stock tube material, closed at the upper end by a disc 58 pressed thereinto and having the end of the cylinder upset thereover. A central circular boss 59 is pressed downwardly in this disc to afford a seat for the upper end of a protractile helical spring 60 within the presser head, the lower end of the spring being fitted in the recess 57 so as to hold the presser head at the upper limit of its movement. This movement is limited by a lower grip 61, which is a suitable hardened non-corrosive metal washer knurled on its top side and having opposite radial tongues 62 set in notches 63 in the lower edge of the presser head, the edge portions 64 of the presser head between the notches being upset to retain the disc in place. The space between the bolt head and presser around the stud 56 in this device is entirely clear, permitting the presser to be depressed sufficiently for the slot 23 to open below the grip 16' to receive a wire, or the like, with a minimum of friction and reduced liability of packing of dirt between sliding parts. The spring is also more securely inclosed.

In the assembly of the device of Figure 10, the parts being formed and ready for assembly, the lower grip 61 may be pressed and secured in the lower end of the presser sleeve 20b and the lower grip 61 set around the stud 56. The head 16' is then put in place on the stud and the end of the tenon of the stud upset to hold it permanently; the spring 60 is then put in position and the disc 58 set thereover in the upper end of the presser 20b after which the top edge of the latter is upset over the disc to complete the permanent assembly.

In Figure 12 a further modification is shown in which the body of the post comprises parts corresponding to those last described in Figures 10 and 11, and have the same reference characters applied with the addition of a prime. The upper grip 16'' however, is formed as a stamping in the form of a cup having a cylindrical wall extending upward a proper height to close the slot in the presser 20c of this device, and the tenon 65 on the stud is shortened and extended through the bottom of this cup and upset thereover to hold it rigidly in place. The presser 20c also in this case, is a stamping in the form of an inverted cup, the wall 66 of which is cylindrical and the top 67 of which is integral with the wall 66. The lower grip 61' of this device is of the same form as the grip 61 of Figure 10, the lower edge of the wall 66 of the presser cup being notched in the same manner as the lower edge of the wall of the sleeve-like presser 20b and secured upon the grip 61' by upsetting as at 64'. The cup-shaped upper grip 16'' thus affords a deep recess within which the spring 60' may be accommodated as shown, and permits the height of this form of the terminal to be further reduced.

In the assembly of the device of Figure 12, the body of the post and the related parts having been formed, the grip 61' is laid temporarily around the stud 56' and the grip 16'' then secured permanently in place by upsetting the tenon 65. The spring 60' is then set over the upper grip, being centered by the upset end of the stud over the grip 16''. The presser 66 in its cupshape is then inverted over the spring and pressed downward sufficiently to receive the lower grip 61', which is then raised and pushed into the opening in the cup, after which the bottom edge of the presser is upset to retain the lower grip, completing the assembly of the device. The fastenings and mountings by which the device is mounted on a panel or chassis may conform to those indicated for the first described forms of the device, as found best adapted to particular uses contemplated.

It is notable that the forms of the invention in Figures 9, 10 and 11, do not require the presser to be oriented in relation to the body and stud of the post for proper gripping of a wire, but the presser may be turned to the position most convenient at the moment for placing the wire. When a predetermined position is desired, a keyed shaft and insulator may be provided. A short lead from any direction may thus be readily accommodated, obviating the need for providing loops of slack wire to enable the bared end to be properly engaged by the device. It also eliminates the need to orient the post when attaching it to a panel or chassis.

In all the forms of the invention shown and described it will be noted that the top grids 16, 16', 16'', 38 and 50 are of a dimension longitudinally of the vertical axis of

the devices sufficient to keep the slot 23 closed when presser head is at the upper limit of its movement, and there is a reasonably close fit of the presser head around this upper grip so that access of dirt over the latter is prevented when the device is not in use. It will also be observed that access to the space between the upper grip and the lower grip in all forms of this device will be substantially closed when a wire or the like is gripped in the device, the form of the slot 23 being such that an engaged wire is positioned near the two extremities of the slot and will be snugly laid across the grips throughout the engaged portion of such wire, so that the space between the grips inwardly of the wire opposite the slot 23 is closed off.

The longitudinal dimension of the upper parts of the devices of Figures 10 and 12 is reduced substantially and owing to the open nature of the space between the head 13a and the presser head, impedance of release action of the device by interposed dirt or other material is greatly minimized.

The reduced size enhances the use of the article in confined spaces, and also minimizes liability of breakage of the binding post by impact of relatively moving bodies, and accidental shorts, as well as economizing the use of critical materials, the metals most desirable for use in the principal parts being in short supply.

In the production of the several forms of the device the bottom grip may be secured in the sleeve of the presser head by staking in accordance with customary practice where available, and in Figure 12, the head 16'' may be formed integrally with the stud 56, if desired, in which event the complete device would consist of four pieces.

It will be understood that modifications and rearrangements of the parts disclosed may be made without departing from the spirit of the invention as hereinafter claimed, including the combination of parts of one view with those of another, as may be found expedient and beneficial.

There is a peculiar cooperation between the axial stud 14 and the like, on the one hand, and the wall 17 and skirt 21 and the like on the other hand, as illustrated in the devices of Figures 1 to 7, consisting in the fact that in this invention it has been made possible to utilize a spring-grip device having a lateral opening to receive a wire end or the like, and at the same time avoid eccentric, peculiar or difficultly manufactured forms, peculiar or excessive machine operations, expensive special tools and/or multiplicity of operations or difficult operations. To this end the invention utilizes the area within the cylindrical presser 20 and the like only at one side of the simple stud 14 or the corresponding part in Figures 1 to 7, so that in many instances a single operation in a conventional screw machine with appropriate tool form may be utilized to produce the body of the post in quantity, and the presser may be formed from stock drawn tube by operations corresponding to those heretofore used in parts of some prior device in which more complicated forms are involved.

In utilizing grip surfaces extending only radially from one side of a substantially rectilinear, and at least a symmetrical post body, it therefore becomes desirable to use a body in which the stud part is of small diameter, so that good broad radial areas of grip faces may be made effective in the opposed grip or jaw elements. Having consideration for the scale of the drawings in this application, heretofore stated, it will be appreciated that the stud element of Figures 1 to 7 has in each instance been reduced so that it might be considered rather weak if it stood alone, but with the supporting relation of the wall 17, or corresponding part, and the skirt 21, liability of failure of the device under quite severe blows or lateral pressures, is largely reduced, so that the device is rugged and highly desirable for the character of service indicated hereinbefore.

I claim:

1. An electrical terminal binding post having a base, means to mount the same, an upstanding stud of small diameter fixed with the base, a presser head coaxially reciprocable thereon and including a sleeve spaced around the stud, an upper grip body of much greater diameter than and fixed on the upper end of the stud, diametrically coextensive with the interior of and slidingly fitted to said sleeve within the presser head, said upper grip body having a lower grip face extending from said

sleeve inwardly to said stud, said presser head including a lower washer-like grip fixed in the presser head under the upper grip body and receiving the stud slidably therethrough, and a compression spring engaged between the presser head and said base to hold the presser head at the upper limit of its movement yieldable to manual pressure upon the presser head, said presser head having a normal released position with said lower grip against said upper grip body, and having a horizontal slot in one side above said lower grip and below the top of said upper grip body, said upper grip body having a vertical dimension greater than the vertical dimension of the major medial portion of the slot and positioned so that the slot is closed by said upper grip body when the presser head is in said normal position, said slot having opposite end parts extending below the top face of said lower grip so as to lie below a wire and the like engaged by said lower grip, a chord drawn across the distal end edges of said slot lying at least close to the periphery of said stud, said presser head being depressible to present said slot below said upper grip body a distance sufficient to permit lateral movement of a wire and the like through the space between the lower side of the slot and the said upper grip body throughout the length of the slot.

2. The structure of claim 1 wherein the stud is tenoned at its upper end and inserted through the upper grip body, said upper grip secured thereon to hold said upper grip body permanently fixed on the stud within the presser head, said sleeve of said presser head being open at its upper end initially to receive the upper grip body at least therethrough initially and for work in securing the upper grip body on the stud, and a closure push plate fixed in the upper end of the sleeve.

3. The structure of claim 1 wherein said spring is located between said base and lower grip, said base having an upstanding substantially cylindrical case wall within the presser head, and said presser head has an apron closely surrounding the upstanding wall as a closure for the space within said case wall, and around said spring, and extending longitudinally beside the case wall a substantial distance, so that lateral bending of the stud will cause the apron to engage against the side of the wall at the side of incidence of lateral force acting on the presser head and said wall and apron together will resist lateral displacement of the upper part of the terminal when mounted, and oppose bending strain of the stud.

4. In a terminal of the character described, a post body adapted to be secured upon a support and comprising a stud, a lower grip slidable longitudinally on said stud, a fixed top grip on the extremity of the stud over said lower grip to coact with the latter when raised thereto, a presser member of substantially tubular form having the lower grip fixed in a lower part thereof, and a protractile spring coacting between the post body and the presser to hold the latter at the upper limit of its

movement limited by said upper grip and yieldable to finger pressure thereon to move the lower grip from the upper one, said presser having a horizontal slot in one side thereof extending over an arc the chord of which extends at least closely without said stud, said presser having an initial disengaged and closed position at the upper limit of its movement around the upper grip, said upper grip having an outer face closely against the inner face of the presser and extending over the whole length of said slot to close the same when the presser is at the upper limit of its movement on said stud, said presser having an open depressed position to lower said lower grip from the upper grip and with said slot aligned with the space between the grips, said slot having a central part above the lower grip and extremities extending a distance horizontally below the top face of the lower grip.

5. The structure of claim 4 wherein said lower grip consists of a washer shaped plate having longitudinally locked coengagement with the presser head at one side and a pressed fit within the head, the locked part of the lower grip being midway of the length of said slot.

6. The structure of claim 3 wherein a vertical groove is formed in the outer side of the said upstanding wall, and an interior rib is pressed in one side of the apron fitted slidably in the groove, said rib stopping short at the lower side of said lower grip as a stop and support for the latter.

7. The structure of claim 4, wherein said lower grip is a thin washer-shaped disc of hardened corrosion-resistant metal having at least one integral radial ear, said presser member being notched at its lower edge to receive such ear, said grip being fitted in the lower end of the presser with said ear set in said notch, and the lower edge of the presser upset upon the grip to retain the same.

8. The structure of claim 7 wherein the said upper grip is a disc integral with said stud, said terminal including a base member receiving an extension of the stud, whereby said lower grip may be introduced on the stud before mounting, and assembled on the presser.

9. The structure of claim 8 wherein said presser is an inverted cylindrical cup-shaped member, said spring being positioned over said upper grip and confined by the cup.

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