July 7, 1970 P. K. KOLETSOS ETAL 3,519,981

MULTITAP CONNECTOR BLOCK FOR HEAVY CONDUCTORS

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FIG.1

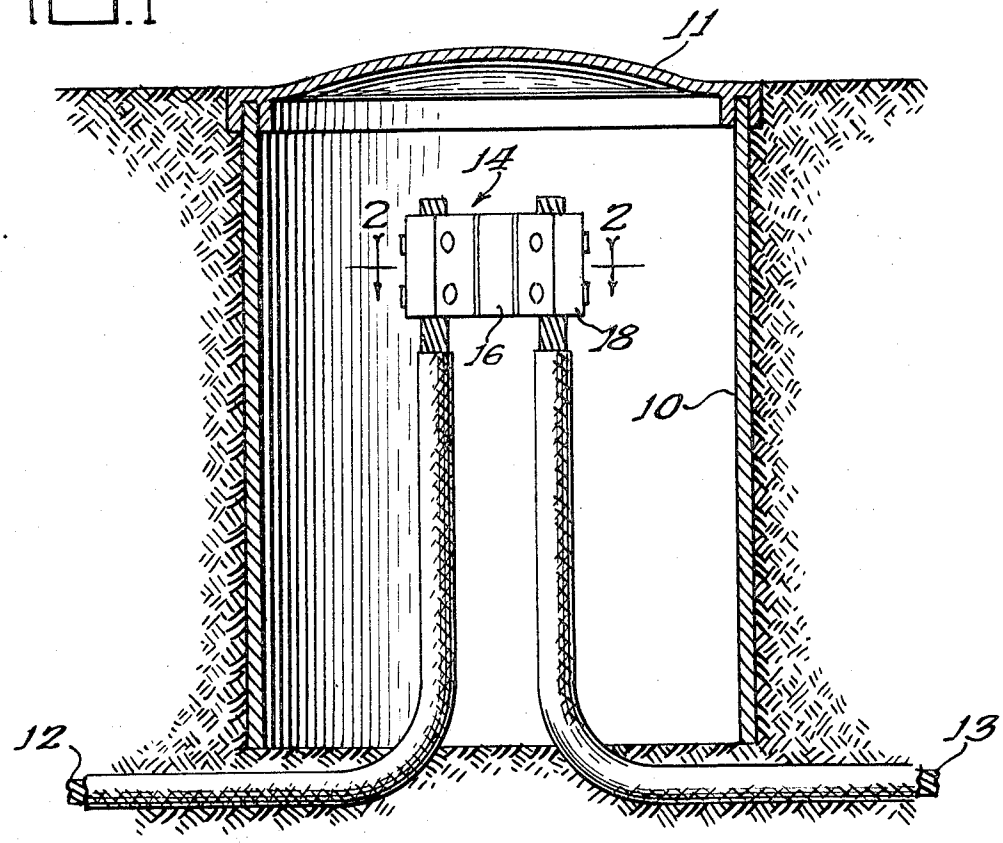


FIG.2

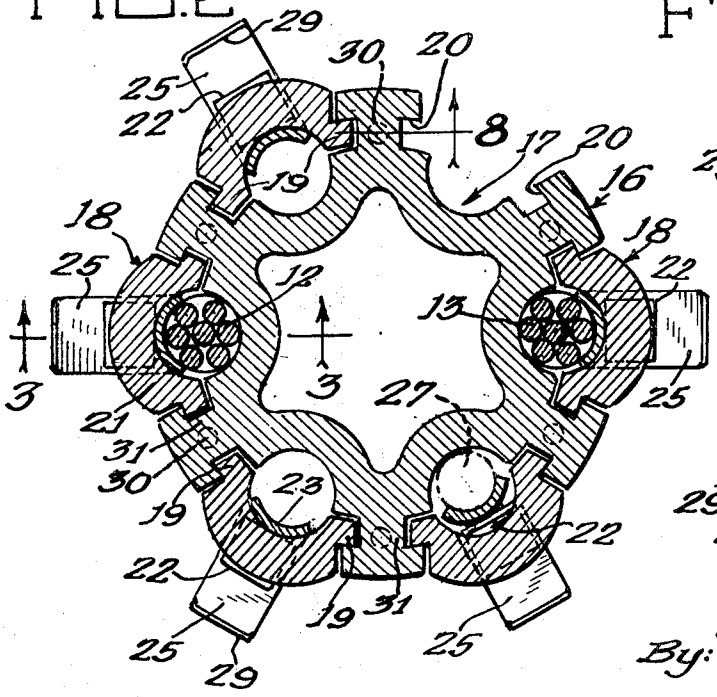
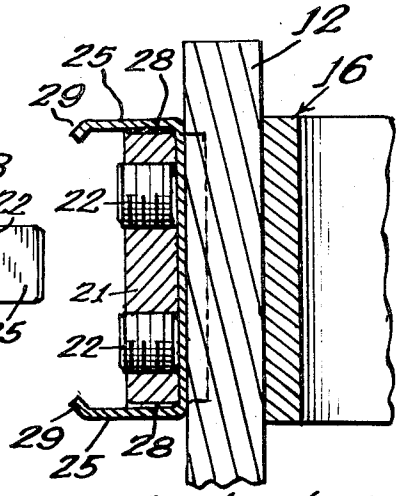


FIG.3



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FIG. 4

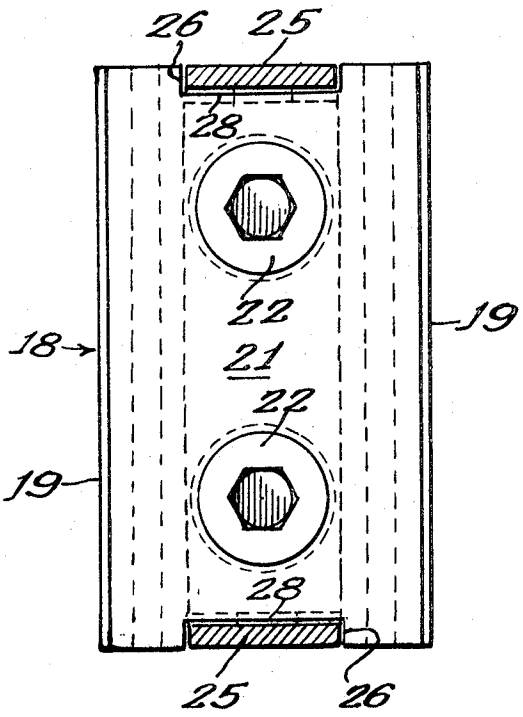


FIG. 6

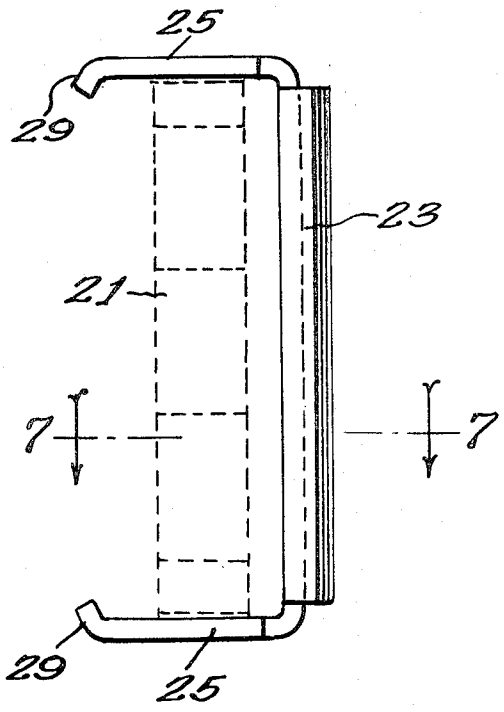


FIG. 5

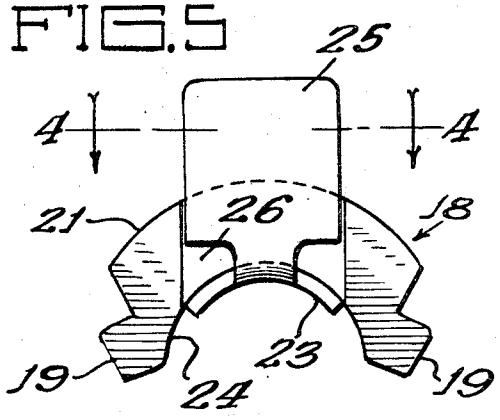


FIG. 7

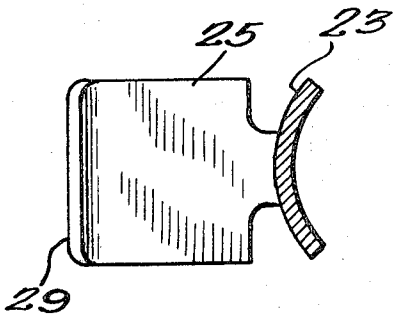
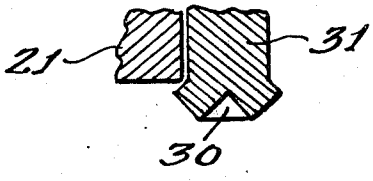


FIG. 8



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MULTITAP CONNECTOR BLOCK FOR HEAVY CONDUCTORS

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Int. Cl. H01r 7/14
U.S. Cl. 339—242 9 Claims

ABSTRACT OF THE DISCLOSURE

A ring-shaped member has a plurality of U-shaped slots along its edge, each side wall of each slot having an undercut shoulder. A bridge type clamping assembly interlocks with the shoulders to close the slot and exert a clamping pressure on a cable located in the slot. The clamp assembly can be withdrawn from the slot by a longitudinal sliding movement. Each clamp assembly comprises a bridge member, set screws passing through same, and a saddle engaged by the set screws to exert gripping force on the conductor. The saddle has end pieces received within recesses in the end surfaces of the bridge member, thus permitting sliding movement of the saddle with respect to the bridge member.

This invention relates to a floating multitap connector block for use in power distribution.

In underground distribution of electric power, referred to in the trade as "URD" (underground residential distribution), it is necessary to provide connector means to tap off the service lines to each house. It has previously been proposed to make these tapped connections by threading each conductor into a hole in a connector block and by securing it with a set screw. The connector block has a number of holes, one for each conductor. For each polarity there are two main conductors, one for the incoming main, and one for the outgoing main, and one or more services conductors.

These conductors are all buried insulated conductors disposed generally horizontally in the ground, but at the connector point they are bent upwardly so that they can terminate in a vault or in a pedestal. Thus all conductor ends are vertically disposed and are parallel to each other and all are cut off at about the same elevation. The ends of each conductor are stripped of the insulating jacket, and it is the parallel stripped ends that are threaded into the separate parallel holes of the connector block. The is supported by the conductors, hence the term "floating."

Due to the stiffness of the conductors, which are from ⅜ of an inch to about ⅞ inch in diameter form the mains, and somewhat less for the service conductors, it is very difficult to manipulate the conductors incidents to threading them into the connector block.

According to our invention, instead of providing a block with through holes, one for each conductor, the block is provided with slots, and a separate clamp assembly in the form of a removable bridge is provided for each slot. Thus, each conductor may be laid in its respective slot by lateral movement; then the clamping assembly or bridge is slid into the slot over the conductor, and the clamping screws tightened up.

A further difficulty encountered in connector blocks of the prior art is that in the course of repeated warming and cooling cycles throughout the months, the clamping means tends to loosen up. According to our invention, the bridge type construction permits one to build into the device a certain amount of resilience, sufficient to overcome the tendency of the clamp to loosen up due to the expansion and contraction of the conductors which are clamped.

Other objects, features and advantages will become apparent as the description proceeds.

With reference now to the drawings in which like reference numerals designate like parts:

FIG. 1 is a vertical section through a power vault showing a preferred embodiment of our invention;

FIG. 2 is a horizontal section taken along line 2—2 of FIG. 1;

FIG. 3 is a vertical section taken along line 3—3 of FIG. 2;

FIG. 4 is a side elevation of one of the bridge type clamp assemblies;

FIG. 5 is an end view of FIG. 4;

FIG. 6 is an elevation of the clamping saddle with the bridge shown in dotted lines;

FIG. 7 is a section taken along line 7—7 of FIG. 6; and

FIG. 8 is an enlarged fragmentary section along line 8 of FIG. 2.

Referring now to FIG. 1, the reference numeral **10** identifies an open bottom vault buried in the ground with a cover **11** removably secured thereto substantially flush with the ground surface. Within the vault are power mains **12** and **13** which are buried at a level lower than the bottom edge of the vault **10** and are bent upwardly so that they are substantially parallel to each other, the upper ends being connected by a connector block **14**. In the case of a service tap, there will be other conductors which are not shown in FIG. 1, these being omitted for purpose of clarity. Also, in a given vault there will be two or three sets of conductors and connector blocks, one for each polarity, but these also are omitted for the purpose of clarity.

Each of the conductors **12** and **13** are insulated conductors having insulating jackets **15** which are stripped from the conductor from a point just below the connector block **14**. In the final assembly, the conductors and connector block of a given polarity are enclosed in an insulating closure of suitable material, such as polyvinyl chloride, portions of which overlap the insulating jacket **16** of each conductor, and which closure is not shown since it forms no part of the present invention.

As shown in FIGS. 1 and 2, the connector block comprises a body portion **16** which is provided with a plurality of semicylindrical recesses **17** in its edge surfaces. The body portion **16** may be of any suitable configuration, such as rectangular, but a ring-shaped or cylindrical configuration as shown in FIG. 2 is preferred for the reason that six recesses or slots **17** may be provided with a minimum amount of metal. For each recess **17**, there is provided a bridge type of clamp assembly **18** having laterally projecting side lugs **19** which interlock with undercut shoulders **20** formed in the side walls of the recesses or slots **17**.

Each clamp assembly **18**, as shown in FIGS. 4 and 5, comprises a bridge member **21** provided with tapped openings which receive set screws **22**. Each assembly also includes a conductor engaging saddles **23** which is of arcuate shape and which underlies the cylindrical inner surface **24** of the bridge member **21**.

As shown in FIGS. 6 and 7, the arcuate shaped saddle **23** is provided with upwardly extending end pieces **25** which fit into a correspondingly shaped recess **26** formed in the end surface of the bridge member **21**.

The set screws **22** bear against the arcuate shaped saddle **23** and urge the same into contact with the conductor **12**, as shown in FIG. 2.

In installation of the URD in the first instance, the two bridge type clamp assemblies **18** which correspond to the conductors **12** and **13** are removed by a sliding movement from the respective recesses **17**; then the very stiff conductors **12** and **13** are manipulated by lateral

flexing movements so that they can be inserted into their respective recesses. Then each clamp assembly **18** is slid into place in an axial direction, and the two set screws **22** of each clamp assembly are screwed up until the saddle **23** engages the conductors very tightly to develop the resilience of the bridge, the clamping pressure being that represented by from 100 to 200 inch-pounds of screw torque where the screw is a half inch screw having a pitch of .05 inch.

In a practical embodiment of our invention, the bridge member **21** consists of a spring tempered material, such as aluminum alloy 6061–T6 with an approximate ultimate strength of 38,000 p.s.i. The deflection of this bridge, being about ¼ inch thick and having a span of substantially 1 inch between the corners of the shoulders **20**, is substantially .003 inch, under 200-inch-pounds of screw torque. This deflection is well within the elastic limit of the material. Therefore the bridge will follow the thermal expansion or contraction of the wire throughout many heat cycles without taking a permanent set. For instance, in a solid aluminum conductor, the thermal diametral expansion of a half inch conductor is approximately .0015 inch for a 200° F. temperature rise.

The saddle **23** permits the distribution of clamping force over a substantial area of the conductor surface with the result that the deformation, if any, of the conductor will be stabilized at a point such that any force exerted by the thermal expansion of the cable diameter will be taken up by a flexing of the bridge rather than by further deformation of the cable. The saddle is thus necessary to the development of the stressed condition of the bridge **21**.

In the embodiment shown, the clamp assembly **18** is two inches long, and the saddle area is substantially one square inch, the other dimensions being proportionate. The clamp assembly is designed to develop a gripping force of several thousand pounds, and the saddle area is sufficiently large that the thermal expansion of the cable will be taken up by the resilience of the bridge, as aforesaid.

When it comes time to install one or more service conductors at the vault location, it will be seen that after they are brought into the vault, and cut to length and stripped, that the sripped end of each can be laid into a recess **17** of the connector block **14** merely by a lateral flexing movement. In the former type of construction, it was necessary to loosen each set screw and lift the connector block from the mains, then position the service conductor and lower the same over the stripped ends, or else, in the alternative, to buckle the vertical span of the service conductor so that it can be threaded into the through hole of the connector block. Either one of these operations is time consuming; the second is particularly difficult from a manipulative standpoint; and both are exceedingly difficult to do with hot tool equipment, that is, when the main is hot.

FIG. 2 shows a service conductor **27** tapped into the power main **12, 13**. The block **14** will accommodate three more service conductors.

The end pieces **25** and recesses **26** cooperate to prevent the saddle **23** from sliding around the conductor; that is, by preventing angular displacement the saddle is always maintained in a position where it is engaged by the set screws **22**, thus eliminating the need for an interlocking swivel connection between the screw ends and the saddle. The clearance **28** between the edge of end piece **25** and the shoulder of recess **26** is substantially .03 inch, the showing of FIGS. 4 and 5 being exaggerated for illustrative purposes.

To facilitate installation on the job, the clamp assembly **18** is made as a self-contained unit. The ends **29** of end pieces **25** are bent inwardly to prevent separation of the saddle **23** from the bridge member **21**, as shown in FIG. 6. This bending operation is performed after the saddle **23** has been assembled with the bridge member **21**, the latter being shown in dotted lines to show the thickness dimension.

As shown in FIG. 8, a dimple or upset **30** is formed on the bottom surface of the body member **16** in the neck portion **31**, which is between the shoulders **20**. This dimple **30** expands the neck sufficiently to interfere with the bridge member **21**, and prevents it from dropping out of the body member **16**.

The present design enables us to use extruded parts for the body member **16** and the bridge member **21**, thus contributing to low manufacturing cost.

Although only a preferred embodiment of our invention is shown and described herein, it will be understood that modifications and changes may be made in the construction shown without departing from the spirit of our invention.

We claim:

1. A multitap connector block for heavy conductors comprising a body member having a plurality of U-shaped slots formed in an edge portion, said slots providing side walls, said side walls having undercut portions providing inwardly facing shoulders, a self contained bridging clamp assembly comprising a stiffly resilient arcuate bridge member having a central portion of arcuate cross section and substantially uniform thickness and marginal portions in the form of laterally projecting lugs interlocking with said shoulders, a tapped opening extending through said bridge member, a screw extending through said tapped opening, a cable engaging saddle of arcuate cross section engaged by the inner end of said screw and having portions loosely interlocking with said arcuate bridge member, said self-contained bridging clamp assembly being removable from said U-shaped slot by longitudinal sliding movement.

2. A connector block as claimed in claim **1** in which said body member is ring-shaped.

3. A connector block as claimed in claim **1** in which said body member and said bridge member are aluminum extrusions.

4. A connector block as claimed in claim **1**, said saddle having end pieces overlapping the end surfaces of said bridge member to prevent longitudinal displacement of said saddle with respect to said bridge member.

5. A connector block as claimed in claim **4**, said bridge member having recessed end surfaces, said end pieces being disposed in said recesses to prevent angular displacement of said saddle with respect to said bridge member.

6. A connector block as claimed in claim **5** in which said end pieces have inwardly bent ends to prevent separation of said saddle from said bridge member during handling.

7. A connector block as claimed in claim **1**, in which said arcuate bridge member is of a resilient material having a stiffness such that the gripping force developed by said bridging clamp assembly is of an order of magnitude only slightly less than the reactive force developed by the thermal expanion of a conductor gripped by said clamp assembly, and of a resilience sufficient to follow the thermal expansion and contraction of said conductor without taking a permanent set.

8. A connector block as claimed in claim **7**, the area of contact between said saddle and said conductor being such that unit pressure between said saddle and said conductor due to said thermal expansion is less than that required to deform said conductor.

9. A multitap connector block for heavy conductors comprising a body member having a plurality of U-shaped slots formed in an edge portion, said slots providing side walls, said side walls having undercut portions providing inwardly facing shoulders, a bridge member having laterally projecting lugs interlocking with said shoulders, a tapped opening extending through said bridge, a screw extending through said tapped opening, a cable engaging saddle engaged by the inner end of said screw, said bridge.

saddle and screw providing a bridging clamp assembly which can be removed from said U-shaped slot by longitudinal sliding movement, said undercut portions defining a neck, and a dimple formed in the bottom surface of said body member and located in said neck to expand the thickness of said neck to prevent said bridge member from dropping out of said slots.

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U.S. Cl. X.R.

24—125; 287—52.03; 339—272