

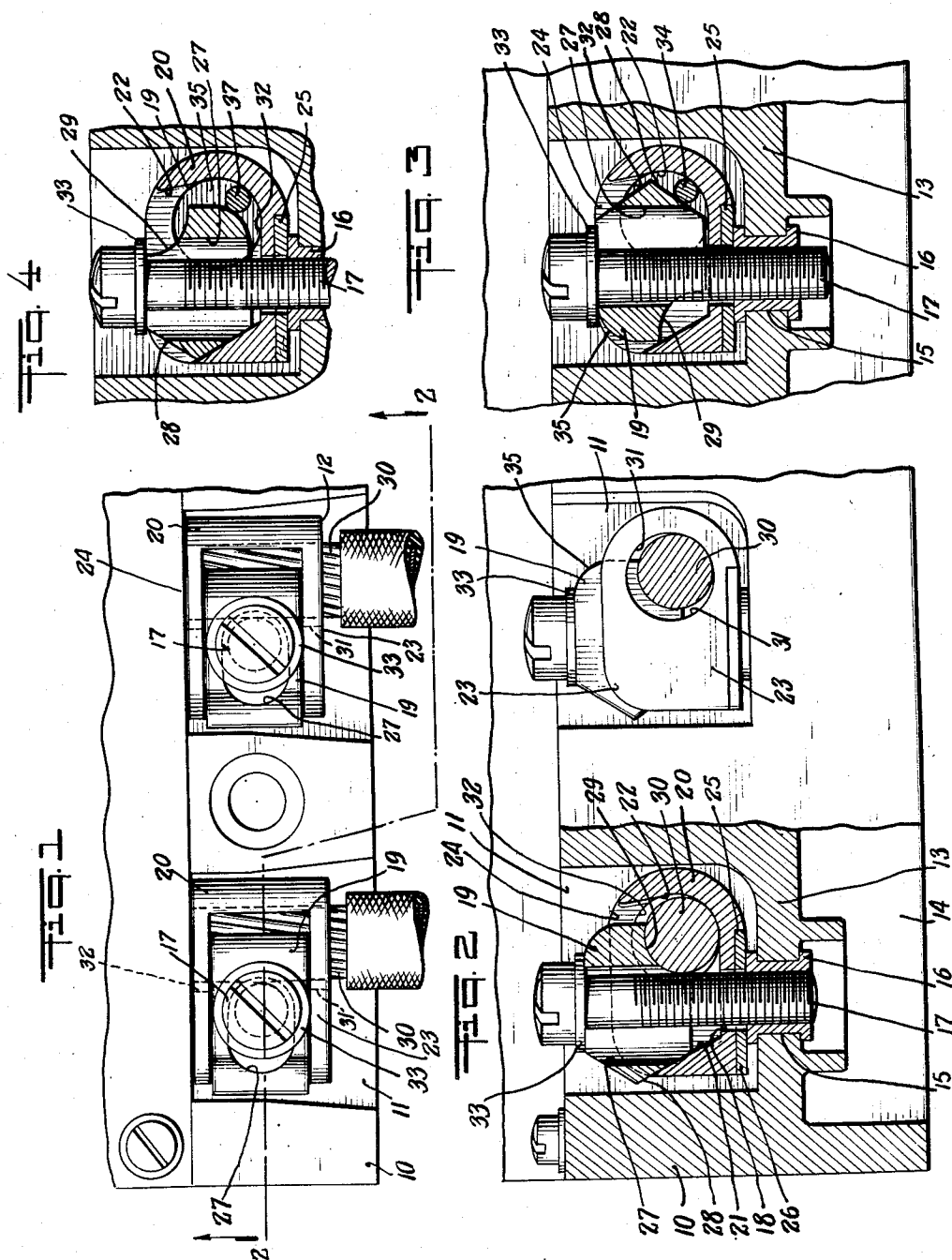
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WIRE TERMINAL CONNECTOR.

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WIRE TERMINAL CONNECTOR

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My invention relates to wire terminal connectors for use with enclosed electrical equipment such as house air circuit breakers, etc. These terminal connectors have usually been solder type connectors because they must fit in small space and accommodate a large range of conductor sizes. One object of my invention is, therefore, to provide a connector of maximum compactness.

Another object of my invention is to provide a connector which will accommodate an unusually large range of conductor sizes.

Still another object of my invention is to use the mounting screw of the connector as the clamping screw thereby eliminating one or more screws and gaining in compactness and economy.

Still another object of my invention is to provide a connector which can readily be installed on the conductors and which does not require close fit of parts for efficient application.

A further object of my invention is to provide a connector which is sufficiently low in cost to compete with solder types.

Another object of my invention is to provide a connector high in strength, which will not distort or bend when pressure is applied by the screw.

All these objects and others are accomplished by my invention which will be disclosed below.

In small air circuit breakers for residential or commercial use, the internal mechanism and all live parts including the terminal connectors must be enclosed by the cabinet in order to prevent accidental contact with exposed current carrying parts. This is usually done by using a molded cabinet made of some phenol-formaldehyde plastic or equivalent insulating material. Generally the space available in such cabinets for the wire terminals is small because these cabinets were designed for use with solder type terminals. Inasmuch as the charges for making new molds are extremely expensive, manufacturers are unwilling to provide new molds for cabinets which would accommodate larger wire terminal connectors. It was therefore necessary to design a solderless wire terminal connector which would fit into the space available in cabinets already molded.

In order to cut down a multiplicity of sizes—and consequently of tools for molding cabinets and stamping metal parts—small air circuit breakers are made in a limited number of sizes. Thus the smallest size is rated at 100 amperes and may be used for all ampere ratings up to that value. This means that conductor sizes ranging from #14 solid wire to 1/0 stranded

cable may be used with this breaker. Inasmuch as the air circuit breaker manufacturer does not have exact knowledge as to the particular size of conductor his customer may use with the breaker it is necessary for him to supply the breaker equipped with wire terminal connectors which will accommodate the full range of wire sizes. To do this with a solderless wire connector in the limited space available for a solder type connector is difficult inasmuch as it is well known that usually a connector which accommodates a range of wire sizes is even larger than one which accommodates only the maximum wire size of that range.

The usual solder type wire terminal consists of a single block of metal with a hole drilled therein to receive the conductor and another to receive the mounting screw. In order to compete in cost with this cheap construction it is necessary to design a solderless type connector which will be equally as simple. This I have accomplished, although my connector is made in two parts instead of one. By using the mounting screw as the clamping screw I avoid the expense of an extra part and am able to make my device cheaply enough to be competitive in price with the solder type.

In order to obtain a good electrical connection it is necessary that the wire terminal connector exert high pressure on the conductor. This I obtain by a combination of screw pressure and thrust against the tapered back of the outer shell. Naturally this thrust puts considerable strain on the outer shell and this must be so designed as to withstand the thrust without distorting or bending. To accomplish this I provide side walls which reinforce the outer shell and prevent the front lip or back from bending outwardly when pressure is applied. Any such motion may prove to be extremely detrimental because the motion may be sufficient to apply pressure to the molded barriers and subsequently cause the barriers to crack or break. This would cut down the insulating efficiency of the breaker and may even cause it to become useless.

I accomplish these and other objects and obtain my new results as will be apparent from the device described in the following specification, particularly pointed out in the attached claims, and illustrated in the accompanying drawing, in which:

Fig. 1 is a top view of the air circuit breaker terminal portion, showing two wire terminal connectors in place.

Fig. 2 is a side view of the same, partially sec-

tioned to show the internal structure of one of the terminal connectors.

Fig. 3 is a sectional view of one of the wire terminal connectors and terminal portion showing an installation on a small diameter wire.

Fig. 4 is a sectional view illustrating a rearrangement of the parts useful for gripping small wires.

Reference numeral 10 designates the air circuit breaker terminal portion having recesses 11, for receiving the wire terminals 12. A wall 13 separates the recess 11 from the base recess 14 running the length of the entire portion, and an aperture 15 joins the two recesses. An internally threaded sleeve 16 is riveted within the aperture to anchor the pressure screw 17 passing through aperture 18 in connector body 20 and pressure bar 19 pressing against conductor 30 within the connector body.

The connector body 20 comprises a shell like section within which is formed a tapered wall 21 forming the back-section, a concave conductor supporting front wall 22 and two reinforcing side walls 23 and 24. A seat 25 is preferably formed on the bottom of the connector body, within which a plate 26 conducting the current to the circuit breaker may be accommodated. The plate is supported directly on the riveted sleeve 16. The pressure bar 19 contains an oval aperture 27 for the pressure screw 17, a tapered back section 28 corresponding to the tapered wall 21 of the connector body, and a concave front section 29 into which the conductor 30 may be seated. The conductor itself is inserted through apertures 31 and 32 in the side walls 23 and 24 of the connector body. A washer 33 is positioned between the head of the screw 17 and the pressure bar.

In operation, the conductor 30 is inserted into aperture 31 of the connector body 18 through the recess 11 in the air circuit breaker terminal portion 10. The aperture 31 conforms to the concave shaped front wall 22 so that pressure bar 19 will compress the conductor uniformly against wall 22 by applying pressure through concave section 29.

The combination of screw pressure and thrust against the tapered back 21 results in a high pressure being applied to the conductor 30 insuring a good electrical connector. Simultaneously the connector body 18 is being securely and rigidly mounted to the riveted sleeve.

In the event it is desired to clamp a conductor 34 of minimum cross-section, the pressure screw is loosened until the pressure bar 18 can be rotated 180°, as shown in Fig. 3.

The tapered end section 28 of the pressure bar can be used to compress the conductor 34 to the concave front wall 22, the oval aperture 27 permitting the pressure bar 19 to be seated lower in the connector body 38 and closer to the concave front wall 22.

If the conductor is of extremely small diameter, the pressure bar 19 may be reversed with respect to the pressure screw, and convex section 35, formed opposite the concave section 29, may be used to compress the conductor 37 against the front wall 22, as shown in Fig. 4, the convex and concave surfaces conforming to one another enabling a conductor of minimum size to be grasped therebetween.

The resulting connector is inexpensive to manufacture and contains a minimum of parts for the wide range of conductors capable of being satisfactorily supported therein. By providing the adjustable pressure bar with a tapered

block section for engagement with the wall, the clamping screw can apply satisfactory pressure within the wide range of conductors accommodated. The shell body is adapted to withstand large pressures thus produced, and the simultaneous clamping of the conductor and locking of the connector into position makes for ease and economy in installation.

I have thus described my invention, but I desire it understood that it is not confined to the particular forms or uses shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of my invention, and, therefore I claim broadly the right to employ all equivalent instrumentalities coming within the scope of the appended claims, and by means of which, objects of my invention are attained and new results accomplished, as it is obvious that the particular embodiments herein shown and described are only some of the many that can be employed to attain these objects and accomplish these results.

What I claim and desire to secure by Letters Patent, is as follows:

1. A connector for attachment to a terminal block, comprising a pressure screw for threaded attachment to the block, a connector body having side walls and a bottom with an aperture therein for entrance of the pressure screw and an aperture in a side wall thereof for the lateral entrance of a conductor; a pressure bar, having a central aperture for entrance of the pressure screw and a conductor engaging surface, the inside of said connector body having a conductor engaging surface and a pressure bar engaging surface rigidly connected to each other by said side walls and said bottom, the conductor engaging surfaces of said connector body and of said pressure bar shaped and positioned for pressing the conductor in a direction oblique to the axis of said pressure screw, whereby when said pressure screw and conductor are inserted into their respective apertures, and the pressure screw threadedly engages the terminal block, the screw will simultaneously clamp the pressure bar and the connector body about the conductor and support the connector and conductor to the terminal block.

2. A connector for attachment to a terminal block, comprising a pressure screw for threaded attachment to the block, a connector body having side walls and a bottom with an aperture therein for entrance of the pressure screw and an aperture in a side wall thereof for the lateral entrance of a conductor; a pressure bar, having a central aperture for entrance of the pressure screw and a plurality of conductor engaging surfaces for alternatively engaging the conductor depending on the size thereof, the inside of said connector body having a conductor engaging surface and a pressure bar engaging surface, the conductor engaging surface of said connector body and each of the conductor engaging surfaces of said pressure bar adapted to cooperate for pressing the conductor in a direction oblique to the axis of said pressure screw, whereby when said pressure screw and conductor are inserted into their respective apertures, and the pressure screw threadedly engages the terminal block, the screw will simultaneously clamp the pressure bar and the connector body about the conductor and support the connector and conductor to the terminal block.

3. A connector for attachment to a terminal block, comprising a pressure screw for threaded

5 attachment to the block, a connector body formed
into a shell with side walls, front and back sec-
tions and a bottom with an aperture therein for
entrance of the pressure screw and an aperture in
10 a side wall thereof for the lateral entrance of a
conductor; a pressure bar, having a central aper-
ture for entrance of the pressure screw and a
conductor engaging surface, the inside of said
connector body having a conductor engaging sur-
15 face and a pressure bar engaging surface rigidly
connected to each other by said side walls and
said bottom, the conductor engaging surfaces of
said connector body and of said pressure bar
shaped and positioned for pressing the conductor
20 in a direction oblique to the axis of said pressure
screw, whereby when said pressure screw and con-
ductor are inserted into their respective apertures,
and the pressure screw threadedly engages the
terminal block, the screw will simultaneously
clamp the pressure bar and the front wall of the
connector body about the conductor and support
the connector and conductor to the terminal
block.

4. A connector for attachment to a terminal
25 block, comprising a pressure screw for threaded

attachment to the block, a connector body formed
into a shell with side walls, front and a tapered
back section with an aperture therein for en-
trance of the pressure screw and an aperture in
5 a side wall thereof, for the lateral entrance of a
conductor; a pressure bar, having a central aper-
ture for entrance of the pressure screw, a tapered
end for engagement with the corresponding
tapered back section of the shell body, and a
10 conductor engaging surface, the inside of said
connector body having a conductor engaging sur-
face rigidly connected to the tapered back sec-
tion by said side walls, the conductor engaging
surfaces of said connector body and of said pres-
15 sure bar shaped and positioned for pressing the
conductor in a direction oblique to the axis of
said pressure screw, whereby when said pressure
screw and conductor are inserted into their re-
spective apertures, and the pressure screw thread-
20 edly engages the terminal block, the screw will
simultaneously clamp the pressure bar and the
connector body about the conductor and support
the connector and conductor to the terminal
block.

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