

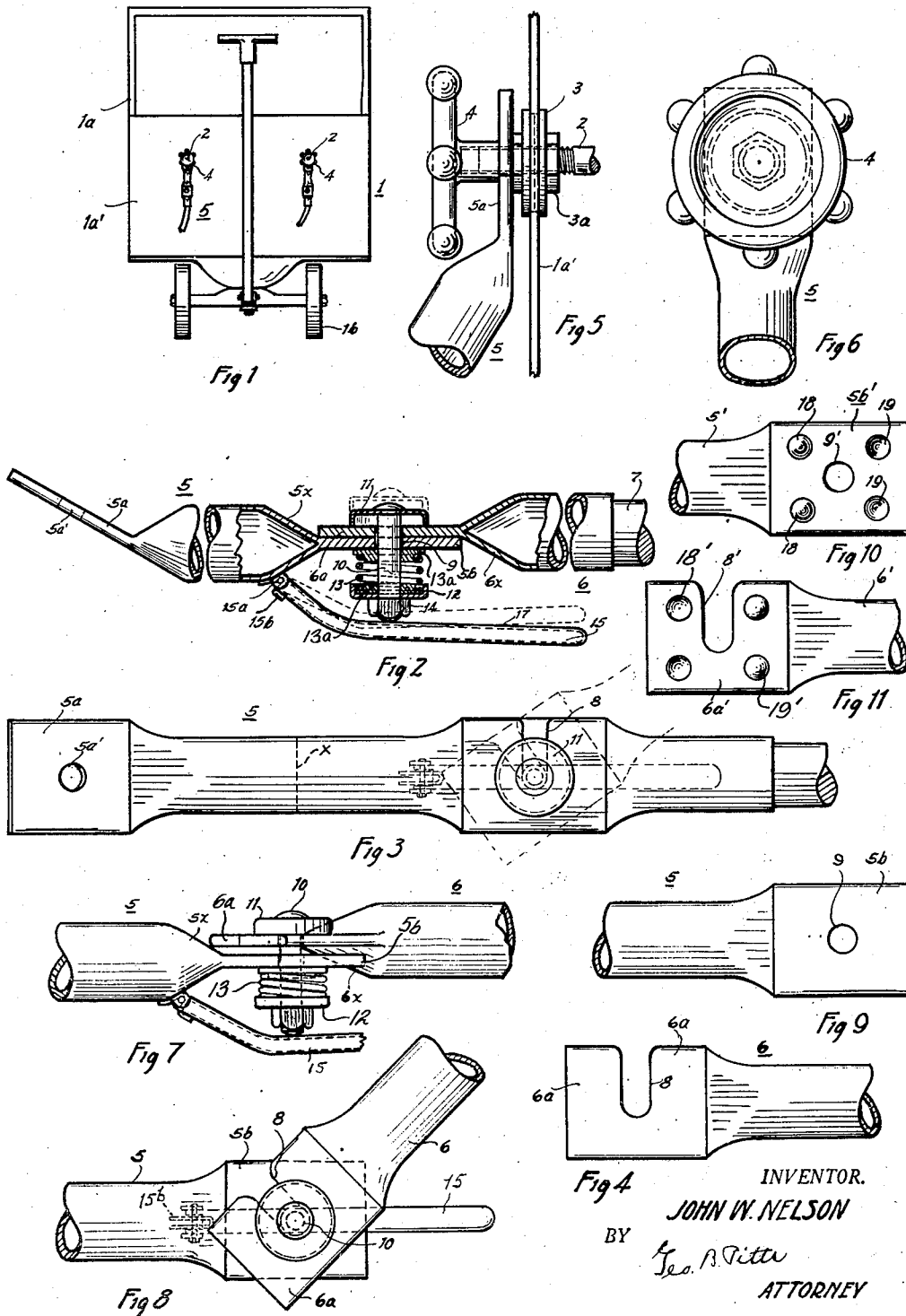
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DETACHABLE CONNECTION FOR ELECTRIC CABLES

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DETACHABLE CONNECTION FOR ELECTRIC CABLES

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This invention relates to make-and-break means for the current supply mains or leads for electrical apparatus, wherein either or both mains or leads are provided with terminal devices adapted to be readily connected or disconnected.

One object of the invention is to provide in an electrical circuit for an electrical apparatus leads either one or both of which are provided with terminal devices having improved detachable means for readily attaching or detaching them.

Another object of the invention is to provide, in a supply main or lead forming part of an electrical circuit, improved terminal devices having detachably related elements, whereby the terminal devices may be readily attached and detached.

Another object of the invention is to provide an improved attachment for an electrical apparatus consisting of detachable terminal elements, one of which is mounted on or electrically connected with one of the terminals of the apparatus and the other of which is fixed to the end of one of the current supply leads, arranged to facilitate the connection and disconnection thereof with the source of electrical supply without disassembly and assembly of the parts forming the adjacent terminal.

Another object of the invention is to provide improved detachable, pivotally connected terminal devices for the lead of an electrical circuit the connecting elements of which, when connected, are related under spring pressure and engage cam walls when moved about their pivotal connection, whereby the spring co-acts with the cam walls to resist relative pivotal movement between the devices and to return them to normal end-to-end relation.

Another object of the invention is to provide an improved means for making electrical connections in an electrical circuit and breaking such connections without the use of tools and operation of nuts or like parts.

A further object of the invention is to provide improved electrical connections for the terminals of a lead and having a spring operated clamping member, whereby the contacting elements of the terminals may be readily engaged and disengaged.

Other objects of the invention will be apparent to those skilled in the art to which my invention relates from the following description taken in connection with the accompanying drawing.

The disclosed embodiment of the invention is shown in connection with a portable type of electrical apparatus (that shown herein consisting

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of an electrical welding mechanism) as the invention is particularly adapted for use where such type of apparatus is employed. Under some circumstances of shop practice, where the parts to be welded are of various shape and sizes, so that they are positioned from time to time in various locations in the shop, outside the shop or at a remote location, the electrical welding mechanism must be wheeled or transported to such locations for each welding operation and in some instances the supply leads (cables) must be moved and reconnected to other outlets; therefore it becomes highly desirable to quickly detach the leads from the mechanism when it is to be moved and attach them after the mechanism has been located adjacent the parts to be welded.

Fig. 1 is a front or end elevation of a portable welding apparatus showing leads each provided with terminal devices embodying my invention.

Fig. 2 is a side elevation of the devices, parts thereof being in section, enlarged.

Fig. 3 is a plan view.

Fig. 4 is a fragmentary plan view of one of the terminal devices.

Fig. 5 is a fragmentary side elevation showing the mounting of one of the inner terminal devices to the adjacent terminal of the welding apparatus.

Fig. 6 is a front view of parts shown in Fig. 5.

Fig. 7 is a side view of the devices showing the position thereof when the outer device is swung into angular relation with respect to the inner device.

Fig. 8 is a plan view of the parts shown in Fig. 7.

Fig. 9 is a fragmentary plan view of one of the terminal devices.

Figs. 10 and 11 are plan views showing a modified form of construction.

In the drawings, 1 indicates as an entirety a suitable welding mechanism, the front end thereof only being shown, as the construction of such apparatus forms no part of the present invention. The supporting frame 1a for the welding mechanism is mounted on wheels 1b (the front wheels only being shown) to provide for wheeling of the mechanism from place to place for reasons already set forth. The electrical mechanism is suitably connected to terminals 2, each mounted on the frame panel 1a' by means of a sectional collar 3 formed of suitable insulating material, through which the adjacent terminal 2 extends, and clamped to the panel by nuts 3a. The end portion of each terminal 2 is provided with screw threads for the nuts 3a and a suitable clamping

element 4 for securing the inner end of a terminal device thereto, as later set forth, in electrical contact with the terminal.

5, 6, indicate pairs of terminal devices the adjacent ends of which are detachably connected together, the connecting means preferably being of the pivotal type, whereby they may be angularly related. A pair of devices 5, 6, is employed between each terminal 2 and the adjacent supply lead or side of the electrical welding circuit, but one pair only will be described. The devices 5, 6, may be interposed at any desired place between the ends of one lead or each lead 7 of an electrical circuit, but in the disclosure herein one device (inner device 5) is fixedly mounted directly on the adjacent terminal 2 and detachably clamped thereto by the clamping element 4. In this arrangement, the device 5 forms an extension of the terminal 2; such arrangement is advantageous as the device is stationarily supported and therefore the outer device 6 may be readily connected thereto and therefrom by the operator in a relatively quick manner, as later set forth. The terminal devices 5, 6, are formed of conducting material and may be of any desired shape in cross section and length. The inner end of the terminal device 5 is provided with a flat plate 5a formed with an opening 5a' through which the terminal 2 extends, this form of connection serving to provide a simple and efficient connection with the terminal 2. The outer end of the device 5 is provided with a flat plate 5b arranged to have face-to-face engagement with a flat plate 6a provided on the outer end of the terminal device 6, whereby an electrical connection may be provided between the devices 5, 6. The opposite end of the device 6 is suitably connected to the adjacent end of the lead, or a flexible cable 7 carrying the lead, the opposite end of which is connected to an incoming supply main or other source of current supply.

The detachable connections between the plates 5b, 6a, consist of the following: 8 indicates a slot formed in the plate 6a and extending inwardly from one side edge thereof, its inner end wall preferably being concentric to the center of the plate 6a. 9 indicates an opening formed in the plate 5b, preferably disposed centrally thereof. 10 indicates a pin extending through and slidably fitting the opening 9 and also extending through and slidably fitting the walls of the slot 8 when the plates 5b, 6a, are related or in electrical contact. (See Figs. 1 and 2.) The opposite ends of the pin 10 are provided with collars 11, 12, the collar 11 being suitably fixed to the adjacent end of the pin 10 for movement therewith and arranged to engage and disengage the plate 6a in the manner later set forth. Between the collar 12 and plate 5b I provide a coiled spring 13, which normally tends to move the pin endwise in the direction to maintain the collar 11 under pressure engagement (a) with the plate 6a when the plates 5b, 6a, are connected and (b) in engagement with the plate 5b when the device 6 is detached from the device 5. That end portion of the pin 10 carrying the collar 12 (which loosely fits the pin 10) is provided with screw threads to take a nut 14, to support the collar 12 on the pin and provide for the adjustment of the tension of the spring, whereby the pressure exerted by the latter will be adequate to provide efficient electrical contact between the plates 5b, 6a.

As shown, the opposite ends of the spring 13 about suitable insulating seating elements 13a,

whereby the spring is insulated from the adjacent parts.

In operation, the pin 10 is moved endwise against the tension of the spring 13—see dotted lines in Fig. 2—to release the collar 11 from the plate 6a. When the collar 11 is operated to this referred to position, the terminal device 6 may be bodily moved or swung laterally (downwardly as shown in Fig. 3), the slot 8 permitting of this operation to effect disengagement of the plate 6a from the plate 5b and detachment of the device 6 from the device 5. When the device 6 is to be attached to the device 5, the pin 10 is moved endwise against the tension of the spring 13 to displace the collar 11 in spaced relation to the plate 5b, the device 6 is then moved laterally to project the pin 10 through the slot 8 against its end wall, which operation positions the plates 5b, 6a, in superposed relation, and then the pin is released to permit engagement of the collar 11 with the plate 6a under the influence of the spring 13. The collar 11 is preferably of inverted cup shape so that the pressure of the spring through the collar 11 is uniformly exerted over a wide area of the plate 6a.

It will be observed that the detachable connections for the terminal devices may be reversed; that is, the slot 8 may be formed in the plate 5b and the pin and associated parts mounted on the plate 6a.

The opposite side walls of the slot 8, adjacent its outer or open end may be inclined outwardly to facilitate or guide the pin 10 therinto when the devices 5, 6, are to be connected.

From the foregoing description it will be observed that by operation of the pin 10 and its release, attachment and detachment of the devices 5, 6, may be readily and quickly made without the use of tools and screwing in and out of nuts or like elements.

While, as above stated, the terminal devices may be of any desired shape or form, for the sake of simplicity I employ standardized parts, namely, parts usually known as "connectors." As shown in Fig. 3 the open ends of two connectors are welded together (see dotted line x) to form the device 5 so that the extension at one end thereof provides the plate 5a and the extension on its other end provides the plate 5b, whereas a separate connector serves as the terminal device 6, the extension thereon providing the plate 6a and its open end serving as a seat for the free end portion of the cable 7, which is suitably electrically connected to the walls of the connector.

It will be observed that the form of detachable connections between the adjacent ends of the devices 5, 6, provides a pivotal connection therefor, so that when the devices 5, 6, are in connected relation, the device 6 may be swung in either direction about the pin 10, as shown in Fig. 8, due to a change in position of the apparatus or cable 7. It will also be observed that when the device 6 is moved into angular relation to the device 5 the free ends of plates 5b, 6a, ride up the contiguous inclined walls 5x, 6x, as shown in Fig. 7, the effect of which is to separate the plates 5b, 6a, in opposition to the tension of the spring 13; accordingly the walls 5x, 6x, tend to resist turning or swinging movement of the device 6 and to return it to normal position, in endwise relation to the device 5. However, due to the fact that the plates 5b, 6a and walls of the devices are formed of conducting material, the separation of the plates 5b, 6a, as above described does not affect the electrical connection between the devices 5, 6. 15 indicates a handle consisting of a lever (pref-

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erably of the third class) pivotally mounted on the terminal device 5, its intermediate portion being related to the pin 10 and arranged when operated to engage therewith and move it endwise against the tension of the spring 13. The handle 15 is pivotally mounted on a shaft supported on lugs 15a, which are welded on the lower wall of the device 5 inwardly of the plate 5b. The handle 15 is normally biased upwardly and maintained in engagement with the pin 10 by a spring 15b coiled around the shaft for the handle 15, one end of the spring engaging the device 5 and its other end engaging the handle 15. The handle may be covered with a jacket formed of rubber or other insulating material 17. By grasping the handle 15 and pressing upwardly thereon the pin 10 may be moved endwise to raise the collar 11 when detachment or attachment of the devices is to be made. In carrying out either of these operations, the handle 15 is operated with one hand whereas the device 6 is gripped with the other hand.

Figs. 10 and 11 illustrate a modified form of construction consisting of terminal devices 5', 6'. The device 5' terminates in a contact plate 5b' and is formed with an opening 9' for a slidable spring operated pin (not shown), whereas the device 6' terminates in a contact plate 6a' and formed with a slot 8' for the pin carried by the plate 5b', the plates 5b', 6a', being adapted to be connected and disconnected as already set forth with respect to the devices 5, 6, and their contact plates 5b, 6a. In this modification, the opposed faces of the plates 5b', 6a', are provided with interlocking elements, preferably consisting of one or more embossments on each plate, those on one plate extending upwardly and those on the other plate forming recesses or depressions, each adapted to receive one of the upwardly extending embossments when the plates 5b', 6a', are in connected relation. In the arrangement shown, the plate 5b' is embossed to provide two upwardly extending elements 18 and two recesses 19, whereas the plate 6a' is embossed to provide two recesses 18' to receive the elements 18 and two upwardly extending elements 19' which fit into the recesses 19. The sets of elements 18—18' and 19—19' are normally held in engagement by the spring for the pin and tend to prevent disengagement of the plate 6a' from the plate 5b' due to a blow thereon resulting accidentally. As the surface of each element 18, 19', is convex and of slight elevation, undue movement of the pin is not required when the plates 5b', 6a', are to be related in face-to-face relation or separated.

To those skilled in the art to which my invention relates many changes in construction and widely differing embodiments and applications of the invention will be apparent without departing from the spirit and scope thereof. My disclosures and the description herein are purely illustrative and not intended to be in any sense limiting.

What I claim is:

1. In an electrical circuit, the combination of a pair of terminal devices provided with electrical contact elements adapted to be detachably connected together, each of said elements having a contact face for intimate engagement with the complementary face of the other element when so connected, one of the elements having a slot extending to and opening at one side of such element, and the other element being provided with an aperture registrable with a portion of said slot, an axially slidable pin mounted in said aper-

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ture and arranged to be entered into said slot when the elements are to be connected together, a collar mounted on each end of said pin, and a spring disposed between one of said collars and the apertured element and yieldably urging the pin endwise in one direction to engage the other collar with the slotted element and pressurably maintain intimate electrical contact between said complementary faces of the elements when they are connected, the pin being movable in the opposite direction against the action of the spring to disengage said other collar from the slotted element when the connection is to be broken.

2. In an electrical circuit, the combination of a pair of terminal devices provided with complementary contact elements arranged to be detachably connected together face-to-face, one of said elements being formed with a slot opening at one side thereof and the other element being formed with an aperture adapted to register with a portion of said slot, the diameter of the aperture and the width of the slot being substantially equal, a pin of uniform diameter throughout slidably mounted in said aperture and arranged to be entered into said slot when the elements are to be connected together, a collar mounted on each end of said pin, a spring surrounding the pin between the apertured element and one of said collars and normally tending to move the pin endwise to engage the other collar with said apertured element, and a handle pivotally mounted on one of said devices and engageable with the pin to move the latter against the action of said spring to disengage said other collar from the apertured element to permit entry of the pin into the slot of the other element, whereby upon release of the handle the elements may be maintained in pressural face-to-face contact between said other collar and spring.

3. In an electrical circuit, the combination of a pair of terminal devices provided with complementary contact elements arranged to be detachably connected together face-to-face, one of said elements being formed with a slot opening at one side thereof and the other element being formed with an aperture adapted to register with a portion of said slot, a pin slidably mounted in said aperture and arranged to be entered into said slot when the elements are to be connected together, a collar mounted on each end of said pin, a spring surrounding the pin between the apertured element and one of said collars, normally tending to move the pin endwise to engage the other collar with said apertured element, a handle pivotally mounted on one of said devices and engageable with the pin to move the latter against the action of the spring to disengage said other collar from the apertured element to permit entry of the pin into the slot of the other element, whereby upon release of the handle the elements may be maintained in pressural face-to-face contact between said other collar and spring, and a resilient connection between said device and handle holding the latter in engagement with the pin.

4. In an electrical circuit, the combination of a pair of terminal devices for one lead of the circuit, each device consisting of a contact plate adapted to be detachably related face-to-face with the plate of the other device and a contiguous cam wall arranged to be engaged by the outer end of the plate of the other device when one device is moved into angular relation to the other device, one of said plates being formed with a slot open at one side thereof and the other plate being formed with an opening, a pin slidably

mounted in said opening and arranged to be inserted into said slot when said plates are to be connected together and operate as a pivot for said plates when the latter are connected in face-to-face relation, a collar on one end of said pin, a spring between the opposite end of said pin and the adjacent contact plate and normally tending to move said pin endwise and said collar into engagement with said plate and to permit movement of the pin and collar endwise in the opposite direction away from said plate, whereby said pin may be inserted into said slot in the other plate and the plates engaged under pressure by release of said pin, said spring being arranged to co-act with said cam walls to resist relative pivotal movement of said plates.

5. The combination stated in claim 1, wherein the contact faces of the respective contact elements are provided with mating depressions and projections.

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