April 13, 1965 F. L. KRADEL ETAL 3,178,538

UNIVERSAL FUSE ADAPTER

Filed Oct. 18, 1960 7 Sheets-Sheet 1

FIG. 1a

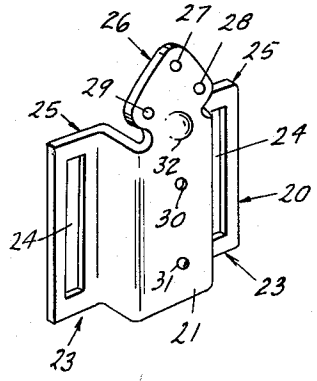


FIG. 6

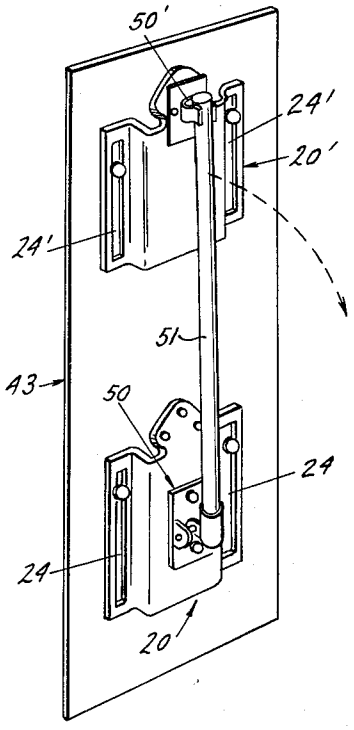


FIG. 1d

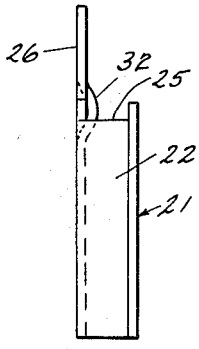


FIG. 1b

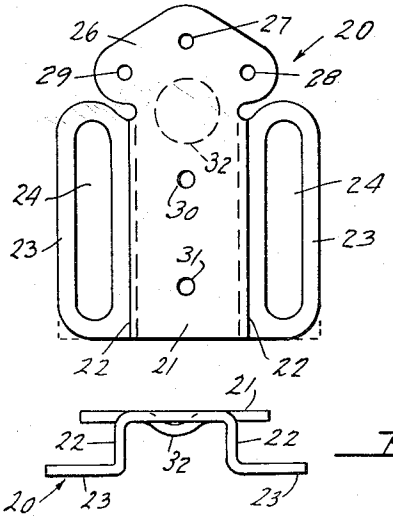


FIG. 1e

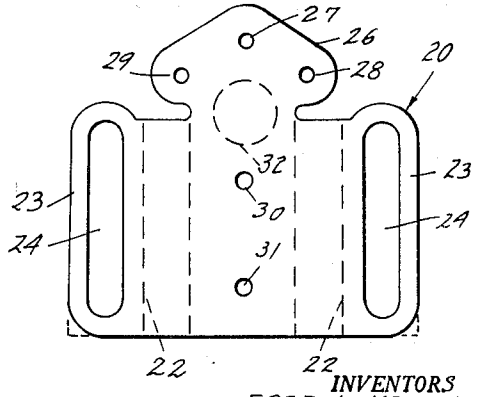


FIG. 1c

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April 13, 1965 F. L. KRADEL ETAL 3,178,538

UNIVERSAL FUSE ADAPTER

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FIG. 2.

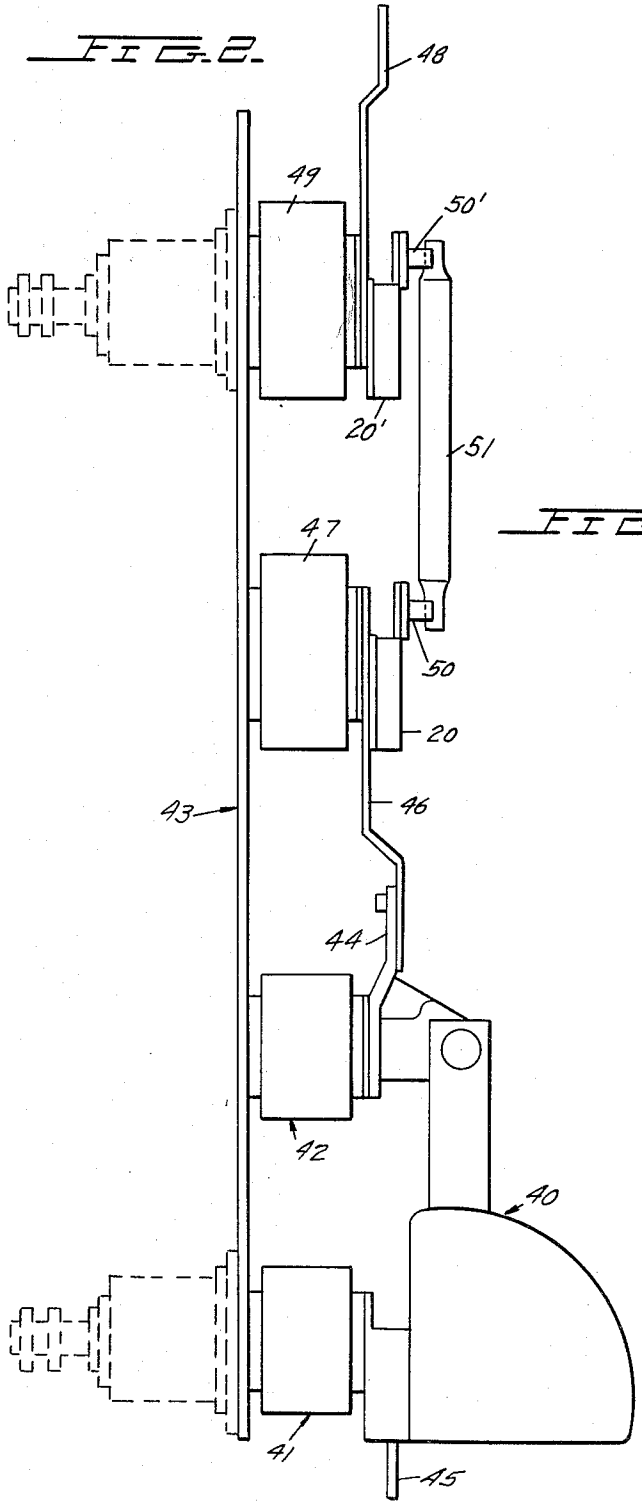
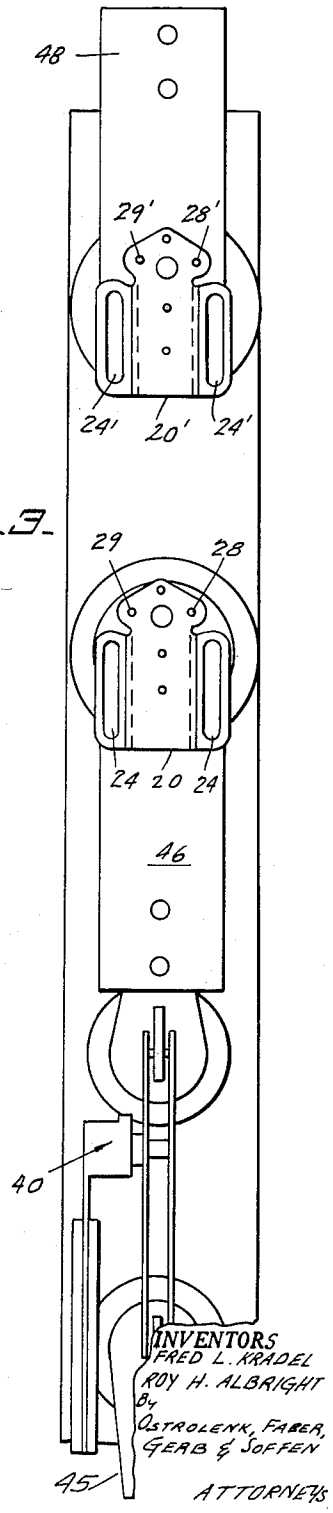


FIG. 3.



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UNIVERSAL FUSE ADAPTER

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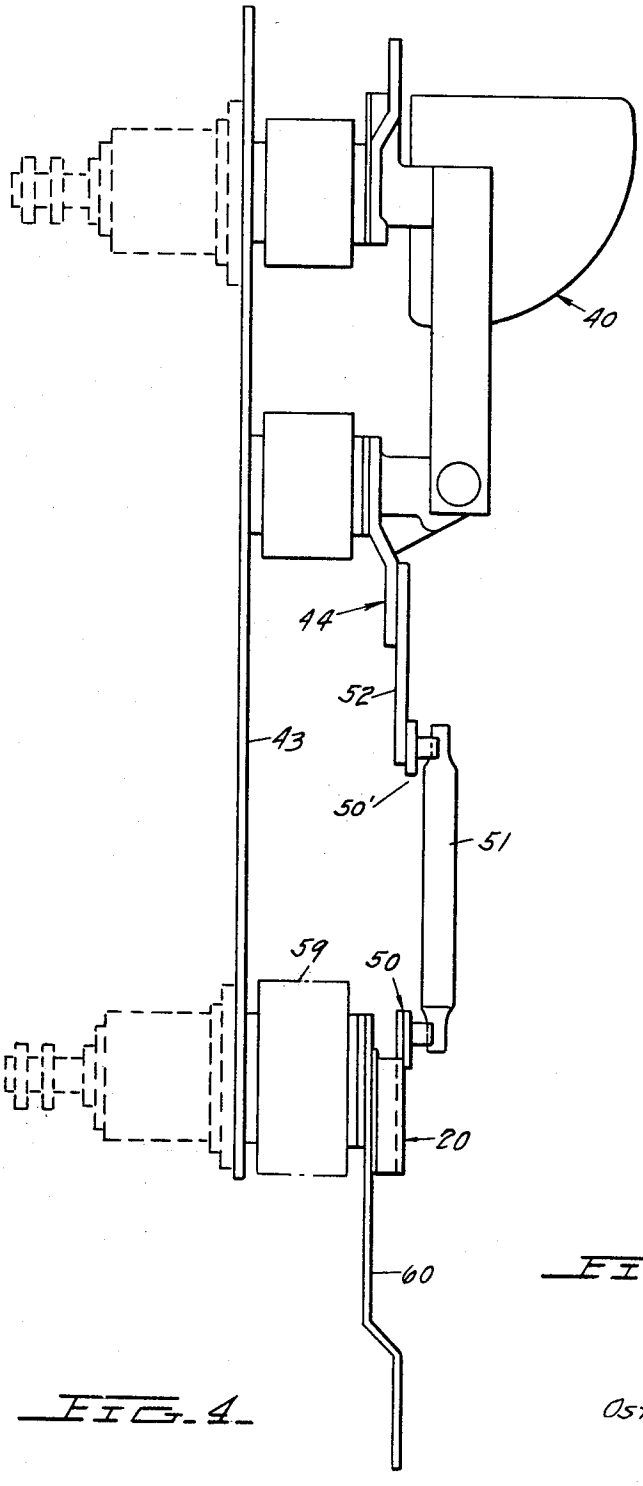


FIG. 4

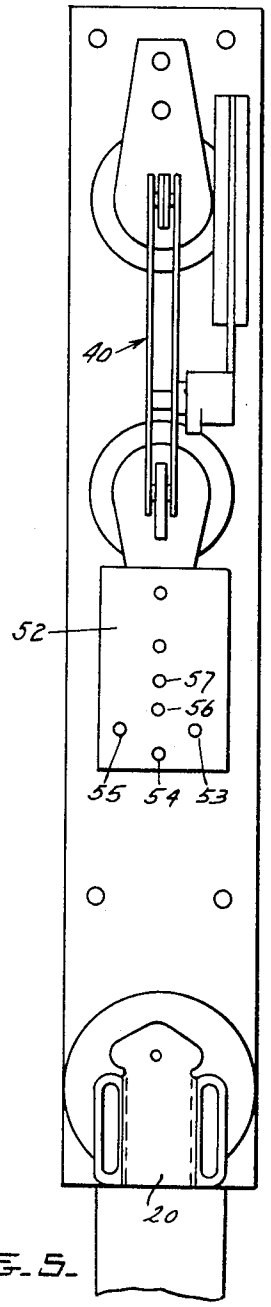


FIG. 5

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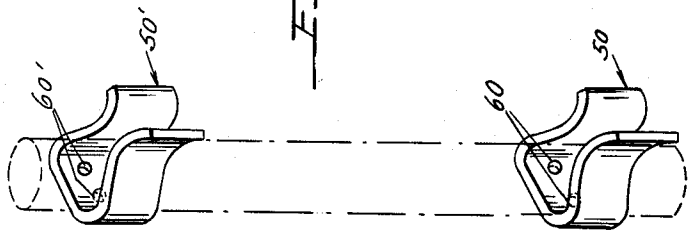
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UNIVERSAL FUSE ADAPTER

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FIG. 7a



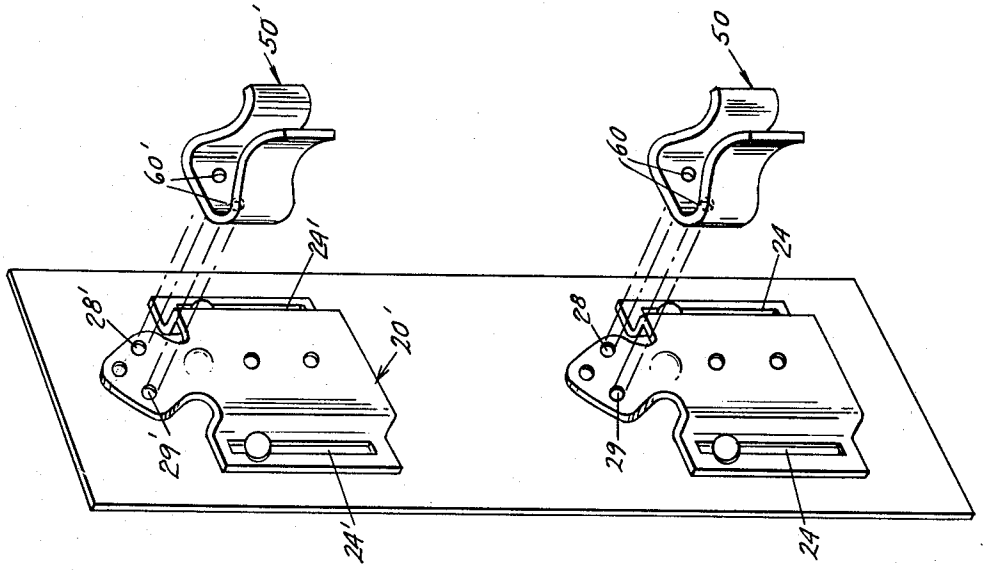


FIG. 7

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UNIVERSAL FUSE ADAPTER

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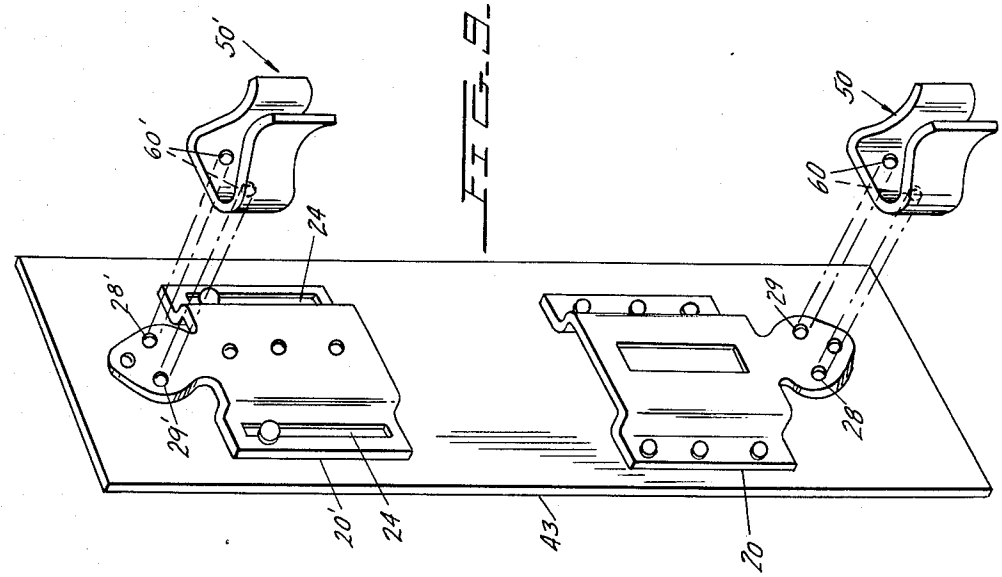


FIG. 9

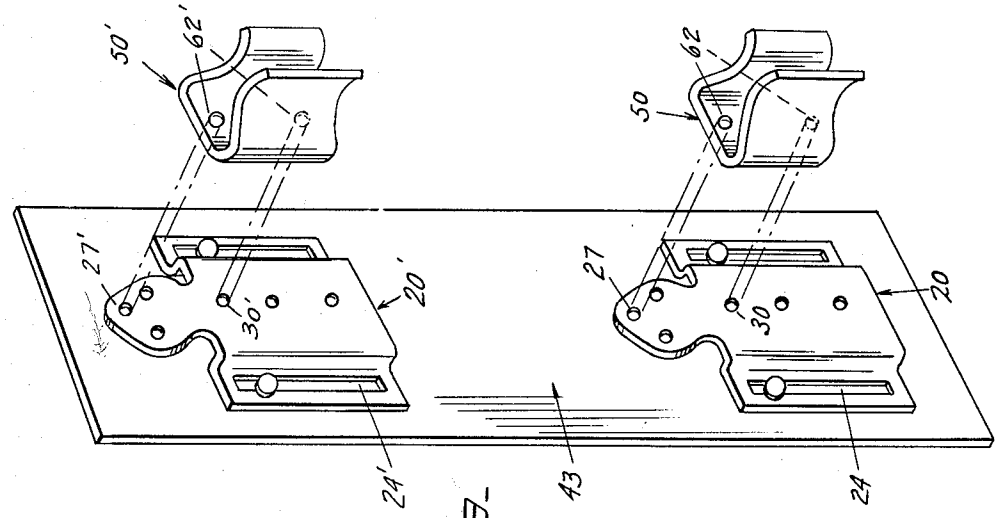


FIG. 8

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UNIVERSAL FUSE ADAPTER

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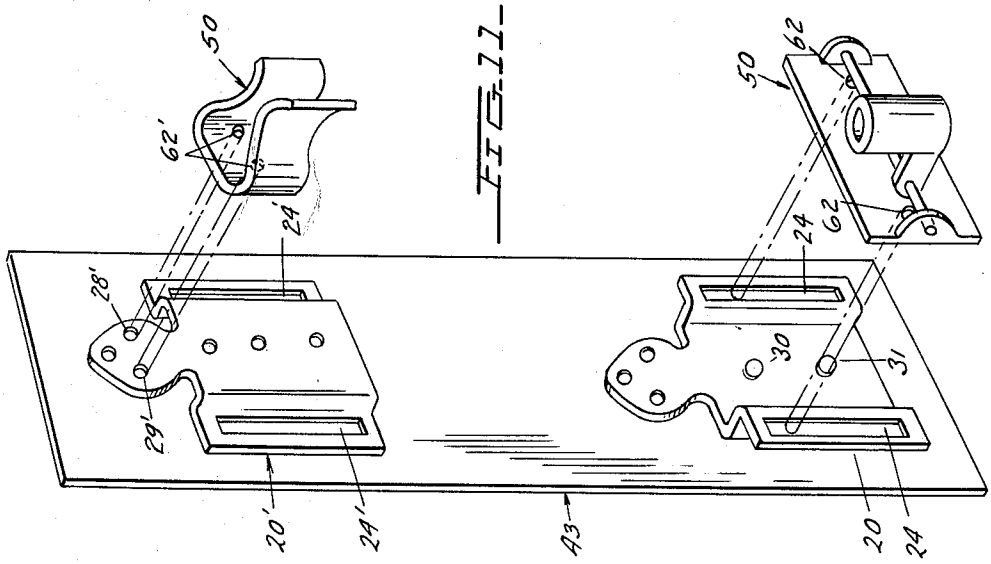


FIG. 11

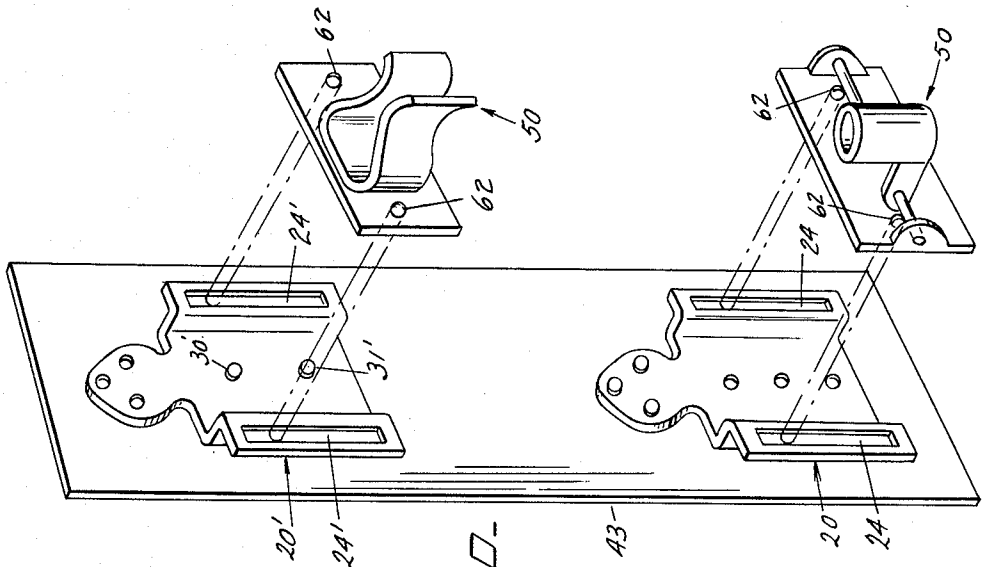


FIG. 10

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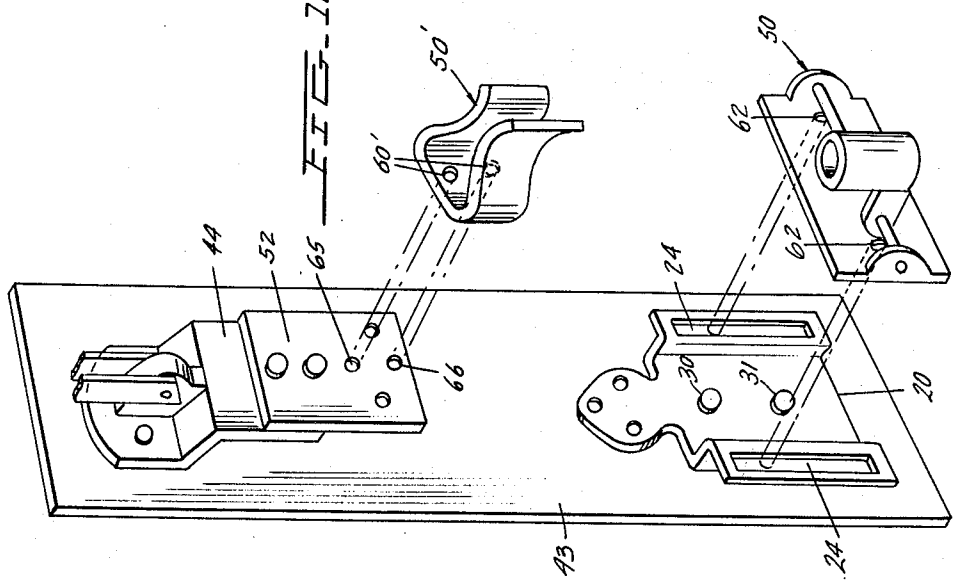
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UNIVERSAL FUSE ADAPTER

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FIG. 12



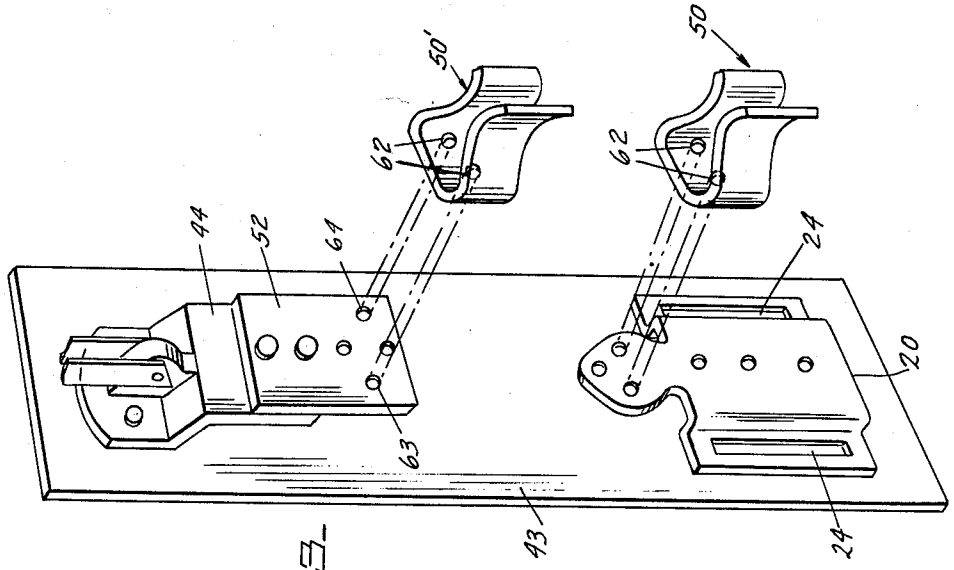


FIG. 13

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United States Patent Office 3,178,538 Patented Apr. 13, 1965

3,178,538

UNIVERSAL FUSE ADAPTER

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Filed Oct. 18, 1960, Ser. No. 63,295
10 Claims. (Cl. 200—133)

This invention relates generally to fuse adapters and more particularly to fuse adapters for use in power fuse assemblies.

Switchgear used in the transmission of electricity requires protection from line faults and overloads and power fuses are often employed for this purpose. Power fuses chosen for any particular installation must have ratings compatible with the maximum current and voltage that the installation can safely handle.

Although many fuses presently being manufactured have similar current-voltage ratings, they quite often differ in over-all dimensions. It was therefore necessary to stock spares of each type of fuse used in a switchgear installation. In addition, a large amount of switchgear presently in use has been designed to accommodate a fuse of specific dimensions or to accommodate a fuse of a specific current-voltage rating while the switchgear may be safely used at ratings well above those of the accompanying fuse designed to be used therewith.

We have provided a novel fuse adapter plate which has a plurality of apertures and is constructed so that the adapter can be used for any length fuse, any diameter fuse, or any special mounting of the fuse. Our novel adapter plate can be used with either side facing the fuse, with either sets of apertures used for securing the fuse thereto, with either end facing away from the fuse, or spaced from another adapter plate a means any deviable distance to accommodate the fuse. Thus our novel adapter plate is so constructed that it can be used in a variety of selective positions and ways depending on the size and dimensions of the fuse.

One object of this invention is to provide a novel means for mounting any one of several types of power fuses to a support.

Another object of this invention is to provide a novel means for mounting power fuses to any one of several types of fuse supports.

Another object of this invention is to provide a novel fuse mounting means which has great mechanical strength.

Still another object of this invention is to provide a novel means for rigidly mounting a power fuse to a support.

The foregoing and other objects and advantages of the invention will appear more fully hereinafter from the consideration of the detailed description which follows, taken together with the accompanying drawings wherein several embodiments of the invention are illustrated. It is to be expressly understood, however, that the drawings are for illustration purposes only and are not to be construed as defining the limits of the invention.

In the drawings, wherein like reference numerals are applied to like elements:

FIGURE 1*a* is a perspective view of a preferred embodiment of the invention.

FIGURES 1*b*, 1*c*, and 1*d* are top, end and side views, respectively, of the embodiment shown in FIGURE 1*a*.

FIGURE 1*e* is a plan view, showing the invention as a flat sheet.

FIGURE 2 is a side view of the invention incorporated into one type of power fuse assembly.

FIGURE 3 is a front view of the assembly shown in FIGURE 2 with the fuse removed.

FIGURE 4 is a side view of the invention shown in another type of power fuse assembly.

FIGURE 5 is a front view of the assembly shown in FIGURE 4 with the fuse removed.

FIGURE 6 is a perspective view of still another type of power fuse assembly incorporating the invention.

FIGURE 7*a* is a perspective view showing the manner in which fuse holders engage a fuse.

FIGURES 7 through 13 are perspective views of power fuse assemblies, each showing the invention mounted in a different manner in order to accommodate fuses and fuse holders of various sizes and configurations.

Referring to FIGURES 1*a* to 1*d*, the device of the present invention comprises a generally U-shaped adapter **20** having a central portion **21** and oppositely disposed legs **22**. The legs **22** are integral with and substantially perpendicular to the central portion **21**. The legs **22** extend or are inclined away from each other, forming flat end portions **23**, each end portion provided with a slot **24**. One edge of the central portion **21** extends beyond the edges **25**, forming a projecting lobe **26**. The central portion **21** and projecting lobe **26** are provided with apertures **27** through **31**. The central portion **21** is provided with a depression **32**, extending partially into the projecting lobe. The purpose of the depression **32** will be readily apparent in the description of the remaining figures.

The adapter may be formed from a unitary piece of sheet material, as shown in FIGURE 1*e*. After being stamped from the sheet material the adapter is bent down along dotted lines **70** and bent up along dotted lines **71**. Depression **32** and slots **24** may be formed during the stamping operation. Apertures **27** through **31** may then be formed by any well known means. This method of producing the adapter greatly reduces its cost.

Referring to FIGURES 2 and 3, an interrupter switch **40** is shown mounted to insulator posts **41** and **42** which are, in turn, mounted to a base **43**. Interrupter switches are well known in the power transmission field, their function being to interrupt current flow, extinguishing any arcing which may occur when the switch is opened. It is desired to have a fuse connected in series relationship with the switch **40** for short-circuit protection of the switch and any other equipment which may be in the same electrical circuit.

The interrupter switch is electrically connected to other switchgear by means of terminals **44** and **45**. One end of a connector bar **46** is mounted to terminal **44**, the other end being mounted to insulator post **47**. A fuse adapter **20** is also mounted to insulator post **47**, the connector bar **46** being sandwiched between the adapter **20** and insulator post **47**. Terminal bar **48** is mounted between insulator post **49** and adapter **20'** in a manner similar to the mounting of connector bar **46**. Adapters **20** and **20'** are mounted, respectively, to insular posts **47** and **49** by means of slots **24** and **24'**. Fuse clips **50** and **50'** are mounted, respectively, to adapters **20** and **20'** by means of apertures **28** and **29** and **28'** and **29'**. Power fuse **51** is rigidly held in place by the gripping force of the fuse clips **50** and **50'**. The slots **24** and **24'** permit adapters **20** and **20'** to be positioned so that fuse **51** is held exactly at its ends.

Although fuse **51** is held rigidly by fuse clips **50** and **50'** for an indefinite period in the position shown in FIGURE 2, necessity for its removal may arise due to "blowing" of the fuse caused by a short circuit or overload conditions. The force exerted upon the fuse **51** by fuse clips **50** and **50'**, in impeding the removal of fuse **51**, is mechanically linked to the projecting lobes **26** and **26'**. An equal force, but opposite in direction, exists when a fuse is being inserted. These two operations place the lobes in danger of becoming bent after repeated use. This is allevi-

ated by the presence of depressions 32 and 32', which greatly increase the section modulus of the projecting lobes thus avoiding any bending. The adapters as used in FIGURES 2 and 3 provide a rigid structure for an interrupter switch in combination with a fuse, which assembly withstands repeated use and is flexible in that a fuse of greater or lesser length than fuse 51 may readily be substituted in its place.

Referring to FIGURES 4 and 5, fuse 51 is shown mounted on base 43 below interrupter switch 40. The need for four insulator posts, as shown in FIGURES 2 and 3, is avoided by use of adapter bar 52. Adapter bar 52 is a rectangular sheet having one of its ends mounted to terminal 44 of switch 40. The opposite end of bar 52 has fuse clip 50' mounted upon it. Adapter 20 is mounted to insulator post 59, terminal bar 60 being sandwiched between adapter 20 and post 59, in addition to avoiding the use of a fourth insulator post, adapter bar 52 places fuse clips 50 and 50' in exact vertical alignment. Adapter bar 52 is substantially thicker than adapter 20 and is able to withstand bending even after repeated use. The adjustable feature is retained since adapter 20 may be positioned anywhere along the length of its slots to accommodate a fuse differing in length from fuse 51.

FIGURE 6 shows a power fuse assembly which does not require a disconnect switch in combination therewith or which may have a disconnect switch mounted upon a support remote from the power fuse assembly. Fuse adapters 20 and 20' are mounted to support 43 by means of slots 24 and 24'. Fuse clips 50 and 50' are mounted, respectively, to adapters 20 and 20'. One end of fuse 51 is inserted into the cylindrical opening in fuse clip 50. The opposite end of fuse 51 is gripped between the arms of fuse clip 50'. To remove the fuse 51, the upper end is pulled away from fuse clip 50'. The fuse travels downward in a clockwise direction, fuse clip 50 acting as a pivot. The other end of fuse 51 may then be removed from the opening in fuse clip 50. The versatility of the adapters as shown in FIGURES 4 and 6 is such that any support means may be used for mounting power fuse assemblies, thus avoiding the necessity for replacing supports, fuse clips and fuses presently in use.

FIGURES 7 through 11 show some of the numerous modes which may be used to mount power fuses to a support.

FIGURE 7 shows adapters 20 and 20' mounted to a support 43 by means of slots 24 and 24'. The projecting lobes point in an upward direction. The apertures 60 and 60' of fuse clips 50 and 50' are in exact alignment with apertures 28 and 29 and 28' and 29' of adapters 20 and 20'. Either adapter or both adapters may be moved up or down so that fuse clips 50 and 50' grip the fuse inserted therein at its end portions, as shown in FIGURE 7*a*. The fuse will be held rigidly in this position. The fuse clips are made of a resilient conductive metal which permits easy insertion and removal of the fuse. The fuse clips retain their shape even after repeated use.

FIGURE 8 shows fuse clips 50 and 50' each having apertures 62 and 62' arranged in vertical array. The fuse clip apertures are in alignment with apertures 27 and 30 and 27' and 30', respectively, of adapters 20 and 20'.

FIGURE 9 shows adapters 20 and 20' mounted to support 43 by slots 24 and 24' such that the lobe of adapter 20 faces downward and the lobe of adapter 20' faces upward. Apertures 28 and 29 and 28' and 29' are in alignment with apertures 62 and 62' of fuse clip 50 and 50'. The configuration of FIGURE 9 is thereby able to accommodate a fuse of greater length than the configurations of FIGURES 7 and 8 may accommodate. It is noted that we have illustrated in FIGURE 9 at the right that the slots 24 and 24' and the apertures 30, 31 could be interchanged on the apapter 20.

In order to mount fuse clips having apertures which are separated by a distance greater than the width of the central portion of the adapter, the mounting of FIGURE 10 is used. Adapters 20 and 20' are mounted to support 43

by the apertures 30 and 31 and 30' and 31'. Apertures 62 and 62' of fuse clips 50 and 50' are in alignment with slots 24 and 24', respectively, of the adapters. In this instance the fuse clips, rather than the adapters, may be positioned anywhere along the lengths of the slots 24 and 24' of the adapters so that the fuse will be engaged by the fuse holders at its ends as shown in FIGURE 7*a*.

FIGURE 11 shows adapter 20 mounted to support 43 by apertures 30 and 31, while slots 24 accommodate fuse clip 50. Adapter 20' is mounted to support 43 by slots 24'. Fuse clip 50 is mounted to the end portions of adapter 20, apertures 62 of fuse clip 50 being in alignment with slots 24 of adapter 20. Apertures 62' of fuse clip 50' are in alignment with apertures 28' and 29' of adapter 20'.

FIGURE 12 shows one manner in which an adapter 20 is used in combination with an adapter bar 52. Adapter 20 is mounted to support 43 by means of slots 24. The apertures 62 of fuse clip 50 are in alignment with apertures 28 and 29 of adapter 20. Adapter bar 52 is mounted to terminal 44 of a disconnect switch of the type shown in FIGURES 4 and 5. The apertures 63 and 64 of adapter bar 52 are in alignment with the apertures 62' of fuse clip 50'.

FIGURE 13 shows another manner in which an adapter 20 may be used to mount a power fuse to a disconnect switch assembly. Adapter bar 52 is mounted in the same manner as shown in FIGURE 12. Adapter 20, however, is mounted to support 43 by means of apertures 30 and 31 in its central portion to accommodate fuse clip 50. The apertures 62 of fuse clip 50 are in alignment with slots 24 of fuse adapter 20.

The specific illustrated embodiments set forth above are exemplary of only a few of the many possible ways that the invention may be used in power fuse assemblies. While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention.

We claim:

1. An adapter for securing any one of a variety of fuse clips to a support comprising, a U-shaped member having a flat central portion, oppositely disposed legs extending substantially at right angles from said central portion, the ends of said legs forming side portions, said side portions each being extended away from and parallel to said central portion; said central portion having apertures suitable for mounting purposes, said apertures lying in the area of said central portion between said legs; each side portion having apertures suitable for mounting said adapter to a support in one of a variety of positions or for mounting a fuse clip thereto in one of a variety of positions, whereby the functions of said apertures of said central portion and said side portions may be interchanged; said central portion being mounted to a support when said side portions are mounted to a fuse clip or said side portions being mounted to a support when said central portion is mounted to a fuse clip; and additional mounting means extending from said central portion.

2. An adapter as defined in claim 1 wherein one edge of the central portion is substantially in alignment with the edges of said legs and the opposite edge of said central portion extends substantially beyond the opposite edges of said legs forming a projecting lobe; said projecting lobe having spaced apertures additionally suitable for mounting purposes, whereby either a support or a fuse clip may be mounted thereto.

3. An adapter as set forth in claim 2, said central portion having an annular depression lying on a line equidistant from the sides of said central portion joining said legs, said depression extending substantially into said projecting lobe, whereby the lobe is used for mounting purposes without danger of bending.

4. A power fuse assembly comprising in combination, a support for mounting electrical switchgear, a selectively

positionable U-shaped adapter having a central portion, oppositely disposed legs extending angularly from said central portion, the ends of said legs being inclined away from each other and being mounted to said support, a fuse clip mounted to said central portion in the area between said legs, a fuse, one end of which is secured within said fuse clip, the elements of said assembly cooperating to provide a rigid mounting for said fuse while being adapted to permit relatively easy removal of said fuse from said clip, said central portion and said ends being substantially flat; said central portion having spaced apertures additionally suitable for mounting purposes; means on said ends for mounting purposes; said ends lying in a plane parallel to said central portion, whereby said fuse clip is adjustably positioned upon said support.

5. The combination as defined in claim 4, said central portion having an annular depression lying on a line equidistant from the sides of said central portion joining said legs; said depression extending substantially into said lobe, whereby the lobe is used for mounting purposes without danger of bending.

6. A power fuse assembly comprising in combination, a support for mounting electrical switchgear, a U-shaped adapter for mounting on said support in a variety of positions and having a central portion, oppositely disposed legs extending angularly from said central portion, the ends of said legs being inclined away from each other; said central portion mounted to said support, a fuse clip mounted to the ends of said legs, a fuse, one end of which is secured within said clip, the elements of said assembly cooperating to provide a rigid mounting for said fuse while being adapted to permit relatively easy removal of said fuse from said clip, said central portion and said ends being substantially flat; said central portion having spaced apertures suitable for mounting purposes; said ends each having a slot suitable for mounting purposes; said ends lying in a plane parallel to said central portion, whereby said fuse clip is adjustably positioned upon said support; one edge of said central portion is substantially in alignment with the edges of said legs and the opposite edge of said central portion extends substantially beyond the opposite edges of said legs, forming a projecting lobe; said lobe having spaced apertures suitable for mounting purposes.

7. The combination as defined in claim 6, said central portion having an annular depression lying on a line equidistant from the sides of said central portion joining said legs; said depression extending substantially into said lobe, whereby the lobe is used for mounting purposes without danger of bending.

8. A power fuse assembly comprising in combination, a support for mounting electrical switchgear, first and second U-shaped adapters for mounting on said support in a variety of positions and each having a central portion, oppositely disposed legs extending angularly from said central portion, the ends of said legs being inclined away from one another, each of said legs having an elongated slot, the ends of said first adapter being adjustably mounted to said support, the ends of said second adapter being adjustably mounted to said support a spaced distance apart from said first adapter, said central portion having a plurality of openings for receiving a fuse clip in one of a variety of positions, first and second fuse clips being selectively mounted, respectively, to the central portions of said adapters, a fuse, opposite ends of which are rigidly gripped by said first and second clips, the elements of said assembly cooperating to provide a rigid adjustably positionable fuse mounting, while being adapted to permit relatively easy removal of said fuse.

9. A power fuse assembly comprising in combination, a support for mounting electrical switchgear, first and second U-shaped adapters for mounting on said support in a variety of positions and each having a central portion, oppositely disposed legs extending angularly from said central portion, the ends of said legs being inclined away from one another, each of said legs having an elongated slot, said central portion of each adapter having a plurality of openings for mounting said adapter to said support in one of a variety of positions, the central portion of said first adapter being adjustably mounted to said support, the central portion of said second adapter being selectively mounted to said support a spaced distance apart from said first adapter, first and second fuse clips being adjustably mounted, respectively, to the ends of said first and second adapters by means of said elongated slots, a fuse, opposite ends of which are rigidly gripped by said first and second clips, the elements of said assembly cooperating to provide a rigid adjustably positionable fuse mounting, while being adapted to permit relatively easy removal of said fuse.

10. A power fuse assembly comprising in combination, a support for mounting electrical switchgear, first and second U-shaped adapters for mounting on said support in a variety of positions and each having a central portion, oppositely disposed legs extending angularly from said central portion, the ends of said legs extending angularly from said central portion, the ends of said legs being inclined away from one another, each of said ends having an elongated slot, said central portion of each adapter having a plurality of openings for mounting said adapter to said support in one of a variety of positions, the central portion of said first adapter being selectively mounted to said support, the ends of said second adapter being adjustably mounted to said support by means of said slots a spaced distance apart from said first adapter, a fuse clip being adjustably mounted to the ends of said first adapter by means of said slots, a second fuse clip being selectively mounted to the central portion of said second adapter, a fuse, opposite ends of which are rigidly gripped by said first and second clips, the elements of said assembly cooperating to provide an adjustably positionable rigid fuse mounting, while being adapted to permit relatively easy removal of said fuse.

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MAX L. LEVY, *Examiner.*