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Rabie

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[54] **TRAFFIC CONTROL BOX ASSEMBLY HAVING A FIXED BACK PANEL AND A MAIN HOUSING DETACHABLY HINGED THERETO**

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[52] **U.S. Cl.** **317/99,** 317/120, 340/84

[51] **Int. Cl.** **H02b 5/02**

[58] **Field of Search** ..... 340/22, 74, 84, 119; 174/45 R, 59; 317/99, 118, 120, 122

[56] **References Cited**

UNITED STATES PATENTS

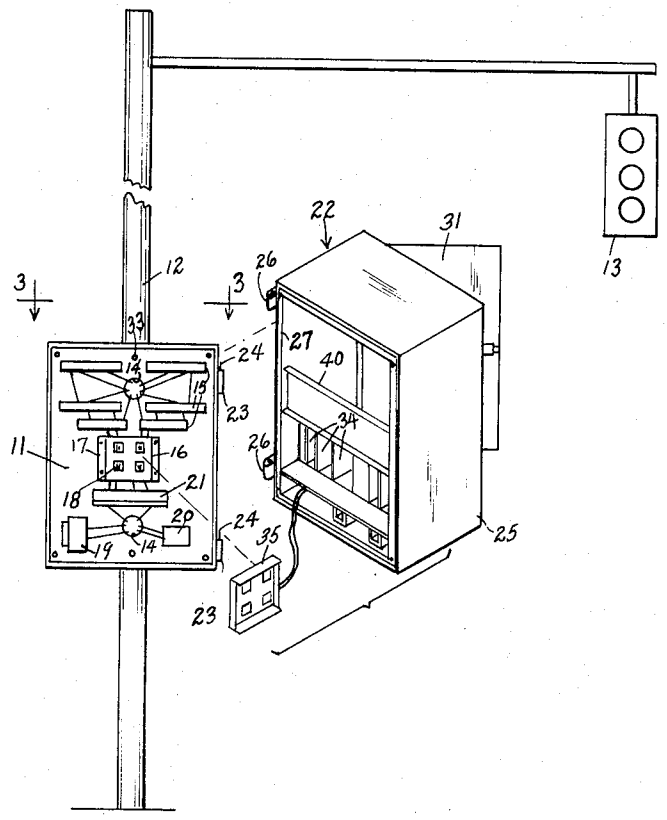
3,624,269	11/1971	Latta	174/45 R
3,390,304	6/1968	Scott et al.	340/83
3,369,331	2/1968	Deskey et al.	340/22
2,941,185	6/1960	Mulliken	340/84
3,745,565	7/1973	Daines	317/120
3,585,456	6/1971	Phillips, Jr.	317/120

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Assistant Examiner—Gerald P. Tolin
Attorney, Agent, or Firm—Herman L. Gordon

[57] **ABSTRACT**

A traffic control box assembly consisting of a back panel permanently secured to a pole, with the field wiring terminating thereon at terminal strips and at a multiple-terminal female socket unit. The major part of the control system is contained in a main housing having vertically aligned hinge loops at a rear corner, the hinge loops being engageable on upstanding hinge pins at one side edge of the back panel, so that the main housing is hinged to but is readily removable from the back panel. The portion of the control system in the main housing is provided with a multiple-pin male plug unit which mates with the female socket unit to establish the required circuit connections. Normally the main housing is bolted to the back panel, but when it must be removed for servicing, it is unbolted and disengaged from the back panel, and may be immediately replaced by an operative substitute assembly. In an alternative form, the main housing is mounted on a horizontal support panel from which it can be detached for immediate replacement by an operative similar assembly.

8 Claims, 10 Drawing Figures



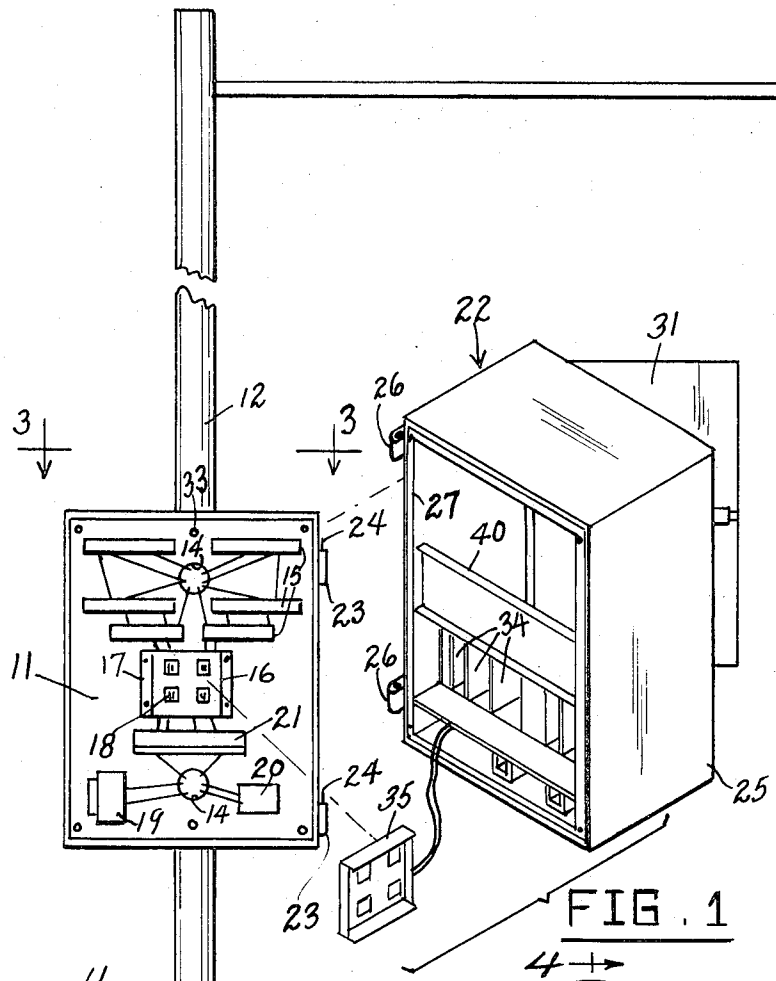


FIG. 1

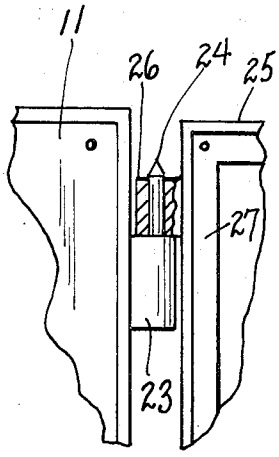


FIG. 2

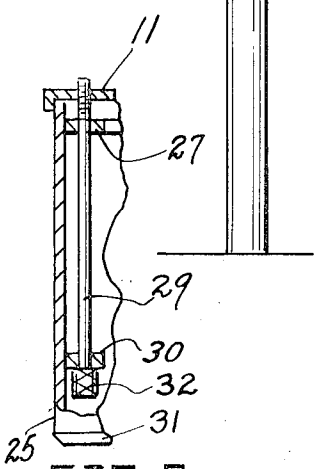


FIG. 3A

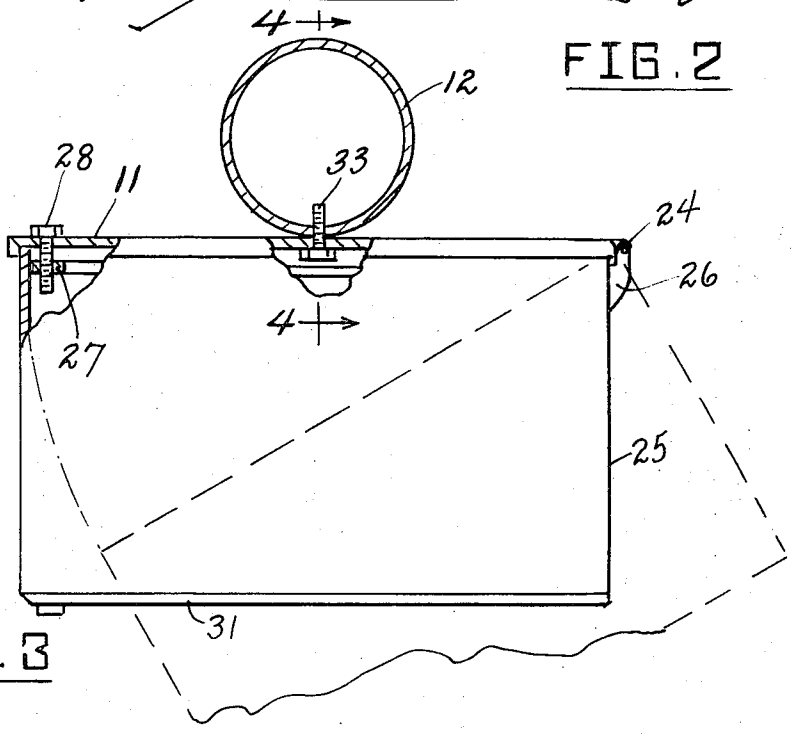


FIG. 3

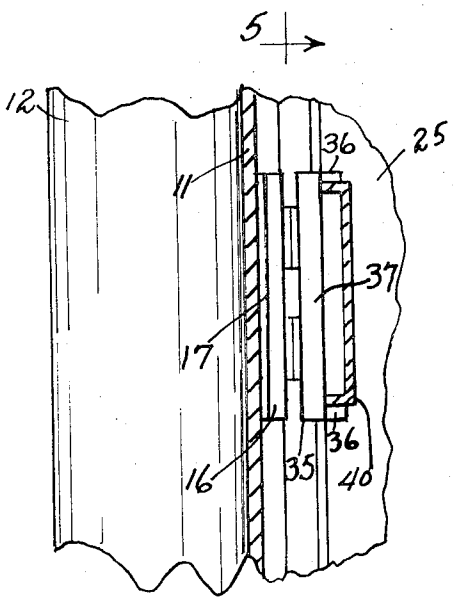


FIG. 4

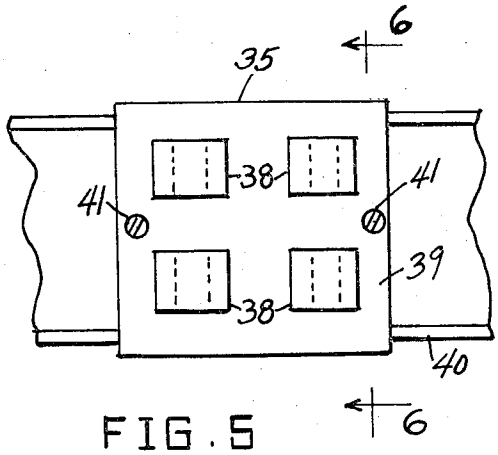


FIG. 5

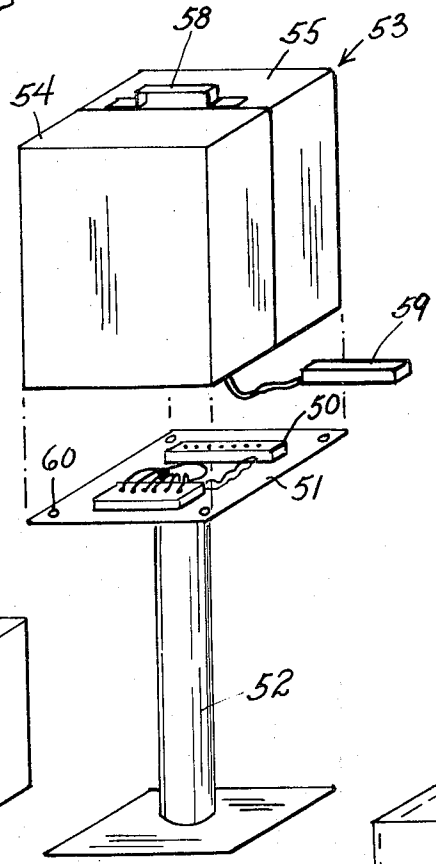


FIG. 7

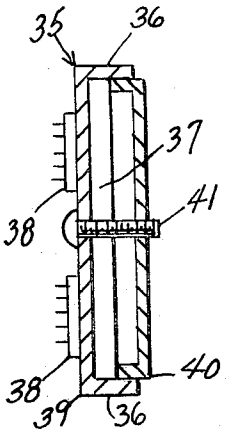


FIG. 6

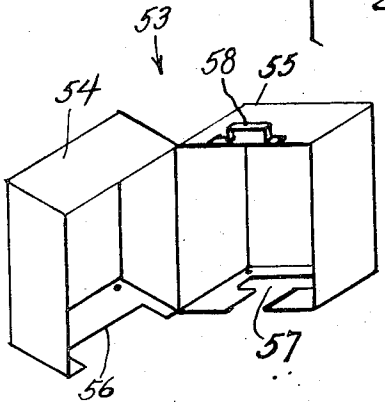


FIG. 8

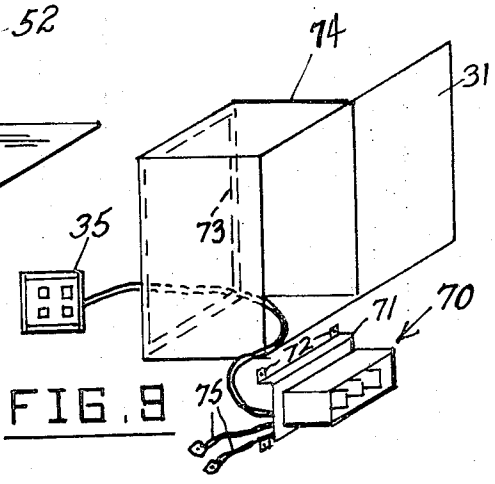


FIG. 9

TRAFFIC CONTROL BOX ASSEMBLY HAVING A FIXED BACK PANEL AND A MAIN HOUSING DETACHABLY HINGED THERETO

This invention relates to systems for housing electrical equipment, and more particularly to traffic control boxes.

A main object of the invention is to provide a novel and improved housing assembly for traffic control equipment, such as at an intersection having traffic directional lights, the assembly being such that the major portion thereof, containing components which are likely to fail, may be quickly and easily removed and replaced by a substitute assembly, so that there is minimum interruption to normal traffic flow, and so that the defective assembly may be repaired under shop conditions rather than under field conditions.

A further object of the invention is to provide an improved traffic control box assembly wherein the main components of the assembly are housed in a quickly detachable cabinet structure and wherein the components are connected to the field wiring by plug and socket means which can be readily disconnected when a failure occurs requiring replacement or repair of the main components, and whereby a substitute cabinet structure containing such main components can be quickly and easily installed, the assembly comprising relatively simple mechanical parts, being inexpensive to fabricate, being easy to handle, providing an efficient weatherproof enclosure for the electrical components of the assembly, providing reliable and secure electrical connections, and greatly reducing interruptions to normal traffic flow when servicing of the traffic control equipment is required.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIG. 1 is a somewhat diagrammatic pictorial view of a typical traffic control box assembly according to the present invention showing the main housing portion detached from the permanently installed back panel of the assembly.

FIG. 2 is an enlarged fragmentary elevational view, partly in cross-section, of one of the separable hinge connections between the detachable main housing and the fixed back panel in the embodiment of FIG. 1.

FIG. 3 is an enlarged horizontal cross-sectional view taken substantially on the line 3—3 of FIG. 1, with the main housing in normal locked relationship with respect to the fixed back panel.

FIG. 3A is a fragmentary horizontal cross-sectional view of a portion of an assembly similar to that shown in FIG. 3 but showing an alternative means for fastening the main housing to the back panel.

FIG. 4 is an enlarged fragmentary vertical cross-sectional view taken substantially on the line 4—4 of FIG. 3.

FIG. 5 is a fragmentary vertical cross-sectional view taken substantially on the line 5—5 of FIG. 4, but showing a modification.

FIG. 6 is an enlarged vertical cross-sectional view taken substantially on the line 6—6 of FIG. 5.

FIG. 7 is a perspective view diagrammatically showing a modified form of improved traffic control box assembly according to the present invention.

FIG. 8 is a perspective diagrammatic view of the main housing of FIG. 7, shown in open position.

FIG. 9 is a diagrammatic perspective view illustrating another modification of the main housing assembly of FIG. 1 in accordance with the present invention.

In many types of traffic control systems, electrical components associated with the system are enclosed in a weather-proof cabinet located near an intersection. The box or cabinet is generally permanently attached to a pole, usually the pole employed to support the associated traffic light assembly.

Due to the fact that traffic is becoming increasingly congested, more electrical components are required in a central system, and these components may be parts of subsystems and may comprise relatively complex items, such as lead switches, vehicle detection elements, timers, monitor devices, and the like. Each one of these relatively complex devices is subject to failure, and therefore may cause delays and/or illegal hazardous displays at the intersection, and ordinarily such emergency conditions will continue until the source of the failure can be located and repaired by a field servicing crew working at the location of the defective control assembly.

A main purpose of the present invention is to minimize the delay and confusion at an intersection caused by failure of a control component, by enabling the defective control assembly to be immediately replaced by a substitute assembly, restoring the intersection to its normal condition, while the defective assembly may be removed to a suitably instrumented repair or service shop for analysis and repair. The substitute replacement system may be either identical to the one requiring repair or may be merely a temporary subsystem adequate to control the lights at the intersection with compatible prearranged interface connection means relative to the original system. Thus, the present invention contemplates the use of a removable cabinet structure containing the critical components most subject to failure in the field, with simple plug-type interconnections between the fixed permanent components and the removable components of the system. As will be apparent, by substituting a replacement or temporary assembly for the defective assembly, the intersection may be restored to normal operation in a few minutes, without being subject to the added cost of a policeman to control traffic while the defective system is being analyzed and repaired.

Furthermore, it will be understood that with the advent of solid state circuitry, a system can be better analyzed and repaired in a laboratory with proper test equipment rather than in the field. The time required for repair will obviously be shortened if the repair can be made in a properly equipped laboratory, thereby reducing the overall maintenance cost associated with the equipment.

With previous types of control equipment, large fixed housings were required because of the large bulk and weight of the electrical components. Due to the reduction in size of components and subsystems permitted by modern solid state components, practically all types of traffic systems, from fixed-time to 12-phase actuated systems to computer-controlled traffic systems, can be packaged to fit into small removable cabinets.

Referring to the drawings, FIG. 1 illustrates a typical traffic control box assembly according to the present invention. In this assembly a rectangular back panel

member 11 is permanently secured to a hollow traffic light pole 12, as by bolts 33, with the field wiring, including power supply conductors and wiring associated with the traffic light assembly 13, being contained in the pole and terminating at the back panel 11, for example, through apertures 14, 14 provided in the back panel. The back panel carries terminal strips 15 and other relatively rugged components 19, 20 and 21 comprising items of a type not likely to fail in ordinary service or to require sudden repair or replacement. Said back panel is also provided with a multiple female socket assembly 16 which may comprise a supporting channel-shaped bracket having side flanges 17, 17 which are secured to back panel 11, the bracket carrying a plurality of forwardly facing multiple female sockets 18. The field wiring is interconnected as required with the permanently mounted components 19, 20, 21, and with the female sockets 18 to define an interface for connection to the removable and replaceable portion of the traffic control box assembly, shown generally at 22.

Back panel 11 is provided at one vertical side edge thereof with a pair of vertically spaced hinge brackets 23, 23, having aligned upstanding hinge pins 24, 24. The removable and replaceable portion 22 of the traffic control box assembly comprises a rectangular box or cabinet 25 having vertically aligned hinge sleeves 26, 26 at one side edge of its open back, the sleeves 26, 26 being adapted to respectively receive the pins 24, 24 to provide a hinged connection between back panel 11 and cabinet 25, as shown in FIG. 2.

Cabinet 25 is provided with an inwardly extending back flange 27 which may be tapped to receive fastening bolts 28 engaged through back panel 11 in the manner shown in FIG. 3 to normally lockingly secure the cabinet to the back panel in closed operating position, the fastening bolts being readily removable when the cabinet is to be swung to an open position, such as that shown in dotted view in FIG. 3, wherein the cabinet may be detached from back panel 11 by vertically lifting it to disengage it from the hinge pins 24.

Alternatively, as shown in FIG. 3A, the cabinet may be removably secured to back panel 11 by employing long fastening bolts 29 engaged through a front internal flange 30 and extending through apertures in rear flange 27 and threadedly engaged with back panel 11. The cabinet 25 has a suitably latched hinged front door 31 which may be opened to provide access to the interior of the cabinet and thus to the knurled heads 32 of fastening bolts 29.

The parts of the traffic control assembly other than those permanently mounted on back panel 11, and including those most likely to fail under normal service conditions, are carried in the cabinet 25, as for example on circuit boards 34, or the like, and are operatively connected to the permanently mounted portions and the field wiring by means of a male interface multiple plug assembly 35 adapted to mate with the fixed female socket assembly 16.

The male plug assembly 35 comprises a generally rectangular box-like main body 39 having parallel top and bottom flanges 36, 36 and shorter vertical side flanges 37, 37. The multiple-pin male plug elements 38 are mounted on the main wall of body 39 in positions to register with the female sockets 18 of the female socket assembly 16.

A rearwardly facing channel bar 40 is transversly mounted and rigidly secured in the rear portion of cabinet 25 and is of a height adapted to closely fit between the top and bottom horizontal flanges of plug body 39. The channel bar 40 is mounted in cabinet 25 in a position such that the channel bar will interengage with the male plug assembly 35 when the plug assembly 35 is plugged into the female socket assembly 16 in the manner shown in FIG. 4, namely, with the top and bottom flanges of the channel bar in transverse abutment with the relatively short vertical flanges 37 of plug assembly 35, holding the male plug assembly in mated relationship with the female socket assembly when the cabinet is bolted to the back panel 11 in the manner above described.

As shown in FIGS. 5 and 6, the male plug assembly 35 may be fixedly secured to the channel bar 40 in proper mating position by means of a pair of bolts 41, 41 extending through the side marginal portions of the main wall of body 39 and threadedly engaged with the web of channel bar 40. This automatically registers the male plug assembly 35 with the female socket assembly 16 and provides the required interface connections when the cabinet 25 is bolted to back panel 11 with the hinge loops 26, 26 engaged over the hinge pins 24, 24.

When the fastening bolts 41, 41 are not used, the interengagement and disengagement of plug assembly 35 with and from the female socket assembly 16 is performed manually.

When failure of a component in the traffic control box assembly 22 occurs, the cabinet 25 is unbolted from back panel 11 and is swung outwardly. With male plug assembly 35 disengaged from female socket assembly 16, the cabinet 25 is lifted off the hinge pins 26, 26 and a substitute assembly 22 is mounted on the hinge pins, swung to closed position and bolted to back panel 11. If bolts 41, 41 are not employed, the male plug assembly of the substitute unit is manually interengaged with female socket assembly 16 prior to swinging the cabinet to closed position. When the cabinet is swung to closed position, this provides the mechanical interlock shown in FIG. 4. If bolts 41, 41 are employed, said mechanical interlock will be accomplished automatically.

Referring now to FIGS. 7 and 8, another form of the present invention is illustrated, wherein the permanently installed parts and a female socket assembly 50 interconnected with the field wiring are mounted on a horizontal bottom panel 51 provided on the top end of a hollow vertical supporting post 52. The replaceable portion of the traffic control box assembly, designated generally at 53, comprises a cabinet having the vertically hinged segments 54 and 55 appropriately notched out at their bottom wall portions, as shown at 56 and 57, to receive the components carried on bottom panel 51. One of the cabinet segments 55 is provided with a handle 58. The replaceable assembly 53 is provided with an interface male plug assembly 59 adapted to mate with the female socket assembly 50. The cabinet segments 54, 55 may be locked to the bottom panel 51 by means of removable bolts engaged through apertures 60 in panel 51 and threadedly engaged with the bottom wall portions of the hinged cabinet segments 54, 55.

FIG. 9 discloses a further modification of the form of the invention of FIG. 1, wherein the replaceable por-

tion or subsystem of the traffic control system, shown at **70**, is carried on a channel bar **71** provided with fastening tabs **72** which are apertured to enable the channel bar to be detachably secured to a rear internal flange **73** in the vertically mounted protective housing **74** which is secured to the back panel **11**. The assembly **70** is provided with a male plug unit **35**, as previously described, interengageable with the female socket assembly **16** on the back panel. The channel bar **71** provides a mechanical interlock with the male plug unit **35** in the same manner as above described.

The channel bar **71** may be detachably secured to the flange **73** by employing suitable removable fasteners, such as screws, quickremovable quarter-turn fasteners, or the like.

The channel bar member **71** is removable from the box **74** with all its terminal strips, additional subsystem cables **75**, and mechanical structure for power switches. This allows simplicity of manufacture, easy subsystem testing, and readily permits easy changes of internal parts in the system.

While certain specific embodiments of traffic control box assemblies have been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. In a traffic control system, vertical support means containing field wiring leading to traffic lights, a back panel member vertically fixedly secured to said support means, means fixedly secured on said panel member defining one segment of a detachable-connection interface for said field wiring, a cabinet associated with said panel member, means in said cabinet comprising traffic control circuit components, cooperating detachable vertical hinge means at a side edge of the panel member and a side edge of the cabinet allowing the cabinet to be removed by lifting it vertically when it is swung away from the panel member, means electrically connected to said traffic control circuit components and defining the remaining segment of the detachable-connection interface, means on the cabinet holding said segments in interconnected relationship when the cabinet is in closed relationship with the panel member, and means to detachably fasten said cabinet to said panel member in said closed relationship.

2. The traffic control system of claim **1**, and wherein said holding means comprises mechanical interlock means on the cabinet lockingly engaging said remaining segment and holding said segments in interconnected relationship.

3. The traffic control system of claim **2**, and wherein said means defining the one segment of the detachable-connection interface comprises female socket means connected to the field wiring and said means defining the remaining segment comprises male plug means connected to said traffic circuit control components.

4. The traffic control system of claim **2**, and wherein the cabinet and panel member are provided with a plurality of vertically spaced sets of detachable interengageable vertical hinge elements.

5. The traffic control system of claim **4**, and wherein said hinge elements comprise a plurality of vertically aligned, vertically spaced upstanding pin members on a side edge portion of the panel member and vertically aligned hinge loops on a side edge portion of the cabinet engageable on said pin members.

6. The traffic control system of claim **5**, and wherein said interlock means comprises spaced parallel flanges on said remaining segment and an interlock member mounted on said cabinet and being closely receivable between said flanges when the cabinet is in closed position relative to said panel member.

7. The traffic control system of claim **6**, and wherein said remaining segment is of box-like shape and has additional flanges, said interlock member comprising a rearwardly-facing channel member mounted in the cabinet and transversely abutting said additional flanges when the cabinet is in said closed position.

8. The traffic control system of claim **7**, and wherein said rearwardly-facing channel member is detachably secured in the cabinet.

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